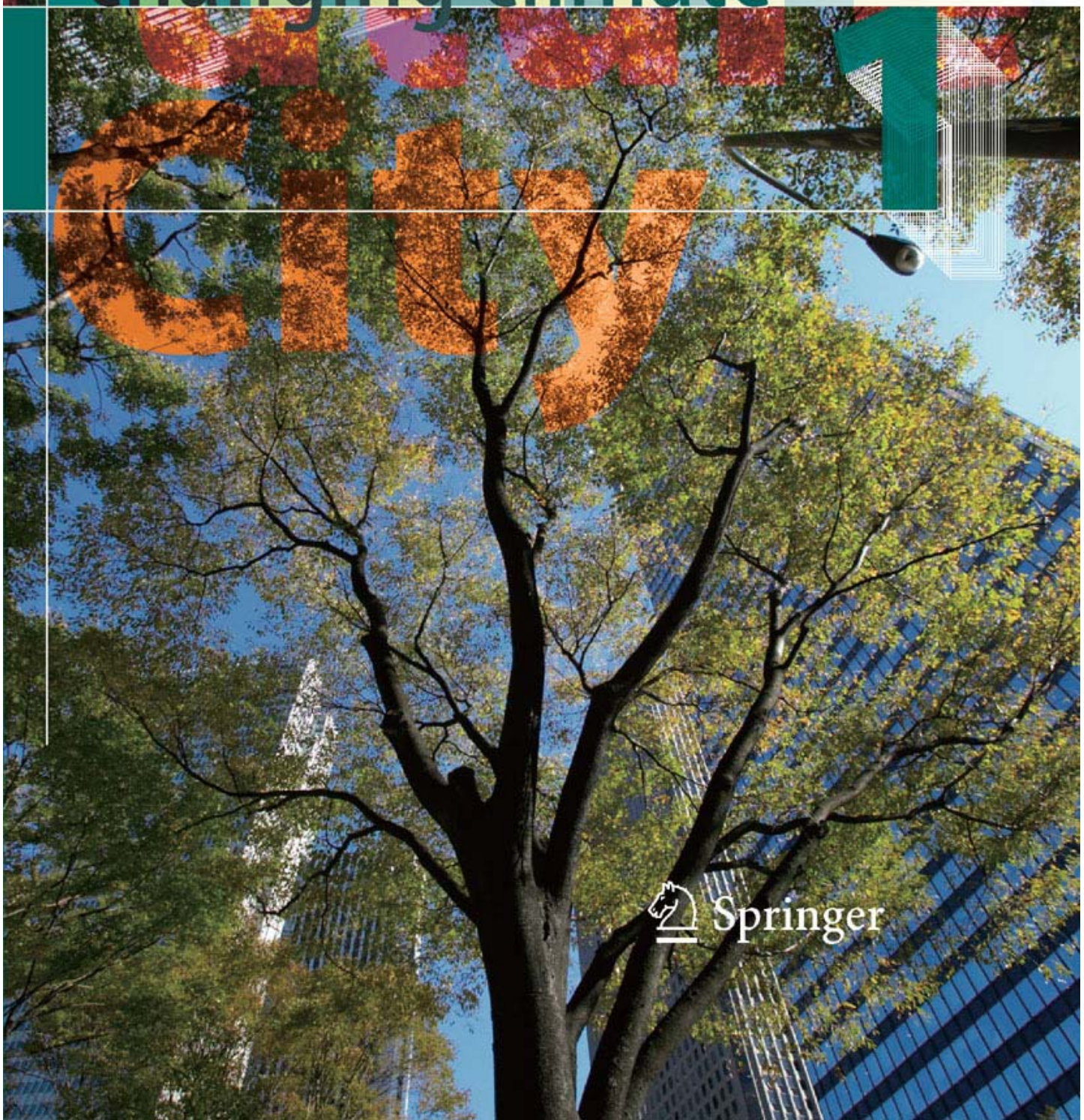
Paul F. Downton

Ecopolis: Architecture and cities for a changing climate



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Gro Brundtland's now classic definition of sustainable development says that it 'meets the needs of the present without compromising the ability of future generations to meet their own needs.' Ecopolis is about much more than pragmatic responses to resource shortages, the careful management of energy, and achieving sustainability, although it includes these things. Ecopolis is about the future, and the future is already here. Climate change is already a reality – I'm finishing this manuscript just as Adelaide comes to the end of a heatwave of 15 consecutive days over 35°C which, an atmospheric scientist has just informed us, is a once in a 3,000 year event.[6]

Too often, the future is seen as another place, separated from the present by some kind of gulf or chasm that we have to miraculously cross. In truth, the future is embedded in the now. Everything we do now is part of shaping it. Most of the buildings and people who will be in the future of, say, 2050, are already with us. Gro Brundtland's future generations are already amongst us, we are already answerable to them, and we cannot afford to compromise any of their abilities.

Paul F Downton
Adelaide, March 2008

[6] "Adelaide's 15-day heatwave was a once in 3000 year event, an atmospheric scientist says. Adelaide has sweltered through 15 consecutive days above 35 degrees – the longest heatwave recorded in any Australian capital city. The heatwave ended today, with a milder 29 degrees maximum forecast. Atmospheric scientist Warwick Grace said the 15-day heatwave had a .03 per cent of occurring. "The odds are about the same as tossing 12 coins and getting all heads or all tails," Dr Grace said today." (Indaily, the on-line service of The Independent Weekly, 18 March 2008).

Part I
Propositions, Theory and Practice

Propositions – Epistemology – Perspectives – Projects

I. People, Places and Philosophies

Increasingly across the globe people have come to live in big cities. And it is in those cities many live that mobile and spatially extensive way of life which is characteristic of modernity. Given this, it is research and action designed to make this modern and urban way of life more environmentally sustainable which will contribute most to the cause of sustainability. . . The real challenge facing us is not one of building eco-villages, but of making the modern city, and the way of life lived in it, environmentally sustainable

(Barton 2000 p.28)

Civilisation, with its two faces of urbanism and agriculture, has transformed the planet. Accelerated by fossil-fueled industrialism, human activities have dramatically affected the world's ecosystems. Changing weather patterns threaten the shape of our coastlines and the stability of our human institutions. We are being presented with the challenge of sustaining civilisation in the face of unprecedented rates and types of change. And therein lies the conundrum. The making of cities and all that it entails is damaging the world to the point of threatening our existence as a species, yet city-making lies at the heart of civilisation. We need cities to survive yet they are killing us.

The Pattern that Connects

In the past few years there has been a great increase in the number of books dealing with the topic of the sustainable, green, or ecological city. They all contain useful information and ideas and generally follow a similar thematic path that deals with the various aspects of urbanisation and environmental impact which are now familiar territory to all but the most casual reader in the field. What is missing, I believe, is any concerted attempt to identify the active linkages between all those aspects; such linkages are merely implied by the fact that the city contains them all. There is a lack of any overarching theoretical construct to help pull the pieces together and make, perhaps, more sense. Exceptions do exist, notably Paolo Soleri's inimitable and profoundly influential 'City in the Image of Man'. My book contains many ideas, but few of them are mine. The basis of this attempt to set out a theoretical framework is the simple observation that even if there is no city as yet worthy of the name, most, if not all, the essential ideas we need to create ecological cities

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already exist. I have tried to find the essential points of connection between ideas that seem to carry particular value for the mission of making ecological cities in the terms defined by the Ecopolis Propositions. I have been looking for the points of connection in what Gregory Bateson might have called 'the pattern that connects'. The propositions describe cities and their relationship to both the biosphere and human culture and lead to a concise definition of the *purpose* of cities – which is to create and manage complex living systems that are the primary habitats for human survival.

Some of the ideas are well represented here, some less so; I ask that you, the reader, forgive any perceived shortcomings in the representation of any particular theorist or set of ideas and use the reference here as their point of connection with the original, more complete expression of those ideas. Likewise, you may find that there are writers and ideas not represented here that you feel should be.

Part of the Ecopolis theory is that anything which fits the propositions can be incorporated in the theory; it is intended as the basis of an evolving body of knowledge that is purposefully directed towards the creation and management of complex living systems that are the primary habitats for human survival.

We have to find ways of making cities that sustain both our human culture and the planet. We need to construct new kinds of urban ecosystems and deal with substantial, systemic changes in the way we live. The solution to the problem of civilisation is civilisation, but our definition of what civilisation means has to be carefully and consciously expanded to encompass a new, more vital understanding of the purpose of building and our relationship to the biosphere. I think that this is an evolutionary imperative and have called the connected pattern of ideas 'Ecopolis'. It is a word that appears to have been concocted in a number of places and times. In Europe, the concept of Ecopolis has appeared in urban ecology programs in Finland (Koskiaho 1994) and the name appears to have risen independently as the rubric of a landscape architects' conference in New Zealand in 2004. It is the name of a Russian research program which builds on the work of one of the pioneers of ecology and in Chinese urban research "The term 'Ecopolis' is used to imply an ecologically sound city or large urban area and its immediate periphery in sectors of cities and towns." (SCOPE 2005). This Australian 'Ecopolis' was first published in a paper I presented at the Ecopolitics IV Conference of 1989. The concept as I have presented it has always included the recognition that urbanisation and human activity is a major force in shaping the biosphere and that it needs to be *consciously* directed.

In the following pages I hope to demonstrate that the solution to our problem of city-making lies in the way we make cities, that we already have the necessary means and knowledge but we need a better sense of how the pieces all connect and must learn how to put it all together a little differently.

In the first part of this book I present the Ecopolis Propositions, discuss an epistemology for urban ecology and review some of the theories and practice in the field. I identify people, places and philosophies that have particular relevance to the Ecopolis thesis and include brief reviews of existing theories of architecture and the ecology of human settlement which either explicitly or implicitly possess an

ecocity agenda[1]. I briefly describe projects that incorporate relevant principles and practices, including some in which I have had a leading role, testing the propositions and demonstrating practical outcomes.

Chapter 1 presents the 'ground plan' in which I introduce the idea of Ecopolis and set out a series of propositions that describe the purpose of cities and the essential determinants of ecological cities. These propositions emphasise the importance of culture as the means by which knowledge is stored and transmitted and the need to consciously construct a modern culture for the development of an ecological civilisation. I introduce the idea of cities as 'engines of survival' in an era of unprecedented ecological disruption. Popular culture is identified as an important means of distributing and embedding key ideas in society to facilitate change and the concept of urban/cultural fractals is proposed as a means to catalyse adaptive activity through the creation of demonstration projects which contain the essence of Ecopolis in microcosm.

I explore some epistemology for the evolving field of urban ecology in Chapter 2 – looking at the organisation of knowledge that is typical of architecture and planning and finding it wanting, failing to provide anything other than superficial analyses and syntheses when addressing the issue of sustainability. I propose that a cybernetic approach offers the basis of an epistemology that might make a coherent relationship between architecture, city-making, ecology and the life sciences. An outline for an epistemology for urban ecology is proposed that is built around the ideas of adaptive response and connectivity across and through traditional disciplines of knowledge and the fluid forms of popular culture.

Chapter 3 takes us in pursuit of the idea of an ecological design epistemology evolving from, or at least incorporating, powerful ideas about city-making, ecosystems, regionalism and architecture that have been extant for decades. Here, I review part of the history that has led to current ideas about the ecological design of buildings and cities. I briefly discuss how different points of view provide both a rich source of ideas but also some contradictory opinions about what sustainability is in urban architecture and design. I propose that architectural and planning ideas need to be embedded in an ecological framework to provide the basis for integrating the cumulative knowledge that is presently dispersed. A critical approach to regionalism is a way to consciously integrate the making of buildings with the ecology of their cultural and physical landscape.

In Chapter 4 an attempt is made to discern the type and extent of the influence of key theorists and practitioners. Its purpose is to show how and why particular people and ideas have influenced the development of the Ecopolis idea. I classify as 'urban ecologists' or 'ecocity theorists' those whose work contains sufficient concern with urban systems, community affairs, ecosystem function, design issues

[1] With its many diverse issues, including, for example: water management, energy systems, air quality, waste and resource management, construction materials selection and use, food security, biological systems design, habitats for non-human species, disease vectors and amelioration, aesthetics, urban design, place making, bioregionalism, geomancy, spirituality, the role of professionals, gender, education, civil liberties, civics, competition, cooperation, and the role of community.

and their inter-relationships, that they are clearly operating in the realm of ecocity theory. The categories I have employed are intended to identify some of the patterns of connectivity that inform ecocity ideas.

This review of theoretical frameworks is followed in Chapter 5 with some discussion about relationship of perception and aesthetics to ecology and the built environment. Despite the increasing number of texts worldwide dealing with sustainability and urbanism, there are very few published designs for ecological cities. There are a small number of examples of plans for parts of cities designed on ecological principles and there are several ecovillage plans. By accepting a broader definition of ecocity than the one proposed for Ecopolis, I have provided examples to illustrate the diversity of form and expression in the ecological design of cities. I consider the role of aesthetics in communicating information and draw attention to the culturally generated, socially dependent nature of aesthetics but also touch on the idea that we have certain aesthetic preferences 'hard wired' into our brains which are manifest in the phenomenon of biophilia.

Although Europeans are not strongly represented in the chapter on relevant theorists, many of the most 'ecological' places, in the terms favoured by this book, are in Europe. Chapter 6 provides a review of attempts at sustainable planning and development in New Urbanist, social activist and ecovillage environments in Europe and America. It then shifts focus to the developing world to discuss Curitiba and Calcutta as examples of urbanisation that display certain characteristics of ecocity function (although not necessarily as a result of ecocity precepts). Calcutta is compared with Curitiba in Brazil, a city that calls itself 'ecological' and brief mention is made, for comparative purposes, of Adelaide, South Australia.[2] Curitiba is receiving international acclaim as a prototypical ecocity although there are a number of aspects of ecocity design, development and maintenance that are not addressed in a manner likely to ultimately support its definition as a 'true' ecocity. This is discussed. These examples are selected on the basis of Calcutta being a quintessential third world city, Curitiba being the first city of any size to identify itself as an 'ecocity', and Adelaide because it represents an almost cartoon-like manifestation of a modern sprawl city – the antithesis of the compact city form favoured by ecocity advocates. In a section on England's rural urbanism I trace part of the conceptualisation of Ecopolis back to some early formative work I undertook on 'anti-Modernist' urban design and theory; the chapter concludes with a brief overview of Masdar in the UAE and ecocity projects in China.

I describe the development processes and results of three Australian ecocity projects in Chapter 7. This includes a summary history of the non-profit group Ur-

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[2] I know something of these cities as a participant in international conferences that dealt with the subject matter of this thesis; Adelaide was host to EcoCity 2, the Second International Ecological City Conference, Curitiba was host to EcoCity IV, and Calcutta hosted the International Conference on Architecture of Cities for which my 'Charter of Calcutta' was drafted and adopted in the formal closing session. This 'charter' has been informally adopted by various individuals and organisations since its dissemination in the early 1980s and has achieved a kind of manifesto status as a 'pro-city' environmental summary (see Section 10.2).

ban Ecology Australia which I co-founded in 1991 and which, with my practice of Ecopolis Architects, took responsibility for the three projects. Despite and because of being so personally close to these projects, I have attempted to draw lessons from the experiences with them and with UEA, concentrating on the processes involved in aspiring to do Ecopolis developments from a community base. In this chapter you will also find the introduction of 'scenario planning' and the need to plan over a range of timescales, something that is taken up and dealt with in more detail in the second part of the book.

Chapter 1
The Ground Plan

And is it not a dream which none of you remember having dreamt, that builded your city and fashioned all there is in it?
(Gibran 1926 p.109)

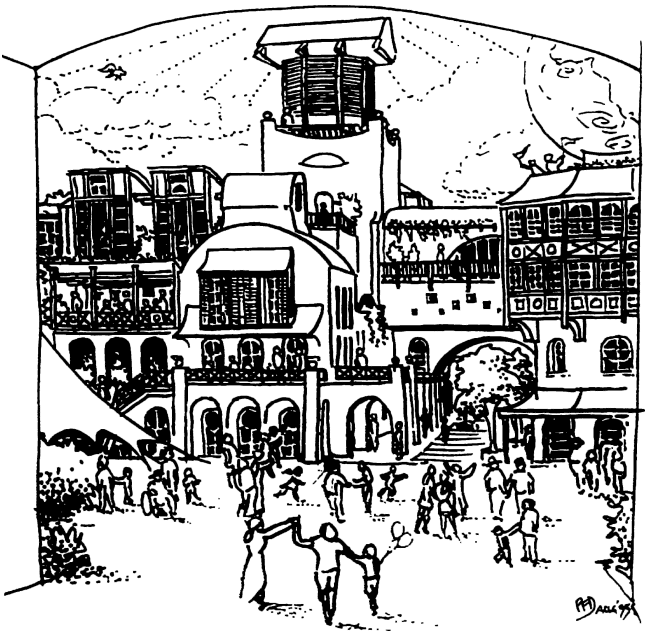

Figure 1: The Halifax EcoCity Project – 'Southgate'

1.1 The Idea of Ecopolis

The making of architecture and cities is not something we choose to do, as if there was something else we might do instead, it is fundamental to our nature and as essential to our capacity to procreate and thrive as nest-making is to birds. Until the development of modern human civilisation, there had never before been a situation in which a single species so dominated the planet's biota, taken up so much of

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its productive potential or affected so many of its ecological processes. We have achieved this dominance and its associated impacts by city-making and its associated processes. As we learn how to deal with managing the consequences of climate change and come to terms with our role as the planet's dominant species, we must understand how this phenomenon of building cities is central to our survival.

The Purpose of Cities

It is time to define the purpose of cities and bring our understanding of that purpose into line with our urgent concerns for sustainability[1] and the health of humans and the biosphere. Historically, when people got sick there were attempts to make healthier environments and when the environment was threatened there were attempts to address sustainability. Now the purpose of the city must be to create an environment that generates health and enhances sustainability. This is a major historical shift, but the city has the power and reach to achieve it, for as Ian Douglas observed several years ago, 'The urban eco-system is the most elaborate geographical control-system or integrated resource-management system in human experience.' (Douglas 1983 p.206)

A city is more than the sum of its buildings; it includes services and infrastructure, hinterland and agriculture that its inhabitants use to consume energy, resources and land. 'To define the city one must look or its organizing nucleus, trace its boundaries, follow its social lines of force. . .' (Mumford 1961 p.113). The making and maintenance of cities creates the greatest human impact on the biosphere and it is vital that we understand their processes and purpose.

This book is about cities; specifically ecocities, rather than 'ecovillages'. Ecocity pioneer and theorist Richard Register defines an ecocity as 'an ecologically healthy city', but asserts that no such city exists (Register 1987 p3). The idea of making ecological cities is a large one. Its scope is enormous although its advocates differ about goals (Roelofs 1996 p. 3). Not surprisingly, writers in the field fail to address every aspect with equal vigour; some stress energy, some transport, some community, and so on (Roelofs 1996, Arkin et al. 1992). Despite numerous definitions of 'sustainable/green/ecological' cities there are no widely accepted, functional definitions of what an ecological city is or what it does. Just as a biologist opens a textbook on biology and fails to find a definition of 'life', so those of us concerned with the fate of cities and the future of our environment imagine that we know what a city is, yet lack a clear definition of its purpose; in the early days of the ecocity movement it was not unusual to hear the comment that an 'ecological city' was an oxymoron.

Most definitions of sustainability talk about minimising negative impacts, but cities must be more than 'mostly harmless'. In the 'mostly harmless' definition of a 'sustainable city' we are exhorted to make its citizens comfortable whilst

[1] Used in its widely accepted sense as a catch-all phrase that links bio-physical issues of environmental health to an abiding concern for human welfare.

minimising damage to the environment: 'to enhance their well-being, without degrading the natural world' (Girardet 2004 p.6). Although such commentaries may talk about 'cities as complex systems that coexist in a dynamic relationship with the world's ecosystems' (Girardet 2004 p.6), nature remains conceptually separated and externalised as something to avoid damaging. There is an implicit passivity in the relationship. Such definitions reflect a failure of the imagination, a fear of mistakes; they are about trying to do as little bad as possible. But what if we were to set out, like Bill McDonough suggests, to be genuinely 'good' instead? (McDonough and Braungart 2002 p.67). Because cities are the drivers of environmental degradation the challenge is to turn them into agents of ecological restoration, supporting massive human populations and simultaneously repairing the damage to the world that humans have already done. The survival of our specie's civilisation depends on how we make our cities work.

What are cities? There is a continuum that spans from city through ecocity to Ecopolis. Cities are what we have been making for nearly 10 millennia without regard to environmental consequences; an ecocity is a city that takes account of its position within the processes of the biosphere; an Ecopolis creates an environment that generates health and dynamic ecological stability.

I propose that successful city-making is about the construction of living systems and that a truly 'ecological' city is exemplified by the Ecopolis concept in which the biophysical environmental processes of a region are sustained through conscious intervention, active engagement and management by its human population. In other words, the citizens of the urban ecosystem seek to fit human activity within the constraints of the biosphere whilst building environments that sustain human culture. Defined by the need to minimise ecological footprints (biophysical) and maximise human potential (human ecology) in order to repair, replenish and support the processes that maintain life, Ecopolis is about process; about the cultural patterning of the way we organize knowledge and how we see ourselves.

A city is primarily a place of culture and for the sake of our own survival we must rapidly evolve a culture capable of constructing cities as urban ecosystems that make a nett positive contribution to the ecological health of the biosphere. Even more than this, on a planet so thoroughly urbanised, with every function of the biosphere in some way mediated by its engagement with urban systems, the capacity of the biosphere to sustain civilised humans depends upon the nature of our civilisation. Cities need to be consciously designed and understood as living systems embedded in the processes of the biosphere as key regulators of the global ecology.

Oikos, Equity and Urbanism

Ecopolis is the next, most important step in the evolution of our urban environments: built to fit its place, in co-operation with nature rather than in conflict; designed for people to live whilst keeping the cycles of atmosphere, water, nutrients and

biology in healthy balance; empowering the powerless, getting food to the hungry and shelter to the homeless.

The term 'Ecopolis' is drawn from 'eco' (strictly, from the Greek *oikos* – house, but conventionally understood to mean 'ecological') and '*polis*'[2] (a self-governing city 'where people come together, not just by birth and habit, but consciously, in pursuit of a better life' (Mumford 1991 p.156). Thus 'eco' refers to ecological purpose and 'polis' to the ideas and ideals of governance that encompass community and self-determination. I adopted the term in 1989, constructing the word from first principles, partly in response to the term 'multi-function polis' then prevalent in Australia. It has been independently discovered or constructed around the world: in late 1970s Russia (Ignatieva 2002), in Finland (Koskiaho 1994), in Italy (Magnaghi 2000), adopted by others (Girardet 2004), and it has been used to name conferences in Russia (1992), China (2004) and New Zealand (2004).

Although Ecopolis is about creating human environments specific to their time and place, the concept is timeless and universal. To make places for everyone, in every land, for all time, cities need to be different, reflecting the characteristics of people, place and processes unique to their place and time. This 'universal regionalism' can only come about through the consistent and persistent application of principles embedded in an explicit culture of city-making. The challenge is to embed processes in the life of a city that are as natural to it as bones are natural to our bodies. Fully realised, Ecopolis is a manifestation of a developed ecological culture, standing in contrast to the expressions of exploitative culture that are our present-day cities.

Towards the end of the 20th Century numerous initiatives took place that addressed sustainability or proffered concepts of ecocities and the terms 'green city', 'sustainable city' and 'ecocity' entered the lexicon. The New Urbanists grew to represent one of the most powerful movements for urban change since Garden City advocates influenced new town and suburban development in the first half of the Twentieth Century, and they explicitly address the concept of sustainability. However, closer examination of their program uncovers a fundamentally conservative ethic that is as much to do with notions of returning to imagined safe havens of the recent past as it is to shaping the future. Concerns about this 'back to the future' approach may be shared by other researchers who are suspicious when issues of equity and social justice seem to slip below the horizon. Writing in a European context, Ravetz of Manchester University's Centre for Urban and Regional Ecology, asks us to

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[2] 'Whatever the city possessed the citizen considered his (sic) own birthright: between citizens as between friends there were to be no secrets, no professional walls, no presumption of inequality. The freeborn citizen owed nothing to princely favour or to his economic or social function: he resumed the place he had once had in village culture, that of being first of all a man, endowed with every human dimension, to whom every part of life was open and accessible. This at least was the ideal. And it is by its capacity to formulate that ideal – not by its failure to achieve it – that we still properly measure the Greek polis.' (Mumford 1990 p.188).

> Imagine a city where all the best principles of environmental management are applied: within a few years this ideal eco-city becomes clean, green and beautiful. But as a result, property prices shoot up, local businesses are forced out, there are labour shortages and a wave of homeless migrants.
>
> (Ravetz 2000)

At the beginning of the Twenty First Century Alberto Magnaghi and the Italian 'Territorialists' proposed a 'New Municipalism' which is much closer to the Ecopolitan idea[3]. It deals with what Anitra Nelson might call 'the grainy level of community-inspired action' (Nelson 2007 p.7) and has more to say about citizenship and the purpose of cities than New Urbanism; it offers much more than prescriptions for civic pleasantries and transit-oriented commuting. Partly, this reflects the birthing environment of the ideas; the New Urbanists are largely from (and a much-needed reaction to) the New Worlds which spawned mindless sprawl, soulless shopping centres and big empty boxes of possessions masquerading as homes; the European Territorialists are from the Old World, where enough remains of pre-consumerist, fine-grained, functional, equitable humanist urbanism and its relationship to the productive landscape that the recent dominance of industrialism and the motor vehicle can be placed in the perspective of a deeper historical context. When it comes to interpreting the patterns and purposes of the urban and the rural, the New Urbanists are, at heart, traditional modernists; the Territorialists are radical traditionalists.

The words 'sustainable', 'green' and 'ecological' recur in commentary and debate but apart from the usual reiteration that explains sustainability in one or another reworking of the sustainable development definition from the 1987 Brundtland Commission,[4] there is rarely any clear sense or formal explanation of which is which and whether there is any qualitative difference between them. I have tried to use the term 'sustainability' sparingly because it has become such a loosely employed and poorly defined term. Whatever sustainability is, it is a social enterprise, it is not about 'self'-sufficiency. Community processes have to be inherent in any Ecopolitan methodology.

For all the talk about sustainability in architecture, planning and design, it is hard not to agree with landscape architect Carol Franklin who, in discussing the definition of 'ecological landscape design' says '. . .one reason that the name 'sustainable design' is so acceptable is that it suggests that if we just develop carefully

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[3] Just before the manuscript for 'Ecopolis' was due to be submitted I discovered the work of Magnaghi. He draws heavily and openly on the intellectual tradition of Geddes, Mumford, Kropotkin, Bookchin et al and it seems likely that my own work displays definite Magnaghian tendencies and is very much in line with the thinking of the Italian Territorialists. It is a measure of the strength of the bio-regionalist, urban-humanist tradition that it enables the work of theorists and practitioners in different places and times to find common resonance and relevance.

[4] The United Nations Commission on Environment and Development, otherwise known as the Brundtland Commission after the chair, Gro Brundtland, defined sustainable development as 'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.'

and responsibly we can continue to over-populate the earth and to build what we like.' Whereas the notion of 'oikos' is to do with interrelationships and is 'a more difficult concept to grasp in all its implications.' (Franklin 1999 p.17).

Another concept that some find difficult to grasp is that the social framework and values that underlie the making of human settlement are critical to the creation and definition of an ecological city. It is not logically consistent to describe an ecocity as simultaneously clean, green, beautiful *and* socially dysfunctional, as with some contemporary observations of the 'ecocity' of Curitiba in Brazil[5]. The idea of Ecopolis is to try and construct an integrated approach to ecocity making that is founded on principles of social justice and direct democracy. It is explicitly about radical change in our urban civilisation and the conscious creation and use of cities as catalysts for social change. At the same time, cities *contain* differences and have to be inclusive environments. They are constructed by mutual agreement to create crucibles of political debate and for the airing of differences. By their very definition and the necessities of their functions cities are places for people of all persuasions and can only exist on the basis of a powerful social purpose that transcends social and economic differences – it would be a nonsense if one were to try and walk along only that part of the pavement or sidewalk, or drive along that part of the street, that had been paid for by your personal tax money! Cities are eloquent expressions of some our best qualities, including our ability to cooperate for mutual benefit over many generations.

Projects and Praxis

Approaches to sustainability range from professional planners anxious to make the world's urban structures work better within the framework of existing political and economic constraints to citizen planners and activists of the ecocity movement who see a need to challenge, and if necessary change, that framework as a prerequisite for sustainability. One approach is about the application of appropriate techniques within the social context of the status quo, the other is about social change itself. In the former 'technical fix' model any project or development program is just itself, in the ecocity activists' view a project or development program becomes '... a microcosm of the whole interdependence of life forms on the planet.' (Clements 1992).

Society needs to support innovation and encourage exploration of various approaches to city-making to ensure a healthy rootstock for future civic development. Community education must be integral to urban sustainability to ensure that professionals are speaking the same language as the citizens. A radical community-based approach to city-making has the potential to reconcile inclusiveness and stability with innovation, exploration and change.

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[5] See Chapter 6.7 South America – 'Ecocity' Curitiba.

Any philosophical position that aims to bring about a difference in the real world must be tested in practice. I have written this book from the point of view of an activist determined to do just that. A significant degree of testing took place over a period of 15 years through the three projects described in the case studies of Chapter 7, all based in South Australia and developed to various levels of completion. Ecopolis has been constructed around an armature of advocacy as a basis for the theory and with a consistent concern with implementation. The following sets of propositions have been derived from my experiences and researches whilst attempting to translate theory into practice significantly, but not exclusively, with the Ecopolis projects in South Australia.

1.2 The Ecopolis Propositions

> The ability to transmit in symbolic forms and human patterns a representative portion of a culture is the great mark of the city: this is the condition for encouraging the fullest expression of human capacities and potentialities. . .
>
> (Mumford 1961 p.113)

Fitting Cities

We need cities that fit their purpose as global pattern makers and provide fitting places for the realisation of the best of human aspirations. We need cities that generate and are generated by appropriate cultural patterning for achieving this, including the way we organize knowledge and manage human affairs. The over-arching proposition and underlying theme for the following set of Ecopolis propositions is simply that:

> **Cities are the means by which civilised societies achieve a physiological fit with the biosphere**.

The four propositions about the necessary conditions for making Ecopolis:[6]

Proposition 1: *CITY-REGION: City-regions determine the ecological parameters of civilisation*

- Cities are a habitat for human survival and evolution.
- Cities are places for procuring, managing and distributing resources for the mutual benefit of their inhabitants and are inseparable from their hinterlands.
- Human impacts on the processes of the biosphere are mediated by land-use patterns that achieve their quintessential expression in city-region morphologies and processes.

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[6] See Chapter 10.10 Sound Bites, Fashion and Cultural Change for a 'short form' of the propositions.

- Cities are the primary means by which humans act on the biosphere.
- An Ecopolis is an urban system consciously integrated by its community into the processes of the biosphere in order to optimise the functioning of the biosphere for human purposes.[7]

Proposition 2: *INTEGRATED KNOWLEDGE: Ecocity concepts generate an imperative to integrate extant knowledge*

- The concepts, principles and techniques that are required to create human settlements that fit within the ecological systems of the biosphere whilst sustaining their biogeochemical functionality already exist.
- Concepts, principles and techniques already exist which are capable of creating urban systems consciously integrated into the processes of the biosphere in order to optimise the functioning of the biosphere for human purposes, but they are not yet embedded in a cultural framework (arts, sciences, humanities, vernacular and popular culture) that integrates and facilitates their application in the design, development and maintenance of such systems.
- Architecture and urban design are major components of culture and must be conceptually expanded as part of a life sciences approach to recognising the central place of human settlement as an evolving agent of change in the biosphere.

Proposition 3: *CULTURAL CHANGE: Creation of an ecological civilisation requires conscious, systemic cultural change*

- The collective consciousness and unconsciousness of human inter-relationships with the biosphere is embedded in culture.
- An Ecopolis cannot exist except as the consequence of the creation and maintenance of a society capable of sustaining the responsiveness necessary for managing such a settlement.
- The inter-dependent nature of elements in urban ecosystems requires communication and decision-making structures based on mutual aid – which recognises inter-dependency, and direct democracy – which shortens channels of communication, improves information flow, and more closely relates decision-making to place.
- The foundations of society are cultural and lasting social change depends on deep levels of cultural change.
- To create ecological cities in the form of Ecopolis it is necessary to effect cultural change.

Proposition 4: *URBAN FRACTALS: Demonstration projects provide a means to catalyse cultural change*[8]

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[7] The concept of Ecopolis as a means of consciously engaging with the evolution of the biosphere clearly distinguishes it from the more immediately pragmatic resource-conserving models of urban sustainability.

[8] I am grateful to Richard Register and Dr. Effie Best for their critical reviews of this proposition.

- Changes in the process of city making can be catalysed by 'pieces of Ecopolis' developed as demonstration projects.
- A living system of human relationships that displays the essential characteristics of the larger culture of which it is a part can be thought of as a 'cultural fractal'.
- Cultural change can be catalysed by the creation of cultural fractals that display essential characteristics of the preferred cultural condition.
- An 'urban fractal' is a network that contains the essential characteristics of the larger network of the city. Each fractal will possess nodes, or centres, and patterns of connectivity that define its structure and organisation, and it will exhibit characteristics of community associated with living processes. It is a particular type of cultural fractal.
- Ecopolis demonstration projects must be urban fractals, containing sufficient characteristics, in process and form, to represent a whole in microcosm.
- These catalysing urban fractals can only be brought about with a high level of participation from the community in their design, development and maintenance.[9]
- That participation represents the conscious engagement of the human community with the urban ecosystem of which it is a part.

Cultural Fractals

> According to the systems view, the essential properties of an organism, or living system, are properties of the whole, which none of the parts have. They arise from the interactions and relationships among the parts
>
> (Capra 1997 p.29)

The concept of cultural and urban fractals can be applied to any culture and urban system. It is intended as a means of investigating and understanding both.

Culture is a living system of human relationships; it expresses itself in many ways, not only in language, arts, tool-making and the creation of artifacts, but also in social organisation, including politics and economics. There are characteristic and distinctive elements that weave together to make up the total pattern which we recognise as a particular culture and if there is an identifiable smaller pattern that displays the essential characteristics of the larger culture of which it is a part – if it is, in effect, self-similar to the cultural whole – it can be considered a 'cultural fractal'.

The stability of any social fabric requires maintenance of its essential customs and general patterns of behaviour. Changes to any social norms are catalysed by changing conditions and, in turn, may change those conditions. For any changes to

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[9] Participation in terms of active involvement. This does not necessarily mean (nor does it preclude) involvement through ballot boxes or action based on consensus politics. See Section 9.3 Democracy and Citizenship and 10.8 The City as the Basis of Social Action.

be effective the catalysts must contain sufficient elements of the preferred cultural condition for it to be recognisably similar to the whole of that preferred condition. The catalysts must be cultural fractals of the changed social condition that is being pursued. This expressly rules out catalytic or revolutionary action that does not exhibit the behaviour desired in the new set of cultural and social conditions it is intended to catalyse. Thus the cultural fractal intended to catalyse a more egalitarian social order must not in itself contain any substantial patterns of exploitative behaviour. Effective change agents must be microcosms of the change they seek to bring about.

Urban Demonstrations

An urban fractal is a particular kind of cultural fractal. Although it might seem possible to posit a whole range of fractals; economic, political, and so on; for a cultural fractal to be meaningful it has to contain all the essential characteristics of its culture to at least some degree. Cities present all the strands of cultural activity that create them and are the most complete expressions of society, including its relationships between the rural and urban, the domestic and the wild. Thus the most complete fractal demonstration of the larger whole of a civilisation is urban. In seeking the means to achieve the extent and depth of change necessary to shift our various civilisations towards ecological health and viability, there can be no better, and no lesser a tool than urban projects which contain and demonstrate the essential characteristics of that desired 'ecological culture'. The concept of Ecopolis is intended to include those essential characteristics in its physical and organisational structure, its ethos, and its process of realisation.

Richard Register found that the urban fractal idea 'describes very well' his own 'integral neighborhoods' and 'ecological demonstration projects' (Register 2006 p.209). Register concurs with the idea that an urban fractal is 'a fraction of the whole city with all essential components present and arranged for good interrelationship with one another and with the natural world and its biology and resources for human activity'[10] and because such fractals are only a small fraction of the size of a whole town or city they are much more achievable than whole new cities, particularly in developed countries. Chapter 6 identifies potential (and partial) urban fractals in existing projects around the world that display ecopolitan characteristics, including Register's work in California, and Chapter 7 describes, in part, how Ecopolis demonstration projects I initiated with Urban Ecology Australia contain or express such fractals. The following table sets out some of the defining characteristics of an Ecopolis urban fractal (I show how the fractal definition relates to the SHED synthesis in Chapter 11).

[10] Register 5 January 2008, personal correspondence.

Fractal Trim Tabs Make Differences

Looked at from the point of view of information theory, Bateson might say that an urban fractal is a physical manifestation of a cultural pattern that is sufficiently different from the norm to change the deeper pattern of the city. It is, systemically, sufficiently different to make a difference.

It is also a device that fits the definition of Buckminster Fuller's 'trim tab factor'. An urban fractal acts as a trim tab to the larger society and its patterns of urbanism, turning the direction of development of a part of the city so that the direction of development of the whole city is affected, with the whole city, in turn, redirecting the evolutionary arc of the larger civilisation of which it is part.[11]

Table 1: The 'Geometry' of Urban Fractals

Characteristic	Conventional Modern City	Sustainable City	Ecocity or Green City	Ecopolis
Relationship to the Biosphere	In conflict. Incidental. Usually exploitative, extractive and polluting.	Mostly harmless.	In balance with nature.	Consciously integrated into biosphere processes to optimise their functioning for human purposes.
Relationship to the Bioregion	Incidental. Usually exploitative, extractive and polluting.	Conscious of bioregional issues, not a determining factor for the city.	Protective of bioregional functions, partly defined by them.	Nurturing bioregional functions, totally defined by them.
Response to Place	Weak.	Fairly strong.	Very strong.	Very strong.
Protection of Biozones: maintenance of food production	None.	Conservation of wetlands, limited food production.	Creek restoration, urban agriculture.	Ecosystem restoration and remodelling, urban agriculture.
Ecosystem Connectivity: creating habitat	None, except in negative terms, e.g. polluting water courses.	Some connectivity with natural networks such as creeks and shorelines.	Functional connectivity with essential elements of the natural environment.	Conscious connectivity with all elements of the environment.

[11] Cities have long been the 'engine rooms' of civilisation and the places that initiate and sustain innovation, from the invention of the state in the city-states of ancient Greece, to modern America, where the U.S. Conference of Mayors endorsed the U.S. Mayors Climate Protection Agreement in support of the Kyoto Protocol when the national government failed ratify it.

Table 1: (continued)

Characteristic	Conventional Modern City	Sustainable City	Ecocity or Green City	Ecopolis
Urban Form: Nodes/centres, patterns of connectivity that define structure and organisation	Poorly defined centres that exist subject to economic convenience, connectivity reliant on high energy use.	Compact core: some medium-density suburbs, urban villages, defined centres with some response to place.	Compact: urban villages, distinct centres that are determined by topography and place.	Compact: urban villages, distinct centres that are determined by topography and place.
Pattern of Development: Networks that contain essential characteristics of the larger city	Automobile-dependent. Arbitrary disposition of built form relative to needs of social exchange.	Transit-oriented development. Some correspondence of built form with needs of social exchange.	Walkable centres. Good relationship of built form with needs of social exchange and ecosystem function.	Walkable with good transit connections. Built form corresponds with needs of social exchange and ecosystem function.
Architecture	Fashionable. Inefficient.	Moving towards sustainability. Stylistic issues may dominate other concerns.	Responsive. Bones of the architectural structure tuned to the local environment.	Organic. Highly responsive to climate, place and human needs. Use of biomimicry.
Ecological Footprint	3–4 planet equivalent typical.	2–3 planet equivalent.	1–2 planet equivalent.	1 planet footprint.
Community	Poorly defined, transitory. Tends to form reactively and be reactionary.	Unevenly represented. Not quite central to planning processes.	Community characteristics associated with living processes.	Well established, integral to living systems and planning processes.
Economy	Exploitative.	Market-driven. Central government intervention on equity issues, etc.	Market-driven. Ethical finance structures. Some local economy. Equity concerns integral.	Market-driven, strong bioregional economy. Ethical finance structures. Equity concerns integral.

Table 1: (continued)

Characteristic	Conventional Modern City	Sustainable City	Ecocity or Green City	Ecopolis
Services	One-way service provision. Consumer relationships dominate.	Some two-way services. Citizen relationships begin to dominate consumer concerns.	Integral neighbourhoods with housing, jobs, shops, gardens, energy systems, transit, bicycle connections.	Ecological services integrated with all city and regional services. Strong citizenship.
Minimum Scale – to be a viable fractal	Defined by the extent that it contains necessary services complete with housing, jobs, commerce. May be very extended.	Defined by the extent that it contains necessary services complete with housing, jobs, commerce. May be fairly extended.	Defined by the extent that it contains necessary services complete with housing, jobs, commerce. Compact.	Defined by the extent that it contains necessary services complete with housing, jobs, commerce. Compact.
Maximum Scale – to be a viable fractal	No limit.	Whole districts of many blocks, maximum walkable distances within its boundary of about 20 minutes.	Whole districts of many blocks, maximum walkable distances within its boundary of about 10 minutes.	Whole districts of many blocks, maximum walkable distances within its boundary of about 5 minutes.
Transport	Ad hoc. Decided by linear extrapolation from previous conditions.	Transit-oriented development with energy-conserving connections to transit.	Access by proximity – planning based on transit corridors and pedestrian networks.	Access by proximity – planning based on transit corridors and pedestrian networks.
Water Use	Profligate.	Considered.	Frugal. Based on restoring equivalent of pre-urban water balance.	Frugal. Based on restoring equivalent of pre-urban water balance.
Energy	Profligate energy use, reliance on fossil or nuclear fuels.	High levels of energy conservation, significant use of renewable energy.	Very high levels of energy conservation, high dependence on renewable energy.	Extremely high levels of energy conservation, total dependence on renewable energy.

Table 1: (continued)

Characteristic	Conventional Modern City	Sustainable City	Ecocity or Green City	Ecopolis
Resource Use	One way use. Tokenistic recycling.	Recycling and re-use encouraged.	Recycling and re-use typical.	Cradle-to-cradle resource management.
Climate Response	Denial.	Some responsiveness. Tempered by economic limitations and social convention.	Responsive. E.g. solar greenhouses in cool climates shade and breeze structures in hot climates.	Responsive. Biomimicry employed as primary design principle.
Principles	Pragmatic, primarily commercial. Social justice and equity issues subsumed by other concerns.	Pragmatic with principles subjugated to perceived political realities. Social justice and equity issues affected by other concerns.	Principled, seeking accommodation with politics and commerce without compromise. Social justice and equity issues seen as important.	Principled, with social, political and commercial issues all conditioned by ecological reality. Social justice and equity issues given prominence.

1.3 Setting Contexts – Places and People

> Cities are more than static structures of stone and concrete. They are also vast processors of food, fuels, and the many raw materials that feed a civilisation. With their complex metabolisms they are huge organisms without precedence in nature; their connections stretch across the globe
>
> (Girardet 1992 p19)

The Organic Community

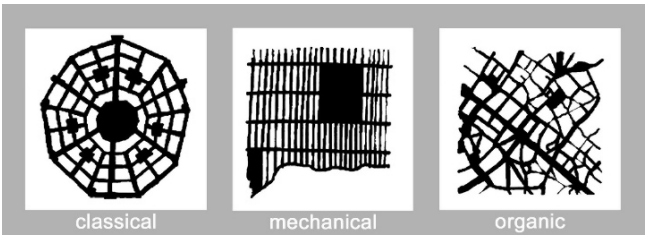

Figure 2: Icons for the 3 City Types (see Typologies in Chapter 10.4)

Kevin Lynch, whose urban design theories of good city form have inspired and informed two generations of planners and designers, introduced a typology which identified three types of city – the 'celestial', the 'mechanical' and the 'organic'[12], and allowed that the organic type could be considered to have the characteristics of an organism, rather than, for instance, a machine (Lynch 1981).[13] Lynch's work was informed by urban design, planning and architectural epistemologies rather than the life sciences. Lewis Mumford was an advocate of the organic city model and described cities as entities with discernible boundaries in both space and time – cities had edges and they lived and died (Mumford 1961/1991). James Sholto Douglas would seem to think that cities are alive because he asserts that towns and cities are viable ecosystems that are '. . .delicate and precariously balanced and any shift in equilibrium will cause their ageing and death.' (Douglas 1974 p.152). Jane Jacobs, again viewing cities primarily from a planning, rather than life sciences perspective, helped to establish the modern view of cities as dynamic (if not wholly 'alive') entities through the publication of such influential texts as 'The Death and Life of Great American Cities' (Jacobs 1962). In 'The City in the Image of Man' Soleri describes a putative life cycle for an 'archology' with a metamorphosis and disassembling 'when functional obsolescence overshadows the liveliness of the city.' (Soleri 1973 p.35). The contribution of these and other theorists to the development of the Ecopolis idea is discussed in Chapter 4.

There has been a steady move towards 'green' architecture and planning around the globe during the last quarter of a century. In Europe there have been strong, central government moves to introduce ecocity programs in the management and development of existing urban centres and there have also been a number of neighbourhood scale projects that exhibit high levels of ecological performance developed by organisations with a bias towards social housing (Kennedy and Kennedy 1997, Scheurer 1998). In England the country's peak environmental organisation Friends of the Earth long ago published both books and campaign literature in support of sustainable cities (Elkin et al. 1991) and there are some impressive new housing projects that exhibit ecocity characteristics, including designs by the venerable Vales whose 1991 book included a chapter on 'Ground rules for the green city' (Vale and Vale 1991 pp169–180). Fashionable English 'Hi-Tech' architect Richard Rogers published an ecocity polemic (Rogers and Gumuchdjian 1997). The OECD has run conferences and programs on 'Ecocities' in Europe and Australia (Foulshan and Munday Pty Ltd 1994). In China and Russia there have been state-supported efforts to research and develop ecocity models for understanding and manipulating urban ecosystems although it is difficult to determine to what extent these theoretical constructs are being applied in practice (Wang et al. 1990, 1991a) although Wang et al. claim that 'Chinese urban ecology studies, unlike traditional ecological study,

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[12] Working with UEA volunteers, I employed this typology as the basis of workshop exercises in urban design as part of community processes in support of the Whyalla EcoCity Development, see Case Study II, Chapter 8.

[13] But see my discussion of The Living City in Chapter 8.

pay more attention to the human dimension of urban ecosystem and the reciprocal relationships between citizens and its natural, economic and social environment and between city and its micro- and macro- environs.' (1991a p.3)[14]. In South America the city of Curitiba (see Section 6.7) is routinely identified as an ecocity because of its adoption of a number of practical, successful, strategies for dealing with transport, resource recycling and education (Rabinovich 1992, Rabinovich and Leitman 1996, Ravazzani and Fagnani 1999) but it is debatable whether the collective effectiveness of those actions amounts to a coherent theory.

In Australia, academics Peter Newman and Jeff Kenworthy undertook original research which demonstrated that the transport energy consumption of cities is proportional to city density (Newman and Kenworthy 1989).

Urban Ecology Australia introduced the term 'ecocity' to Australia in 1990. The term entered the lexicon of the environment movement after the Greenhouse Association of South Australia hosted Richard Register as keynote speaker at the national Greenhouse 91 Conference in Brighton, South Australia. In 1992 David Engwicht also took the humane/sustainable transport orientated argument to its logical conclusion after years of working with anti-freeway groups in Brisbane and published *Towards an Ecocity – Calming the Traffic* (1992). At the time he was under the impression that he had coined the term 'ecocity' and was unaware of its use by activists in the USA and Australia until the advent of EcoCity 2 – The Second International Ecological City Conference, held in Adelaide in April 1992.[15]

A number of community organisations around the world either advocate, or directly or indirectly support 'green', 'sustainable', 'environmental' or 'ecological' city programs, e.g. Urban Ecology, USA; Ecocity Builders, USA; Planet Drum, USA; Oekos Biodelezia, Italy; Friends of the Earth, England; Sustainable Urban Neighbourhood, England; Urban Ecology Australia, Australia. An important aspect of the Ecopolis theory is that there must be significant, articulate and continual community input to any ecocity program and that there is an obligation for advocacy to be allied to any educational components associated with ecocity community programs. Education, advocacy and activism are dealt with in Chapter 10.

Cities as Ecosystems

> A city is an ecosystem – an intricate web of interacting organisms involving energy transfer and materials cycling
>
> (Gill and Bonnett 1973 p.3)

In the mainstream of popular awareness and in most of the built environment professions and literature, cities are defined by their built form. Boyden et al. observed that 'There has been some argument whether it is correct to apply the term

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[14] Rusong Wang was a keynote speaker at EcoCity 2, Adelaide, April 1992.

[15] Personal communication February 1992.

'ecosystem' to a city.' (1981 p.18). Although there may be some dispute about definitions the literature shows that cities, and even buildings, may be regarded as ecosystems (Nix 1972, Boyden et al. 1981, Spirn 1984). Patrick Geddes and Lewis Mumford presented a view of 'city and region' that places the built structures of urban systems in an active relationship with the living landscape they occupy (Geddes 1915, Kitchen 1975, Mumford 1961). This relationship is established and determined by the many links that must exist between the buildings and their environment and between built forms and their builders. Cities are thus part of a network of relationships which include their hinterlands and which can be considered, altogether, as urban ecosystems (Hughes 1975, Girardet 1992, Zeiher 1996).

There is a clear distinction between the inhabited and uninhabited states of buildings and cities. When occupied and functioning as human settlement, built environments are 'alive' as much as any ecosystem is alive; with their biotic and abiotic components functionally interlinked.

Adopting the ecological or systems view in which the city is '. . .an integrated open system of living things interacting with their environment' (Douglas 1983 p.2) one can argue that a city without people is not a city at all. The uninhabited state represents abiotic components 'at rest' in a form of static art, whilst the inhabited, active state represents the full flowering, or coming into being, of the thing we call a 'building', or a 'city'. Thus people and other organisms become integral to the ecological description of any architecture or urban construct (see Chapter 8) – houses are buildings, homes are ecosystems. A city, or more correctly, a city-region, is a living ecosystem when it is inhabited.[16] Douglas, citing Deevey, distinguishes the physical form of the city as the *urbs*, and the lived-in, functional, cultural entity of the city as the *civitas* (Douglas 1983 p.2). This distinction clarifies the difference between the theories and practice of conventional architecture, urban design and planning, and their ecological counterparts that include the emergent properties of living systems.

Any ecosystem requires functional engagement from its constituent organisms. In an ecosystem containing conscious organisms, that engagement must also be conscious. In an ecosystem constructed by conscious organisms in order to support themselves, that engagement is critical, and conscious information exchange becomes central to ecosystem function. Thus an ecological building or city is dependent for its function on engaged, intelligent information exchange. Rather than being a reductionist, Corbusian 'machine for living', an eco-house – and, by extension an Ecopolis – is an ecosystem for supporting consciousness. That consciousness is expressed through culture and the free flow of information is crucial to its survival.

Planner William Rees observes that '. . .the 'environmental crisis' is really a symptom of profound human ecological dysfunction resulting from deeply-rooted cultural values.' (Rees 1998 p.6). Culture systemically embeds values in society over time. Community-based 'bottom up' planning strategies, rather than top

[16] Of course, an ecosystem does not exist *unless* it is alive.

down planning strategies, are fundamental to the foundation and sustenance of any ecologically viable human settlement in the long term. Community-based strategies imply direct democracy and active citizenship. They demand approaches to architecture, planning and urban design that are as responsive to the body politic and social demands as they are to the sun, the weather, and the living processes of the biosphere. Historically, civilisations appear to have been carrying in themselves 'the seeds of their own destruction' (James Sholto Douglas 1974 p.43); to counter this, the viability of human settlement depends on maintaining systemic, sustained, ecologically and societally responsible social structures capable of ensuring the self-replicating conditions required for their continued existence.

Following on from J. Scott Turner (2000), we can consider that the built environment of our architecture, buildings and cities represent an external physiology, intimately bound up in our adaptive modification of the environment, altering 'the flows of matter, energy and information through the organism and between the organism and the environment'. As an extended phenotype (Dawkins 1982) we can understand the built environment as evidence of the extension of our genes beyond ourselves as organisms and consider how 'these extended phenotypes aid in the transmission of genes from one generation to the next' (Turner 2000).

According to Brown, Turner distinguishes human structures as one step removed from those of animals, particularly devices like cars, on the grounds that they are powered with fossil fuels rather than solar, wind, gravity, osmosis and other 'natural' energy sources (Brown 2000). In order to accept that buildings and cities may be extensions of our physiology, perhaps our definition needs to require that those structures are powered entirely by extant, renewable energy sources. This would add an imperative to architecture and urban construction that it is specifically *not* powered by other means. This, intriguingly, fits the idea that we are (or should be) evolving human settlement towards functioning as a more efficient extension of our physiology. The increasingly stringent requirements of building codes and ratings are moving the built environment towards non-fossil fueled power sources, making it, arguably, more of an extension of our physiology and less of an addendum, less like being 'merely architecture'.

As I am neither an evolutionary biologist like Dawkins, nor a physiologist, I cannot claim expertise in either field, but as an architect and student of cities and their environments, I can identify what appear to be links and notice correspondence between the world of animals and humans. That humans are a particular kind of animal seems axiomatic to me, but I am aware of the dangers of anthropomorphising. On the other hand, there seems to be a curious reluctance to draw any conclusions about human behaviour in building structures from observations about animal behaviour.

This book is about cities and climate change, so why bother to explore these supposed links between animal and human behaviour in building structures? Surely the task (and it is an urgent one) is to design and build with what we already know so that our societies are able to accommodate the expected changes in the global environment before too many people are injured, disadvantaged or killed by potentially cataclysmic events? Is there really time, or any need, to ponder the niceties

of extended phenotypes and physiologies when pragmatic concerns with urban systems would seem to demand action, rather than theoretical excursions outside the accepted boundaries of the disciplines of planning and design? I think there is. Our present predicament in which we face a world with a growing population, shrinking resource base, massively disrupted biosphere and accelerated climate change has been of our own making. If we are serious about long-term sustainability then we know that we are unlikely to fix the problems we have given ourselves using the same way of thinking that got us into the mess in the first place. As a species we are omnipresent on the globe and have affected every aspect of its functioning. We have, intentionally or not, created a global culture that affects every other species on the planet. Our task must be to change the basis of our thinking to one that intrinsically and always recognises the impact of our actions on the living world. Our biggest impact on the world is through our cities and built environments. There are great efforts being made by many people to ameliorate the impact of city making and to find ways to construct our built environment so that it does not so readily destroy the living systems on which we ultimately depend, but there is no coherent theory that connects human behaviour to the world through the way we build.

There is a growing body of knowledge that seeks to understand and explain the workings of other animals in terms that connect their organisms with what they build and how that fits the flux of the ecosphere, but there is nothing comparable in relation to human activities. Part of the purpose of this book is to sketch a framework, a set of ideas, to help evolve a properly ecological approach to making human settlement that fits the Earth. It sets out to provide some initial steps in the conscious creation of an appropriate cultural condition that will sustain the framework and its intent into the future. With a culture based on values generated by focussing on life-sustaining behaviour, with this deeper understanding integrated into every act of building, then the extended (and evolving) physiology of our built environment might finally be one that protected our future as a species as a sentient part of a complex living planet.

City-making is really about the creation and management of complex living systems – and cities must now be considered the primary habitats for human survival. The developing theory of Ecopolis is predicated on an approach to the making of architecture and cities that defines them as potential living systems, as extensions of the human organism, and just as the constructions of living creatures can be seen as extensions of their physiology (Turner 2000 p.27) then buildings and cities can be conceived as components of living systems. This line of thinking promises a rich field of enquiry. If the making and maintenance of cities was analysed on the basis of them being extended phenotypes of the human gene, it might be possible to look forward to achieving a kind of unified theory of urban ecology. Architecture and associated creative activity could then be seen as integral to life processes, as ways of making our habitat function better and increasing our chance of survival as a species through a purposeful, goal-directed approach to city-making.

For further exploration of the built environment as a living system, see Chapter 8.

The Ecology of Knowledge

If you have any doubt that we are social creatures, and depend on society to survive, then try to imagine several thousand people choosing to stop and live in a small valley somewhere, all existing as individuals, each building their own shelter, growing their own food, collecting their own water, providing their own medicines and gaining their own education. Imagine that all trade had to be conducted by individuals only, each one having to find others with whom to exchange goods and services. Imagine every person having to mine their own raw materials and build their own machinery. And imagine that they all have to make up their own language, and learn to translate what everyone else might be saying. . .

Clearly, this is an impossible scenario. In order to happily and healthily inhabit any place, indeed to do anything at all, we need to cooperate with others – and we need to do it without undue violence to each other or to the living landscape. All the activities listed above, and many more besides, are to do with our mechanical, physical, and biochemical functions as living organisms, i.e. they are part of maintaining our physiology. In working together to achieve our physiological requirements we create society, staying closely together for reasons of efficiency and convenience. And in the process of settling in place in this way, we make the structures we call cities. To paraphrase Turner (2000 p.212) 'in such structures, we co-opt the environment into a physiology that extends well beyond our conventionally defined boundaries as organisms.'

To successfully integrate the vast and increasingly sophisticated scope of the systems of knowledge available to us, we have to extend our conventional definitions of the boundaries of that knowledge, seek commonalities, acknowledge overlapping relationships between disciplines as zones of transition rather than walls of separation, and generally become a lot more creative and less precious about the distinctions within and between the professions, academia and government as we learn to connect, and re-connect, with daily life and the public domain.

Philosophy, Practice and Popular Culture

> But the true town plan, the only one worth having, is the outcome and flower of the whole civilisation of a community and of an age
>
> (Geddes 1915 p.211)

Part 1 of this book includes a review of practitioners, philosophies and places that address various aspects of ecocity-making. Part 2 synthesises what has been learned from reviewing extant works and the experience of the case studies to formally present precepts and processes derived from this ongoing work. The case studies are about projects that set out to test the four propositions and were all conceived of as 'pieces of ecocity', microcosms of the larger whole – urban fractals. The projects employ ideas and their inter-relationships described in Part 2 of this book. All the

work is in turn drawn from or related to the study of other places and people working in the field, past or present; the most pertinent of whom are briefly described in Chapter 4.

The idea of ecocities necessarily involves cultural change, but Ecopolis posits cultural change as the core requirement for making urban systems consciously integrated into the processes of the biosphere in order to optimise the functioning of the biosphere for human purposes. It is about continuous process, with no omega point. My attempt to reweave the many strands of analysis, theoretical positions and practical examples to create an original synthesis, is presented as the 'SHED' (Sustainable Human Ecological Development) in Chapter 11.

An important part of the overall proposition is to do with the dissemination and replication of ecopolitan ideas. As cities are the built expressions of values held in social, political and cultural processes, the *real* task is not the making of buildings but the creation of an ecological culture. Education is a vital part of the process of embedding ecocity precepts and values in the communities that comprise that larger culture, but education is understood here in its widest interpretation as a means of transmitting information, knowledge and experience, rather than just to do with formal institutions (see 10.1 'Capturing the Transmitters'). It is about a rediscovery of citizenship. Most importantly, because so much of what people learn in mass society is not through formal institutions, and because the task of adjusting cultures globally is urgent and cannot rely on returning everyone to school, it is vital that mainstream popular media provide critical pathways for disseminating ideas. It is imperative to communicate effectively to the general population in order to both precipitate and maintain the changes in human settlement design, development and maintenance needed for humans to be successful organisms in the community of the biosphere. To be truly effective, ecopolitan ideas need to resonate in the mainstream of popular culture.

Ecopolis inherently requires a trans-sectoral, inter-disciplinary approach to provide both appropriate ideas and effective organisation for their implementation.[17] Whilst the differences between all the various levels and types of knowledge need to be recognised and understood, they also need to be integrated and that integration is not to do with blurring the boundaries between disciplines but with actively seeking connections between them. Some of the epistemological implications of this approach to breaking down the silos and scaling the ivory towers are explored in the next chapter.

[17] There is a lot of work to do here. Even some of the most inspiring, holistic writers often fail to provide references that might assist the reader to track back to the source or sources of their thinking, or to make explicit connections with other relevant texts and inspirations. Christopher Alexander is particularly frustrating in this regard.

Chapter 2
An Epistemology for Urban Ecology

We are the ultimate inheritors of a drive hundreds of millions of years old to build, and thus take charge of the immediate surroundings. For better or for worse, this architectural drive eventually created the kind of mind we now possess
(Gould and Gould 2007 p.299)

Unfortunately, the guiding metaphors of those who shape the built environment still reflect a nineteenth-century epistemology. Until our everyday activities preserve ecological integrity by design, their cumulative impact will continue to be devastating
(Cowan and Van der Ryn 1996 p.18)

Perhaps 'epistemology' is only another word for the study of the ecology of mind
(Bateson 1973 p.372)

2.1 An Heuristic Hybrid?

. . .there is a knife moving here. A very deadly one; an intellectual scalpel so swift and so sharp you sometimes don't see it moving. You get the illusion that all those parts are just there and are being named as they exist. But they can be named quite differently and organised quite differently depending on how the knife moves
(Pirsig 1974 p.79)

Legitimacy Exchange

The discipline of urban ecology is emerging with multiple trajectories. One is towards the study of urban nature in semi-classical terms that counts the number of different species and identifies their habitats and so on, another is the evolved version of the Chicago School that treats human behaviour in a similar fashion to animal populations; there is the environmental systems approach that deals with urban metabolism and there is the grassroots movement represented by organisations like Ecocity Builders in the USA and Urban Ecology Australia. There are connections between each of these approaches but to evolve as a discipline, it needs a coherent vision. In their early days the sciences of cybernetics and systems theory borrowed from a variety of sources that "reached across disciplinary boundaries

P.F. Downton, *Ecopolis*, DOI 10.1007/978-1-4020-8496-6_3,

and claimed a universal relevance for their new 'science"' (Turner 2006 p. 25). Fred Turner's fascinating study of the co-evolution of counterculture and cyberculture describes how "In this process, two rhetorical tactics played especially important roles: the use of prototypes and. . . 'legitimacy exchange', a term that refers to the process by which experts in one area draw on the authority of experts in another area to justify their activities." (Turner 2006 p. 25). It seems to me that urban ecology is at an equivalent stage in its development and needs to employ a similar approach.

The Knife Moves

Epistemology is the science that deals with the origin and method of knowledge; it is about the way we think, how we choose to view and consider the world. An heuristic method is one in which accuracy is traded for speed in order to solve a problem rapidly with something close to the best possible answer based on reasonable estimates and available knowledge. It is a way of allowing or assisting the process of discovery, partly through a process of trial and error. As the basis for an epistemology it has the benefit of being able to accommodate intuitive judgments. By allowing intuitive overviews and use of the sense of the whole that we all possess but have trouble quantifying, it can be helpful for dealing with phenomena that cannot sensibly be understood by reductionism, like cities. The heuristic device of a conceptual model of a city can be used to explore the inter-relationship of elements, such as social or physical infrastructure, that are necessary to support the model. The use of story and metaphor can help construct scenarios to test the model, identify problems and develop potential solutions.[1]

When it comes to the consideration of the built environment in an ecological context, most architectural and planning epistemologies betray a number of inherent limitations. Despite the plethora of architectural courses worldwide with 'theory' in their titles, no clear model of architectural theory has ever emerged in them (Lang 1987 p.2), so it is hardly surprising, for instance, that there are no schools of architecture in Australia with programs constructed on the foundations of an *environmental* system of knowledge.[2]

In response to the limitations of knowledge in the disciplines of architecture and planning I have ranged widely across the boundaries of architecture, design, geography, ecology, biology, sociology, economics and political philosophy in an attempt to bring together disparate methodologies including those contained in architecture, design and life sciences. Situating the work in this context of an

[1] An example of this 'thought experiment' approach is given in Appendix 1.

[2] Although there is promising progress. In recent years the University of Adelaide has introduced a subject 'Natural and Urban Systems' that purposely sets out to provide an urban and ecological basis to the undergraduate education of architects.

inter-, or trans-disciplinary,[3] approach where intellectual integration is achieved other than by 'the linear accumulation of subject matter,'[4] is intended to achieve three related things:

1. The location of architecture, planning and urban design in an environmental context where they can be clearly identified as sub-sets of urban ecology,
2. An ecologically rigorous description of the activities of city-making for which architects and other urban professionals claim responsibility.
3. A system of knowledge and praxis for the design and development of human settlement that engages the wider community.

This contextual imperative is reinforced by the advocacy that has been at the heart of my research, where the trans-disciplinary path is really many paths, crossing and re-crossing one another as they explore the territory of enquiry (the idea of layered, braided pathways again echoes the metaphor of weaving). Environmental studies programs are typically trans-disciplinary. They are where graduates from many disciplines are brought together 'in a bid to produce flexible analytical tools needed to address problems associated with amorphous organic systems.' (Doyle 1997 p.39). Cities comply readily with the definition of 'amorphous organic systems' and their problems seem to be well beyond solution by any single discipline of thought or enquiry.

There is precedence for the multi- or trans-disciplinary approach in the work of the pioneers of what might be termed modern urban ecology as an academic endeavour:

> . . .we are necessarily concerned with many variables of a kind that would normally not come within the orbit of the biologist who studies the ecology of a natural ecosystem. Needless to say, this transdisciplinary and comprehensive approach, ranging as it does across many areas of academic specialism in the natural sciences, social sciences and humanities, is not without its problems
>
> (Boyden et al. 1981 p.19)

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[3] In the Review of Graduate Centre for Environmental Studies, Frank Fisher was cited for the following definitions: 'Interdiscipline – A juxtaposition of disciplines so that each is affected by the others; Transdiscipline – A science that recognises the limits to discipline and to generality, i.e. that recognises the embedded interlocking, non-isolable nature of all knowledge and therefore the essentially unreal (although heuristically valuable) nature of reduced specialist knowledge.' (Young 1989 p.3).

[4] In 1989, as the Planning Group Coordinator at the South Australian Institute of Technology I prepared a 'Proposal for a Trans-Institutional Centre for the Environment and Sustainable Development'. In a letter tabled in response to the proposal, discussing the Master's degree program at The Centre for Environmental Studies, the then-director Dr John Young, commented that 'the transdisciplinary structure of the new course emphasises the unique focus of Environmental Studies as a subject defined by the inter-related nature of the problems it addresses, which cannot be absorbed into the traditional disciplines. As you pointed out, universities of late have come to be modeled on pin-factories, with their infinite compartmentalised specialisms. Environmental Studies is forced by necessity to re-create the university.' (personal communication 1989).

Despite the work of Boyden et al. on the city ecology of Hong Kong in the 1970s (Boyden et al. 1981) there was no study of an entire city as an ecosystem outside of Russia or China until the Baltimore Ecosystem Study directed by ecologist Steward Pickett of the Institute of Ecosystem Studies in New York which commenced in 1997 (Hamilton 1999 p.39).

> The theory, or conceptual model, guiding the Baltimore Ecosystem Study is derived from several complementary disciplines. The sources include physical sciences, social sciences, civil infrastructure, and ecology
>
> (Pickett et al. 2007)

Their work again uses a multi-disciplinary approach and is beginning to provide the kind of tools that planners need to be able to model and predict the behaviour of microclimate, vegetation or hydrology when built environments are modified and developed (Hamilton 1999 p.42). The scientific goals of the study have been conceptually connected to the socio-cultural environment, as indicated by a key question set by the researchers as part of the study research goals when they asked themselves 'How can urban residents develop and use an understanding of the metropolis as an ecological system to improve the quality of their environment and their daily lives?' (Pickett et al. 2007). This question is important as it is recognises that scientific work cannot, in itself, deliver more sustainable communities because that can only be achieved through socio-cultural and political activity. At the same time, without science the notion of ecological cities could never be more than a chimera. The science makes the task of creating viable urban ecosystems more likely, by improving our understanding of how biophysical systems function. As Sears aptly noted '. . .science does not exist so that we can outwit nature – an impossible task – but rather to comprehend it and guide ourselves accordingly.' (Sears 1962 p.23).

The architectural world-view is based in humanism and the arts and has neglected science. As an architect with limited scientific training my decision to engage with the community when I was based in academia was an epistemological decision intended to generate empirical information without the boundaries of traditional disciplines. In relation to architectural theory-making my approach has, technically, been dealing with *models*, *hypotheses* and *normative theory*. It is about having a model, or 'way of perceiving reality that imposes a structure on that reality' (Lang 1987 p.13) (what Lang also calls a philosophical position); it is about predicting outcomes from certain actions, i.e. having hypotheses; and it is normative – being to some extent concerned with design principles and standards and having an ideological position on what constitutes good urban design, for instance.

Reconciliation of Urban and Non-urban Epistemologies

If cities are to be the fulcrums for levering global change the theory of their design and making needs to address the pre-industrial and non-urban cultures that are both extant or buried in the urban-industrial psyche. The role of traditional and

indigenous cultures in relation to modern urbanism has to be one of informing the deep cultural roots of being – bioregionalism offers a way to do this, combining scientifically derived knowledge of resource and ecological limits with an appreciation of the cultures of the people of a place (Berg 1991, Sale 1991 p.42) (see also Chapters 3 and 4). But tribal cultures do not hold the magic key to solving environmental, social or spiritual problems for the predominantly urban species that now holds sway over the state of the planet. In his lucid introduction to 'The Limits of the City', Murray Bookchin succinctly makes the case for seeing the positive side of civic realm and the limitations of tribal culture.

> . . .I am concerned not only with the uniqueness and limits of various cities but also with the city as a distinctly human and cultural terrain. The city is more, in my view, than an epiphenomenon of a broader division of labor between agriculture and crafts or barter and commerce; it is a world *in its own right* (author's emphasis) that goes beyond familial, tribal, economic and social ties to establish a uniquely political universe of its own. For all its collectivism and strong bonds of solidarity, tribal society was surprisingly parochial. Based on kinship, however fictitious its reality, the tribe rooted its affiliations in lineage ties. . .The city, by contrast, over a long period of development, created a more universal terrain – the realm of the citizen. Civic rights depended upon residence rather than a shared ethnic background. . .*where*. . .the 'stranger' could first find a home and the protection of laws, and later, citizenship as one among equals, not the arbitrary treatment that characterizes the status of visitors to tribal communities
>
> (Bookchin, 1986, pp.6–7)

With the rise of interest in tribal cultures and attempts to reconcile modern industrial civilisation with its history of economic exploitation, social and cultural oppression (Maybury-Lewis 1992), this view is at odds with those held by many people in the environment movement. The 'myth of the common goal' and the tendency of environmentalists to perceive constructive criticism as destructive dissent (Doyle 2000) make it difficult to advance views that are contrary to prevailing wisdom, but when it comes to cities, the environment movement has displayed very little wisdom; new urbanist Andres Duany suggests that 'The environmental movement needs expertise in urbanism. . ..At the moment they are very inexpert, you still get environmentalists who prefer low-density housing.' (Zimmerman 2001 p.30). Notwithstanding the observation by Doyle that 'On the urban front much imaginative work by Australian environmentalists is under way.' (Doyle 2000 p.216) environmental activists tend to skirt around the task of making our urban civilisation fit the patterns of biosphere. There has been a pattern of general avoidance of urban environmentalism across the board. When the Australian federal government began exploring ESD policies in 1990, nine sectors were identified as key areas to address and the built environment was conspicuous by its absence.[5] Internationally, Rees made the point in the late 1990s that 'cities have been given short shrift in the mainstream sustainability debate.' (Rees 1998 p.3). Approaching the end of the first decade of the 21st century there is a great deal more discussion about cities in the

[5] An omission that was also noticeable when the Commission for the Future ran the 1988 Greenhouse conferences across Australia.

mainstream of debate on sustainability, but it remains curiously peripheral when it should be considered the core issue.

Architecture, Cross-talk and Points of View

> In 1925, the French architect Le Corbusier proudly praised the fact that cities were an assault on nature
>
> (Gardner in Canfield (ed) 1990 p.10)

The terms 'green', 'sustainable' and 'ecological' are nowhere as slippery as in discussions of architecture and planning. It is unwise to treat them as equivalent. 'Green' and 'ecological' cities are often used deliberately as meaning the same (and I have been as guilty of this any other writer). This can lead to epistemological confusion.

Architects design buildings, but they also design cities (see the work of Soleri, Le Corbusier, and Wright in Chapter 4). As the above reference to Le Corbusier suggests, architectural culture heroes have left a philosophical legacy that is not necessarily sympathetic to environmental concerns. The scope of architectural design is wide, but the scope of design is altogether so wide that it encompasses virtually all human activity. Rapoport suggests that all artificial environments are designed 'in the sense that they embody human decisions and choices and modify the world in some purposeful way.' (1980 p.291). If 'The work of a tribesman burning off, laying out a camp or village or building a dwelling is as much an act of design as the planner's or architect's act of dreaming up ideal cities or creating beautiful buildings.' (Rapoport 1980 p.291) then the democratisation of architecture is implicit in the view that design is a normal component of human action in the environment. What is architecture and what is not is defined by culture.

> So also the 'symbolic universe' of architecture... is entirely a product of the societal universe
>
> (Mänty 1999 p.104)

For architects, architecture is about principled endeavour, or the craft of building, or both, or something in between, depending on one's philosophical (or ideological) position. Architects are capable of arguing vehemently about subtleties of design that might entirely escape the uninitiated – and of giving design awards to projects that are popularly disliked. The symbolic universe of architecture is defined according to a given point of view, so that there are, in effect, any number of such universes. If the architecting of built form is to have any relevance to the wider community (which is a fundamental precept of participatory, community-oriented concepts of planning and design) it must carry appropriate meaning. It is unlikely that architects can establish that meaning by talking among themselves for, as Lang observes 'Professions are not good at monitoring themselves or the quality of their work. Expecting practitioners to broadcast weaknesses in their design solutions and in the theoretical assumptions on which those solutions are based may be asking too much.' (Lang 1987 p.248).

The language employed by architectural critics and theorists can appear almost willfully obscurantist. Even apparently fundamental terms used in the language of design lack shared definitions by those using the words. Discussions about 'spatial' issues by planners and geographers generally embody different concepts from those intended by architects using the term. Planners and geographers mean 'distribution in space/location on a map' whereas architects mean the three-dimensional modeling of space. There are thus both dimensional ('2D' vs. '3D') and scale differences. This lack of shared definitions for common terms extends to other fields of study and practice; an ecologist's concept of space may be different again. In recent years the concept of 'environmental space' has been introduced into the lexicon of planning for sustainability. 'It describes the scope for human activities by defining environmental constraints' (McLaren et al. 1998 p.6) but one can be certain that, presented with the term, most architects would imagine quite different interpretations. If architects have difficulty communicating with each other and with other disciplines because of their specialised use of language, then it is not surprising they have difficulty in communicating with the wider community.

Dialogue with the community has to be an integral part of the larger architectural endeavour. Historically, and particularly during the 20th century, there has been little evidence of this dialogue. Nevertheless 'Every artefact is expected to have certain properties, or characteristics, or qualities, after being put through the processes of designing and building.' (Mänty 1999 p.41). The challenge is to link a popular culture of ecology with the making of architecture and the design of cities – and thence to link the perception of properties, characteristics and qualities of the resulting built form with appropriate social values. But with the notable exception of Alexander et al. (1977, 1987) it is typical of even the most profound texts on principles in architecture that they do not consider society as a determinant of architectural language – whilst the natural world is regarded as an inanimate backdrop to design rather than a living system.

The architectural fashion industry remains, for the most part, desperately out of touch with ecological concerns and as long as energy hungry office towers dominate the city landscape the ecological city will remain a chimera.[6] In the course in Urban Ecology[7] at the University of South Australia one of my students interpreted the environmental impact of Adelaide's tallest office block (the 30 storey State Bank) in graphic terms and showed that the energy consumed in creating the building was equivalent to the energy released by six Hiroshima-sized atomic bombs! The impact of urban development is enormous.

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[6] Recent adoption of rating tools for buildings have mixed consequences that are doing little to change the fundamentals of the problem. For instance, new '5 Star' rated office buildings in Adelaide, Australia appear to consume more energy per square metre than the much maligned 1960s edifices. A strong government building code requirement that limited energy use on a per square metre of floor plan basis would be much more effective than voluntary, industry selected rating systems like GreenStar and LEEDS, especially when, as in the Australian experience, there is a high cost to getting the ratings and only wealthy clients can afford them.

[7] I initiated this and it became a core subject in 1998, but the course was dropped in 2001 in favour of a non-specific program for making 'environment' a part of the whole BArch course structure.

Ideology and Ethics

> Clearly, there is no universally accepted single concept or model of the city. We must assess the varied approaches and ideas of students of the city from different disciplines and ideologies
>
> (Douglas 1983 p.1)

Ecology is an evolving science. According to Gill and Bonnett 'Species diversification stabilizes the system: the greater number of species, the more stable the systems.' (Gill and Bonnett 1973 p.3) but Haila and Levins argue that this is not true and that local communities seem to possess the highest diversity in sites subjected to recurring environmental disturbances (Haila and Levins 1992 p.8). Haila and Levins explore the broader issues of the relationship of ecology to society considering ecology in its several meanings as the nature, the science, the idea and the movement. (Haila and Levins 1992 p.ix)

In the primary precept of the Ecopolis theory[8] there is an attempt to adopt an ethical position which correctly informs and frames the reference for any outcomes of the theory. Haila and Levins distinguish between moralistic and ethical attitudes about nature and provided an excellent discussion of the issues in their chapter 'What Program can Ecology set for Society?' (Haila and Levins 1992). Rejecting the cultural construct that sees only a narrow, instrumental view of nature as merely a collection of usable elements, and calling for an 'appreciation of nature as a value by itself', they nevertheless recognise the necessity for humans to accept their interventionist role in ecology.

> Moralism claiming that humans have no right to intervene with nature is equally unintelligible as claiming that lions are 'immoral' when eating gazelles, or pikes be 'immoral' when attacking roaches... We are creatures of nature and live of nature, and we simply have no choice in this respect. *What matters is not whether we modify nature or not, but how, and for what purpose, we do so*
>
> (Haila and Levins 1992 p.11) (Author's emphasis)

Haila and Levins caution against setting up a 'cheap opposition' between instrumentality and appreciation and go on to propose that 'we should figure out ways of integrating ecological knowledge with social affairs without constructing prescriptive rules.' (Haila and Levins 1992 p.12). This is precisely the intent of the Ecopolis theory and the purpose of the Seven Steps described in Chapter 11. As cultural creatures we are not ignorant of our impact on our environment but neither do we possess sufficient knowledge to predict the consequences of our activities. Barry Commoner's exhortation that nature knows best implies a final ignorance on our part whilst one of Eugene Odum's ecological vignettes tells us that 'Nature is mute, she does not give us explicit advice; she only forbids, sometimes only post factum.' (Odum 1998 p.13).

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[8] That ecological cities are urban systems consciously integrated into the processes of the biosphere in order to optimise the functioning of the biosphere for human purposes.

Defining Urban Ecology

> Beginning with Kropotkin's Mutual Aid the study of human ecology has taken a more positive turn: witness Huntington's studies of civilisation and climate, the urban investigations of the Chicago school of sociologists, and above all, Patrick Geddes's lifelong effort to develop a sociology on the basis of biology, and a social art on the positive foundation of our biological, psychological and sociological knowledge. . .
>
> In emphasizing the importance of this new orientation toward the living and the organic, I expressly rule out false biological analogies between societies and organisms. . .
>
> (Mumford 1938 p.302–303)

To understand the world as a living system and be able to practice design in that context requires a system of knowledge that links design to the needs of individual humans, society and nature. Whether we look at individual buildings, social dynamics, or the demands on environmental space, we find that urbanisation is at the core of contemporary concerns. Urbanisation is the effective replacement of natural ecosystems by an artificial system:

> Urbanization is the ultimate replacement of all natural elements (soil, hydrologic system, vegetation, and fauna) by man-made (sic) ones: roadway, sewage network, lighting and heating apparatus, living and working constructions. Whereas in the forest, the field, and the garden, man is an influent, in the city he has practically suppressed other members of any possible biocenosis,[9] barring those that are completely domesticated (dogs, canaries, goldfish), or the inquilines[10] (rats, houseflies), and the parasites (lice, fleas). The natural order has been so far disrupted that the recurrent menace from weeds, trees, and animals is very remote
>
> (Dansereau 1957 p.263)

The idea of 'replacement' is relative. It implies separation between nature and humanity when, ultimately, humans are clearly part of nature, entirely dependant on the same bio-geo-chemical processes that sustain all other living things. The concept of urban ecology can perhaps best be understood as a means of reconciling the natural and the artificial in a systematic way that seeks connectivity between diverse areas of knowledge and ways of comprehending the world:

> Urban ecology means simply an attempt to combine two different elements, natural and 'man-made', in an urban context. Ontologically this task is not simple, because in the Western scientific tradition these two elements have been separated and analysed in isolation. Urban ecology combines expert knowledge from the different sciences, especially the natural and social sciences
>
> (Koskiaho 1994 p.27)

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[9] Biocenosis is the participation of various organisms in the nutritive elements of the environment, or better, in all the resources of the environment: space, food, shelter, etc.' (Dansereau 1957 p.238). An association of different organisms forming a community; the relationship existing between such organisms (Concise Oxford Dictionary 1992).

[10] Inquiline – an animal living in the home of another (Concise Oxford Australian Dictionary 1992).

Having established a system of knowledge for analysing the artificial, urban ecosystem, how does one employ that analysis in constructing such systems? What is the role for architecture, planning and design? Koskiaho (1994 p.55), citing Levy and Naess, identifies four categories for urban ecology projects but suggests that a sharp distinction between them is not practically possible:

1. Repairing and partial: ecological renewal of districts and single buildings
2. Preventative and partial: ecological rebuilding of new development areas or of single buildings
3. Repairing and structural: changes in the town's infrastructure due to ecological considerations
4. Preventative and structural: ecological principles for future patterns of built up areas and transport systems

Three of the four categories address repairing and rebuilding rather than new building. The emphasis is on a remaking of the existing built environment.[11]

This European concept of 'urban ecology projects' (Jensen 1994 p.39) is informed by social concerns but is primarily to do with built form construction as a means to improve environmental conditions. Until the advent of activist ecocity groups, the American understanding of the term 'urban ecology' tended to relate to sociological studies with relatively little emphasis on environmental conditions. In the book 'Invisible Homeless: A New Urban Ecology' for instance, we find an historical account and analysis of homelessness in America since the Civil War. The ecology refers to social ecology and there is no overt connection made with broader environmental factors apart from obvious references to physical deprivation. This is a pertinent text in relation to environmental epidemiology. (Ropers 1988).

Whereas any city can be analysed and understood as an ecosystem, an ecological city is a term intended to identify a particular *type* of city. A type that would seem to transcend, or rather contain, Lynch's three city types, as it is conceivable that the 'celestial' or 'mechanical' types might be as capable of becoming ecocities as the 'organic'. Whereas the celestial and mechanical city typology is strongly related to formal representation of a particular kind of functional demand (obedience to the centre, interchangeability of parts), those forms do not preclude their function as managed ecosystems. The most important aspect of city form in this respect may in fact be *density*, as a sprawling city of any type is harder to service efficiently. Walkability, complexity and internal interconnectivity are strongly related to density and any city type might be developed to provide these characteristics.

The physical form of an ecocity is important but the way it works is what distinguishes it from a non-ecocity. In other words, it is about its occupation and operation rather than its built form. Nevertheless, one would expect the built form to evolve in response to, and to reflect, essential requirements for effective ecological performance.

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[11] Shadow Planning (see Chapter 10.7) can be seen as a category 4 activity leading to more detailed consideration of individual retrofit and new building design at the level of categories 1 and 2.

After establishing that the ecological city concept is part of the gamut of practical urban ecological responses, although he observes that it is not 'a constant entity' Koskiaho finds there are four typologies of ecocity approaches' (1994 p.61):

The first approach: a protest against western culture, new philosophies, biocity – mostly represented by the 'alternative' movement, this is seen as too focussed on small communities to be relevant to the problems of existing 'very urban' environments;
The second approach: from natural sciences – mostly represented by biologists and engineers, this is perhaps too materialistic, lacking 'understanding of social and human factors';
The third approach: a practical city planning approach – mostly represented by architects and urban planners, this is in danger of 'technologisation of the whole ecologisation in city planning (technopolis)';
The fourth approach: human and social critique – mostly represented by human and social scientists, this is seen as providing challenging critiques, but little else.

Ecopolis attempts to combine the valuable contributions of each of the four typologies, albeit with a necessary tendency to simultaneously carry the problems of each, but it should be possible to transcend the limitations of the four typologies.

2.2 Further Words on Architecture and Ecology

> Architects tend to think architecture matters. Not everyone else does
>
> (Day 1990/1995 p.7)

Buildings are amongst the most powerful 'transmitters'[12] in any culture. Architects have long seen themselves as guardians of values expressed through the built environment. In considering the relationship of architectural theory to the nature and limitations of an ecological world-view it is instructive to relate notions of sustainability and ecology to aspects of architectural theory.

Greening the Discourse

Architectural discourse and criticism tends to the manufacture of apologia for certain styles or approaches to architecture. The cynical view of architectural theory sees it is as a field in which even the academic writing is no more trustworthy than the rhetoric of stylemongers. Nevertheless, the embrace of sustainability has been

[12] A phrase borrowed from Andres Duany.

a striking feature of architectural publishing in recent years. The Architectural Review, published in London, is one of the most venerable and respected publications in the world of architecture. It is a measure of the growing impact of ecological concerns on the profession that during the 1990s it began to produce ever more frequent issues on 'green' themes (1993, 1996, 1997, 1998, 1999, 2000).

Le Corbusier rose to fame in the early part of the 20th century and became a culture hero for architects with his visions of high-rise towers set in great parks with huge highways and aircraft filling the sky. Every house was a cog in his designs of machines-for-living that he mistook for a city. His book 'The Radiant City' is one of the great classic texts of dystopian urban-industrial madness. It may be that 'From our standpoint today it is hard to grasp the sense of innocence, beauty and liberation that the machine offered to someone like Le Corbusier in the '20s.' (Farmer 1997 p.114) but he celebrated the violence against nature done by city-making. It is hard to see how he might be seriously considered to have provided any worthwhile contributions to green, sustainable, or ecological architecture and planning. Yet a 1996 publication claiming to be about the growing environmental sensibility in architecture[13] contained revisionist readings of Corbusier's work that seek to place his work in a positively green light (Farmer 1996).[14]

Architectural journals are cultural artifacts that also seek to define the culture of which they are part. The world of architects constitutes one of the most influential sub-cultures of the modern era. Its gurus tend to be individualistic hero-figures, its sages and soothsayers speak through the pages of glossy magazines in which image is of greater import than words. If the words serve any purpose, it is to direct the reading of the images, to set out the expectations of how they should be interpreted.

Consider the following example.

In her editorial for the 1999 'Greening Architecture' issue of the Architectural Review, Catherine Slessor provides a brief history of the emergence of sustainability as a movement in architecture (Slessor 1999 p.29). She is a effective writer and her essay is a good example of the more accessible genre of architectural writing. Her observations provide some insight into the state of thinking about sustainability in the enlightened mainstream of architectural theory. The title of her essay 'Touch-

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[13] Published by WWF-UK.

[14] Revisionism is an insidious part of architectural theory. An outstanding example can be seen in the way that the early fascist and anti-Semitic pronouncements and texts by Philip Johnson have been progressively 'overlooked' as his fame as an influential architect increased.

'Whatever we may think of Philip Johnson's qualifications as a designer or of the individuals and movements that he has promoted over the years, there can be no question that he has played a key role in shaping twentieth century architectural discourse. Johnson has been an architectural trendsetter, promoting the International Style, Mies van der Rohe, classicism and historical eclecticism, postmodernism, deconstructivism, and now a kind of Scharounian neoexpressionism. That his own design skills might be weak and that he sometimes took ideas from others and presented them as his own does not change the impact he has had on the discourse.' (Varnelis 1994).

'Between 1932 and 1940, Johnson was an antisemite, fascist sympathizer, and active propagandist for the Nazi government. The discipline of architecture has been largely silent on the issue of Johnson's right-wing past. . .' (Varnelis 1994).

ing the Earth Lightly', is an overt reference to '. . .an Aboriginal saying quoted by Glenn Murcutt. Steeped in Aboriginal culture, it also embodies a wider ecological resonance.' (Slessor 1999 p.39). Notwithstanding the tautology of *'an Aboriginal saying. . .steeped in Aboriginal culture*, there is the remnant of 'noble savage' romanticisation in the reference (especially given the absence of any Aboriginal architectural culture) whilst the authority of the quote is derived, not from its aboriginality but from its use by Glen Murcutt, who enjoys acclaim as just that kind of guru-like, individualistic hero-figure that the architectural sub-culture seems to require for its intellectual sustenance.

In a by-line Slessor tells us that 'Synthesizing the lesson of tradition with the advances of technology is crucial, if humankind is to meet the challenges of the current environmental cataclysm and re-evaluate its troubled relationship with the planet.' (Slessor 1999 p.29).

There are three important components to this statement:

Firstly, the value of traditional and modern technological practice is recognised as part of an on-going synthesis. This stands in stark contrast to the Modernist agenda which, in various manifestations since its initial rise to dominance during the fascist era of the early Twentieth Century, has held sway as the intellectual armature of architecture with its insistence on the need to abandon pre-industrial practice and be 'liberated' from the past. In her call for a synthesis of traditional knowledge with advancing technology Slessor echoes the ethos of critical regionalism expounded by Frampton (Frampton 1980/96, Frampton 1987).[15]

Secondly, ecological concerns are expressed as both global and immediate – the challenge is that of 'the current environmental cataclysm'. This is a far cry from the 'whoops the oil is running out' scenario that drove the push for energy efficiency in the 1970s. It accepts, with alarm, that we are in the deluge and that action is required.

Thirdly, a 'Gaian' sensibility is expressed in the recognition that humans, as a global species, have to re-evaluate a 'troubled relationship with the planet'. Prior to the widespread dissemination of Lovelock and Margulis' Gaia Hypothesis it was unthinkable, in a serious professional journal, to use language that spoke of relating to a planet as an entity. Imperfectly understood though it may be, the Gaia Hypothesis has given rise to a new way of conceiving of, and discussing global environmental issues that see them as intrinsically linked, not just to one another, and not just to the actions of humankind, but also to the *way of being* that humans adopt and enjoy. This ecological connection of culture to its environmental context, always inherent in verancular architecture, is now being revisited and celebrated in the evolving architectural idiom of which Slessor's essay is itself a partial reflection.

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[15] Frampton articulates an approach to architecture that places all technology, knowledge and the science of building (tectonics), understanding of culture, and response to place, in the stream of history for fishing out as required by architects who choose to reflect the particularities of the place, time and people for where, when and whom they are employed. (see also Sections 4.3 and 9.6).

This Gaian reflection is magnified in the first sentence of her first paragraph when Slessor implicitly acknowledges the spiritual dimension of global environmentalism, saying that 'Sustainability has become an elusive, mantric ideal for the late twentieth century. . .'. But perhaps the most important sentence is the one that implies a more complete approach to making architecture that is entirely congruent with the kind of cybernetic trans-disciplinarianism advocated in the Ecopolis idea:

> . . .the emergence of sustainability as a movement is clearly to be encouraged, for it offers the prospect of a holistic response to the present environmental crisis and makes much-needed connections between nature, culture, economics, politics and technology
>
> (Slessor 1999 p.29)

Architects are directly responsible for shaping only a small part of the built environment, but society's most important structures are usually architect designed. Architects are taught to see the bigger picture, to understand the role of the microcosm in the macro – the how and why of making sure that the nail holds the horseshoe in order to win the war. Architects spend many years developing their skills, some of which are very practical and to do with the technics of construction, some of which deal with understanding the vagaries of climate and culture, and some of which are quite arcane. The broad scope of architectural education sets it apart from disciplines like mathematics or physics and has made it difficult to fit within the framework of universities in the modern era. The study and comprehension of topics as disparate as mud-brick manufacture, contract law and aesthetics is intrinsic to architecture. Slessor is correct to say that architects have always been known as generalists '. . .assimilating a wide variety of information and converting it into a solution.' (Slessor 1999 p.29).

Slessor sees sustainability as a challenge to architects to employ their multi-facetted skills to solve environmental problems because it '. . .encompasses areas as diverse as ethics, economics, sociology, ecology, history and biology.' Although the span of subject matter dealt with by architects during their education and in practice may be as broad as those which come under the rubric of sustainability, the manner in which they deal with them may not be immediately transferable. Despite the wealth of material they learn to assimilate, architects are trained to produce finite objects within finite time scales whereas sustainability is about on-going process. It may be optimistic to suggest that 'The analytical and deductive skills of architects can be used to make sense of the complex systems and interactions of global ecology.' (Slessor 1999 p.29) but it is in this requirement for architects to cover a wide spectrum of issues and have an understanding of connectivity, that one can discern links between the discipline of architecture and environmental studies.

For all the intelligence represented in Slessor's essay and the clear links it draws between the practice of architecture and the need for architects to engage profoundly with environmental issues, and despite its celebration of vernacular heritage, it does not connect with the broader community in its language or content. Although the words 'systems', 'interactions' and 'community' appear in the text, the essay is coded to speak to those immersed in the architectural sub-culture and betrays an abiding preoccupation with form rather than process where, somehow,

the invigoration and inspiration of 'natural forms' and 'quotidian' (commonplace) construction represent an 'immemorial dialogue between architecture and ecology'. (Slessor 1999 p.29).

2.3 Towards Sustainable Human Ecological Development

> The barriers that separate academic disciplines are stronger than the links, a fact that mitigates against an understanding of the urban ecosystem
>
> (Spirn 1984 p.240)

Putting Design in Its Place

The hairless ape has evolved to need shelter to the point that, unless specifically trained otherwise, modern humans cannot survive without it. The most so-called primitive human cultures construct environmental adjuncts to their bodies which modify the climate to make more efficient their own bodily functioning. Humans are essentially incapable of raising their young without constructing shelter for the purpose. Human settlement, that is, settling in place, is a precondition for the development of civilisation, but we have a very poor record assessing whether our building and city-making really works.

Despite the efforts of pioneers like Van der Ryn (Van der Ryn 2005 p.25) another measurable aspect of building performance largely neglected by the design community is post-occupancy evaluation. Architects and most others concerned with designing the environments that people use rarely check to find out how well those environments perform from a user's point of view. Similarly, there is very little testing done of the *actual* environmental performance of buildings in terms of energy, water and resource use. So we are faced with the apparently curious fact that most of the environment occupied and used by humans is never formally tested or evaluated in relation to *any* aspect of its performance. This is so well known that nobody talks about it and so well accepted that practically no-one questions it. At the same time we know that our built environment is failing us. Most buildings perform poorly in terms of energy, water and resource use – it is being belatedly recognised that, applied across the board, even a small improvement in energy performance alone would reduce carbon dioxide emissions sufficiently to meet the Kyoto Protocol requirements.

Why is it that this abysmal performance is accepted? Because buildings perform a powerful symbolic function. They are not built merely to provide shelter and security but to display wealth and power and express cultural messages. Otherwise there would be no Great Pyramid, Taj Mahal, Eiffel Tower or Guggenheim Museum. The meaning of a building takes precedence over its value as an efficient or effective shelter. Otherwise why would people accept as they do, all over the world, expensive

house designs that gobble energy and destroy valuable resources – but fit the dictates of cultural norms which speak of status and fashion?

In many ways, rather ironically, architects and other professional trumpeters of design have succeeded in trivialising much of what is most important to us. By treating design as little more than aesthetic conceit, the relevance of design in the built environment has been diminished, reduced to a question of taste and fashion. And at the same time, unforgivably, the high culture of architecture and design has wilfully disengaged itself from the popular tastes and practical concerns of most of the population. By determinedly positing architecture as a kind of fine art, the high priests of the design religion have done what the worst of religiosity has always done – create and then exploit the power of secret knowledge, and insulate the deliberations of the priesthood from the concerns of daily life.

One of the primary tasks is to bring the design professions into an integrated, trans-disciplinary knowledge base within a framework that supports design and development of towns and cities in an ecological and socially responsible context. Owen tells us that 'There is. . . a wide range of texts on the natural environment in urban areas within the disciplines of hydrology, climatology, horticulture, civil engineering, geomorphology and ecology.' but 'Much of their content, which tends to be re-worked from text to text, is expressed in the terminology of the parent academic discipline and is presented as part of a discrete field of knowledge.' (Owen 1991 p.16–17). If ecology is the study of the relationship between living things and their environment then architecture and planning might best find their place within a new science of urban ecology. Historically, the disciplines of architecture and planning have between them encompassed the art, science, theory and practice of creating human settlement across a scale that ranges from the details of individual shelter to the level of regional and national planning strategy. Given the epistemological confusion that is endemic in architecture and planning, and the urgent need to address the impact of city-making on the biosphere, *I propose that architecture and planning be redefined as sub-sets of urban ecology*. In turn, urban ecology must be understood as one of the life sciences. This would position the production of human settlement, and all its associated artifacts, within a conceptual framework based on understanding the dynamics of living systems.

The traditionalists (most clearly represented in the mainstream of architectural education and readily identifiable across the very wide range of architectural practice) hold to the view that architecture is principally and fundamentally concerned with the intellectual and technological creation and manipulation of artifacts, with a strong emphasis on the aesthetic implications and value of that manipulation. There is some concern with resulting social and environmental impacts but that concern is not central to what are essentially artistic preoccupations. Innovation is valued to the extent to which it supports the creation of more artifacts and lends value to the central activity of design – for its own sake.

Design occupies centre stage and contemplation of design provides the paradigms within which architecture is generated. This is, typically, self-referential – most books on architectural design are about architects and what they have designed rather than the how and why of the design process. Assessment of the ecological

implications of any design is almost invariably confined to the visual environment, i.e. aesthetics.

Traditional mainstream planners, on the other hand, tend to be less concerned with aesthetics and more interested in the functional aspects of things. So we find that it matters less what individual houses and buildings look like than how the lives of their inhabitants and users are affected by them. The appearance of a town or city is less important in the final analysis than how effective it is at operating as a focus for trade, industry, habitation and social interaction. Planners have clearly articulated concerns and codified responses to the placement of human artifacts in the landscape and there is a large body of knowledge and its application regarding connected issues such as water supply and service provision – knowledge which implies some understanding of the physical connections between the artificial processes of making settlement and those natural processes which shape and make the landscape.

Although planning is more usually about process than architecture and its obsession with artifacts, the dominant processes which provide the parameters within which planning operates are artificially generated. The most obvious and powerful parameters are generated by the economic system. Environmental impacts may be acknowledged but they are subsumed in the context of the prevailing economic order and its associated value systems. Conventional planning rarely challenges the status quo and its role is essentially to extrapolate trends and develop policies and organisational forms which reflect the perceived needs of those who set the trends.

So, to put it crudely – architecture is to do with a self-referencing, object-orientated craft activity – planning is to do with placing the objects of architecture in patterns which do not adversely affect the dominant economic order. Any connection between these activities and the state of the planet's ecological health are mediated by their respective preoccupations and are thus seen as incidental or peripheral to the central tasks of architectural creativity or pragmatic planning.

Many architects and planners are dissatisfied with, and disaffected by, this state of affairs but the intellectual and political structures of their disciplines do little to help them change it. Landscape architecture sits somewhere between architecture and planning but fares better in terms of having a basis to its way of knowing because it is founded in both the world of design and the need to understand living systems (so that the plants will grow). It behoves us to remember that the founder of town planning, Patrick Geddes, developed his ideas using an approach that was fundamentally multi-disciplinary and recognisably ecological in its examination of the phenomenon of the city. It is perhaps significant that he came to the subject trained as a biologist and was thus used to the contemplation of living systems.

Architecture and planning are primarily concerned with the creation of human settlement, i.e. places for people to live. In order to do this water and food must be obtained ('settlement' implies staying) and shelter must be erected (to create desirable micro-climates and to keep out unwanted people, beasts or other things). All these activities have an immediate impact on the environment, both animate and inanimate. The creation of the built environment is, arguably, a more damaging human activity than warfare. In the developed world 50% of greenhouse gas emissions

can be attributed to the making and maintenance of the built environment and both historically and presently, the establishment of every urban centre has necessitated the ecologically destructive invasion of agriculture into its hinterland.

Whereas it is possible to identify design processes in both conscious and unconscious activities which manifest artifacts amenable to design-orientated analysis, it remains an inescapable, scientifically verifiable fact that the environment is affected as a primary consequence of the creation of any aspect of human settlement. For instance, it may or may not be the case that a piece of wood is crafted into an implement for the purpose of, say, making a clearing for agriculture or shelter construction, but obtaining the piece of wood necessarily entails affecting a tree, even if it is only to remove a dead branch from the forest floor – depriving the soil of a nutrient source.

In other words, the artifacts and economics associated with architecture and planning are of less consequence than their impact on ecosystems.

Architecture's Next Golden Age?

This being the case, the academic disciplines and professional practices of architecture and planning must accept that ecological manipulation is their core activity and requires an appropriate theoretical framework. This would not deny the importance of all those activities and concerns, both theoretical and practical, with which architecture and planning have traditionally been associated, but it would assert the need to maintain global ecological health as a prerequisite for the development of human settlement. It would move the architectural goalposts away from purely aesthetic concerns to set the target of achieving satisfactory ecological functionality as the essential means of connecting buildings to place. In his exploration of the idea of extended phenotypes, Turner proposed that '. . .the path to biology's next Golden Age will involve breaching the essentially arbitrary boundary between organisms and their environment, to create a biology that unifies the living and inanimate worlds.' (Turner 2000 p.212). This is what ecology is about; any description of an ecosystem has to include organisms *and* their environment and consider them altogether in a connected, holistic manner. Similarly, the making of architecture and cities has to be understood on a theoretical basis that unifies the living and inanimate worlds and that urban ecology provides the means to do this. In so doing, it can establish the functional relevance of architecture and city-making to the management of the biosphere. To paraphrase Turner, 'the path to architecture's next Golden Age will involve breaching the essentially arbitrary boundary between buildings and their environment, to create an architecture that unifies the living and inanimate worlds.'

Placing the goal of creating sustainable human settlement at the core of architecture and planning, and setting the two disciplines within an urban ecological framework, would clearly determine environmental priorities for their respective professional and academic realms. The concept of 'sustainable human ecological

development' would make it plain that the process of design (and all its wonderful creative energies), the role of economics (with all its powerful mechanisms) and the organisation of human society (with its need for culture, equity and challenge) have to be subservient to the inescapable fact that for our species to thrive in its adopted habitat of the city, it must respect ecological imperatives above all else.

By encouraging all those concerned with the creation of human settlement to recognise the complex and interdependent nature of the environment on which they act, it might be that we can escape from the rather too prevalent idea that some kind of technical fix will rescue civilisation or the planet from disaster. City and country would be seen as part of a whole rather than conflicting and separate entities. The concept of an ecological city would no longer appear to be a contradiction in terms.

That contradiction evaporates when it is understood that all cities already exist in an ecological context. The issue then becomes one of defining the relative position of cities to their ecological contexts. An holistic approach to architecture and planning would, of necessity, place these human endeavours firmly in an ecological context. Architecture and planning are inextricably tied up with the urbanisation of this planet and urbanisation is at the core of the environmental dilemma. But how do we understand that dilemma with the tools of a culture that has created it in the first place?

2.4 Romantic Science

Cities are very much about relationships. Ecology is entirely about relationships; between organisms and between those organisms and their environment. Serious students of society and city-making tend to find themselves looking carefully at how ideas are put together as much as buildings – witness Mumford's musings on technology, or Fisher's concern with relationship and process in his 'journey home' (Fisher 1997). Any exploration of the nature of cities must proceed with an understanding of the structure of knowledge appropriate to describing an exploration of relationships. Arthur Koestler observed that the 'citadel of orthodoxy' upon which the sciences of life were constructed in the first half of the twentieth century rests on 'monumental superstitions' including quantitative measurement as the only scientific method and complex phenomena simplified to the extent that their defining characteristics are lost in the process. (Koestler 1975 p.3). In writing about ways to calm traffic and move 'Towards an Eco-city', Engwicht determined that 'schools and tertiary institutions must cease propagating the now outdated notion of detached, objective scientific observation, which by definition is totally impossible.' (Engwicht 1992 p.81).

The Biosphere 2 project for enclosing 1.2 hectares of artificially created ecosystem in a steel and glass megastructure[16] has been criticised for not being proper

[16] See Section 4.2.

science but it can be seen as a project very much in the romantic tradition of holistic total system observation and testing (Lewin 1992 p.12). Biosphere 2 is a good example of how even if the whole is not greater than the sum of the parts it is certainly not the same, and of the necessity for attention to inter-relationships and processes, rather than discrete objects, as a means of understanding living systems.

Picking Flowers

> . . .the reductionist triumph of modern biology: the idea that we can understand nature most effectively by dismantling it
>
> (Lewin 1994 p.31)

There are different ways to do science and concerns with the limitations of reductionism have been expressed for as long as science has been a recognised activity. The Romantic movement in art, literature and philosophy strongly opposed 'the mechanistic Cartesian paradigm' in the late eighteenth and nineteenth centuries in England (Capra 1997 p.21). At the end of the nineteenth and in the early part of the twentieth century in Germany the romantic movement in science defined science as 'any study which proceeds logically and rationally'. In a radio interview for the ABC Science Show in 1989 Carol Adams observed that:

> . . .one other characteristic of the romantic movement is that its model is organic rather than mechanistic. Instead of saying what we will do with nature as scientists is break it down into little pieces and study each individual piece, rather than that, what scientists who are romantic are saying is, 'we the scientists are part of the organic whole of the universe and we must study the universe as a whole. We must therefore see ourselves as part of that whole of the universe
>
> (Adams 1989)

Observation and study of 'Lines of force. . .and. . .inter-relationships rather than discrete, mechanistic particles' (Adams 1989) are what characterise the romantic science viewpoint. Adams went on to contrast the empiricist with the romantic view by describing how 'the empiricist' studies a flower by picking it, taking the leaves off, taking it apart and saying 'Aha, I now understand that flower!' whereas 'the romantic' would sit down next to the flower, study it, think about it, meditate on it – then go away. The difference being that the empiricist destroys the object of study whilst the romantic maintains the flower's integrity as a living organism.

In pursuing the idea that inhabited cities are living systems, it is important to recognise that the purpose of all human settlement manufacture (from the hut to the metropolis) is to accommodate creatures with consciousness. That consciousness is impossible to define on the basis of reductionism. Theodore Roszak damned 'The Strange Interplay of Objectivity and Alienation' in his magnum opus 'Where the Wasteland Ends' (Roszak 1974 p.107) and suggests that 'As a phase in the history of consciousness, the building of the artificial environment may best be understood as an ever deepening condition of idolatry.' (Roszak 1974 p.109). We have seen that

that idolatry may be readily identified in the architectural sub-culture where object fixated world-views idolise and idealise the making of fashionable artifacts[17]. At the larger scale, architects often fail to consider how much the creation of architecture is intimately linked with the patterns of human settlement to which is a major contributor.

Architecture is a social art generated by bipedal carbon life-forms with consciousness. It is the result of a complex mixture of processes embedded in living systems. The truth seeking aspects of this study are better achieved by looking at the whole and through comparative analysis of wholes in relation to human activity rather than reduction of the subject to so many inert bits and pieces. As Koestler wrote in respect of behaviourism:

> The attempt to reduce the complex activities of man (sic) to the hypothetical 'atoms of behaviour' found in lower mammals produced next to nothing that is relevant – just as the chemical analysis of bricks and mortar will tell you next to nothing about the architecture of a building
>
> (Koestler 1975 p.9)

Thus, in order to relate the functionality of architecture and city planning to living systems, this book is written in something of the romantic tradition, seeking to understand its subject by studying the inter-relationships of things as well as analysing the discrete pieces; looking at both the whole and the parts.

Gestalt theorists would claim that a flower dissected for analysis is no longer the flower that attracted the attention of the erstwhile analyst. In this study the pieces of architecture, culture, politics and so on (though some of these pieces themselves include studies in relationships) are there in a similar way to the parts of a dissected flower. Yet the attempt here is to reconstitute a clear picture of the flower. A monocular view would be unbalanced and parts must co-exist with wholes for either to exist at all. To quote Koestler again:

> The two-term part-whole paradigm is deeply engrained in our unconscious habits of thought. It will make a great difference to our mental outlook when we succeed in breaking away from it
>
> (Koestler 1975 p.49)

Reality then, is multi-valent, many facetted and superficially messy. It is certainly complex. It is a reality which results from, and is an expression of, the social and political realities that actually manufacture places of collective human habitation. It needs to be understood that the making of the built environment is also firmly set into the context of politics. Historically, culture studied as anthropology or sociology has attempted to maintain an ostensibly objective viewpoint implying value-free assessments, observations and conclusions, but nothing is value-free if it is in the realm of human affairs. Politics is nothing if not about values.

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[17] To the extent that in professional publications, the higher the art of architecture, the less likely there are to be people in the photographs.

Objectivity, Subjectivity and the Third Way

The issue of objectivity is always tricky. Strictly speaking, it is not possible (Engwicht 1992 p.81). Fritjof Capra has eloquently explained how, at the atomic level, the new physics makes the whole universe subject to subjectivity as the observer affects the observed (Capra 1973/2000). But even at the corporeal level of reality everyone has their own unique version of the history we all share. That human beings are biased towards this or that point of view is an inescapable fact of life. That such biased viewpoints can result in conflict is not a new observation. For instance, the Middle East, which was a preoccupation of mine during the germinating stages of study that eventually resulted in this book, has provided some of the best known and well chronicled stories of human conflict. To write about any aspect of it one cannot help but enter the arena of conflict in which spectators must take sides to understand the game better. To criticise those who feign objectivity is to invite criticism oneself, and protestations of any kind deny impartiality by their very existence! But the honest attempt to tell a story often requires telling the tale from both sides or all. The true story of the bird killed in flight is the story of the bird's life and the life of its hunter, joined together. Fate twists and blends all truths to produce the total truth, which includes the lives and lies of all within it. Thus it is in the Middle East, and, in particular, the Holy Land; where so much of our cultural and moral growth began. This book does not claim to be objective in the sense of providing a value-free report or analysis of any aspect of the topic, which is human settlement, but it does claim to try and fit the stories of birds and hunters well enough together that each might see more clearly how they both belong in the same story. With such knowledge, birds may choose to alter their flight, hunters might forgo their game. But that is their decision, not the story-teller's.

My earlier researches on regionalism and the manufacture of human settlement were focussed on the Middle East. One might reasonably claim that all writing on the Middle East is partisan. There are so many respectable varieties of opinion on Middle Eastern issues that even those who attempt to be non-partisan are liable to lend support to one or another of those opinions! The problem in writing about that part of the Middle East which is known variously and inclusively as Jordan, Palestine and Israel (this range of perceptions itself being a fine example of how difficult it is to convincingly define 'regions') is to be able to be critical of the Israelis, for instance, without being seen as an Arab partisan (or anti-Semitic) and vice versa. This recurring dilemma which all serious writers about the Middle East must confront, has been a prod to my concern to develop a means of analysing and discussing the built environment which is neither culture-bound nor self-deluding or otherwise either dishonest or unfair.

To use an architectural analogy, words can frame a view of things as a traditional window does – transparent and with the direction and framing of the view quite obvious. One knows where one stands as the curtains are drawn back and the picture is revealed. The purported objectivity that may be offered instead may be dishonest

by comparison. There are many papers in which the authors' prejudices are intended to be concealed, where there is no overt value system because scientific method is presumed to have banished human foibles from the scene. These works are not like windows at all, but are more akin to the glazed cladding in Richard Rogers' offices for Lloyds in London, offering the promise of extensive views through walls of glass, but making it dimpled and obscure with many layers and a great deal of hot air passing between the sheets, with only a thin defensive slit through which the observer is grudgingly granted a view. Separated not only from nature by the city then, but separated from the human nature of the city by the building.

Cameron (1998) suggest that 'hierarchical separations of humans from nature' can be 'moved toward a reconciling space of respectful relationship.' But a relationship requires mutual responses that are pertinent to each other and thus capable of development. Is it possible to have respect on the part of one party in a relationship and not with the other? If not, then a 'respectful relationship' with nature is not achievable because however much we may be convinced that we respect nature, nature cannot 'respect' us, it cannot feel 'deferential esteem' towards us, it can only provide the means for us to be alive. At the same time, it might be argued, we are in any case part of nature (in which case maybe we can at least respect ourselves), and we might as well accept that we are nature's route to consciousness.

How then, to employ that consciousness?

Much that purports to be objective in academic investigations is only disguised as such. By quoting particular sources and authorities with appropriate selectivity a reasonably clever student of any subject can achieve the semblance of a well-researched and balanced approach. Any human's selection of material written by another is bound to contain subjective assessments, whether explicit or not. We are all, at least in part, the result of years of conditioning by particular environments, none of which can seriously be considered value free. It is difficult to regard authors who discuss at length their attempts to remain objective without the suspicion that they protest too much.

Subjective views cannot be cleared from the mind, but they can be put into context.

It would be extremely difficult for me to claim any credibility as an objective observer of urbanism and the environment. Most of the activity surrounding the three Ecopolis case study projects is reported from the view of someone who was often simultaneously a co-initiator, advocate, theorist, co-designer of participatory processes, architect-planner, and, particularly in relation to the Christie Walk development, builder, developer and resident. I have a professional architectural background, but I believe strongly that the design of cities is too important to be left to entirely to professionals because, amongst other things, 'The democratic nature of the ecocity movement is fundamental to its existence.' (Orszanski 1993 p.13–14). The issue of social systems in relation to cities is critical, and one of the things I continually attempt to do in this book is bring the making of cities, and architecture, into the realm of the life sciences because cities need to be understood, first and foremost, as living systems.

The problem we face is not one of a lack of knowledge, but more to do with the problem of reaching across disciplines, professions, industry sectors, government departments, advocacy groups and other modern information silos, and to connect and seek coherence in all the knowledge we already possess, for if we can do that we can be sure that the emergent property of that coherence will be greater than the sum of what we already know.

Chapter 3
Architecture, Urbanism and Ecological Perspectives

As we address the new millennium, sustainability should not be seen simply as a corrective force, but as a new mandate for architecture

(Slessor 2000 p.17)

3.1 Points of view

Give a boy a hammer and all he can see are nails. (unattributed)

More or Less?

The world is different depending on how we choose to look at it. A point of view determines what someone will see. There is a tendency to see solutions to problems in terms that are most familiar to those who do the seeing. This limits the extent to which problems are fully and effectively addressed. Thus engineers see the solution to a problem like salination in terms of engineering rather than biology, social workers identify a need for more social work to solve social problems, governments see a need for more government, industry sees the need for more production, academics see the need for more education – and architects see the need for more architecture!

But just as more architecture is no solution, neither is more planning. In 'After the Planners' Robert Goodman (Goodman 1972) provides a critique of planning that still holds true. After working with dispossessed communities in urban America he concluded, simply, that 'it was not lack of expertise that was at the root of these communities' problems.' (Goodman 1972 p.51).[1] Just as one's view is conditioned by who one is, one's cultural background, social circumstances and education or

[1] Goodman's book was an important text in the formative years of my efforts at urban activism in the mid-1970s with a group called Cardiff Housing Action in South Wales. It helped to inform my developing critique of city-making which was also conditioned by its evolution in a strongly environmentalist context. Part of the evidence for the impact and activities of that period are in those illustrations for this book (including the one on this page) taken from my work as illustrator for 'The Second Blitz: The Demolition & Rebuilding of Town Centres in South Wales' (Dumbleton 1977).

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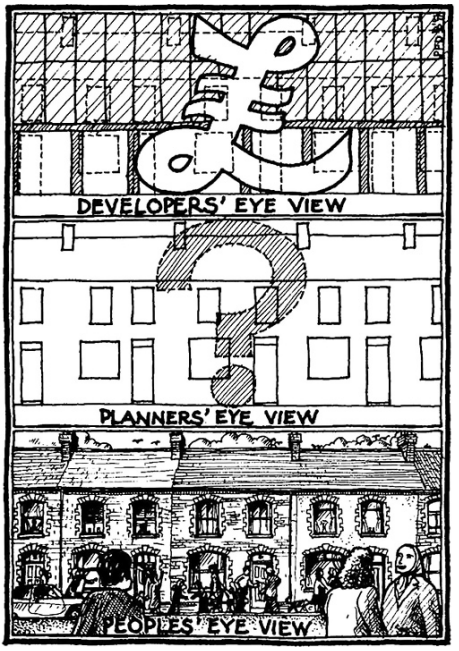

Figure 3: Points of view *(Source – Dumbleton 1977 – Illustration by PFD)*

training, so perspectives on urbanism can be conditioned by adoption, or otherwise, of an ecological view. The architectural perspective on cities is not only lacking an ecological sense, it is often too preoccupied by architecture to see the bigger picture offered by other disciplines.

In order to make sense of the complex problems brought about by rapid environmental changes, it is necessary to look at the overall picture from a number of viewpoints, and appreciate the range of perspectives that make up what we humans think of as reality.

Antecedents and Antitheses

Back in the 6th century AD, under Justinian Law, there were legal rights to solar access, two millennia ago Vitruvius was exhorting people to build so as to suit the climate of the region (Gwilt (trans.) 1867), and solar architecture and urban design has a 2,500 year history (Butti and Perlin 1980). One of the earliest published treatises with relevance to the concept of ecocities is 'The Ten Books of Marcus Vitruvius Pollio' which dates from just after the time of Julius Cæsar (Gwilt (trans.) 1867). It seems that for many centuries, environmental sensitivity has been ignored rather than unknown but even in the modern era there do not appear to be any overarching, coherent approaches to the making of ecological cities although there are a

handful of inspirational theorists and some sustained attempts to compile pertinent ideas and, to a lesser extent, methodologies. (see Chapter 4).

Although they may have existed for decades or millennia, the roots of ecocity ideas reach deep into diverse soil types where even the protagonists do not necessarily agree with each other.

Gardens and Cities

Howard's 'Garden City' is of particular importance to the growth of ecocity ideas. Roelofs states unequivocally that his Garden City was a major influence on green city advocates (Roelofs 1996 p.14) and the concept is routinely cited by writers on green architecture and planning (Farmer 1996, Roelofs 1996, White 2002). Howard's proposed cities certainly contained ecocity precepts, with proposals for light, air and sunshine for all, and the proposition that work, leisure and home be kept within reasonable proximity of each other (although separated by rigid zoning) and served by efficient transport systems. Howard recognised that a city is dependent on a productive landscape and so made appropriate provision in his plans with the city in a 'symbiotic relationship with the surrounding farmland' (White 2002 p.45). He also recognised that the land tenure system could either encourage exploitation or help prevent it, and so he proposed community land ownership schemes that protected property from speculation (Beevers 1988, Howard 1985).

Jane Jacobs has also exerted a powerful influence on the thinking of ecocity advocates like Register and her influence on modern planning has been extensive (see Section 4.2). According to Jacobs though, Howard '. . .not only hated the wrongs and mistakes of the city, he hated the city and thought it an outright evil and an affront to nature that so many people should get themselves into an agglomeration. His prescription for saving the people was to do the city in.' (Jacobs 1962/1984 p.27).

Le Corbusier, on the other hand, celebrated the city as 'an assault on nature' (Gardner 1990 p.10). His vision of an ideal city is infamous for having made respectable the notions of high-rise, tower block living that eventually so disenchanted the planet's urban populace, particularly in the western world. Although critics believe that it has limited value as a model for development outside of Hong Kong and Singapore where territorial imperatives have been paramount, the high-rise housing model is integral to Curitiba's planning (Ravazzani and Fagnani 1999). The multi-level, mixed-use buildings that are part of the Register and Yeang visions of high density ecocities owe little to Le Corbusier, whereas some may see echoes of Corbusier's 'Unité d'Habitation' in Soleri's arcologies.

Soleri's arcologies may be extraordinary (see Chapter 4) but city visionaries have proffered much strange fare in the 20th century. Inspired by the promise of new technologies, the industrial era futurists responded in anything but authentically urban ways. If Howard would 'do the city in' by turning it into a garden, Corbusier would have obliterated much of Paris by turning it into a park in order to build his Ville Radieuse (Jenger 1996 p.50, Frampton 1996 pp.178–185), Frank Lloyd Wright was determined to see the city replaced by a new kind of countryside of extreme,

architectured sprawl integrated with systems of agricultural self-sufficiency (Wright 1945, 1963a) and others, like Garnier, were envisaging an ideal 'city-for-industry' in which greenery was used for 'insulation' between 'rationally dispersed usage zones' (Collins in Wiebensen 1968?, p.7).

Howard also wanted to see the city separated into places of simplified, relatively self-contained functions set in a heavily controlled economic environment, and this was one of his 'powerful and city-destroying ideas' according to Jacobs (Jacobs 1962/1984 p.28). Jacobs was offended by Howard's utopianism, his insistence on the wholesomeness of suburban 'small town' housing and his dismissal of 'the intricate, many-faceted, cultural life of the metropolis.' (Jacobs 1962/1984 p.29). She saw Howard's ideas as paternalistic and authoritarian, with good planning conceived as 'a series of static acts' (Jacobs 1962/1984 p.29). Howard's ideas could also be seen as a reaction to prevailing circumstances in an England at the height of industrial development. 'He saw the great city, the London of his day, not as a faulty machine but as an unstable social structure created by economic forces, by the process of industrialisation which had upset the balance of town and country, industry and agriculture.' (Beevers 1988 p.183). Beevers suggests that this remedy of the marriage of town and country, in the form envisaged by Howard, was now 'little more than a historical curiosity' but maintains that the idea may still have relevance to countries experiencing rapid industrialisation (Beevers 1988).

Conservative or Conservationist?

The conflicting approaches represented by Jacobs' celebration of the metropolis and Howard's commitment to horticulture remain at the core of the sustainable city debate. Nowhere is the width of the divide between current sustainable city approaches greater than in England, home of the Garden City.

> Early efforts in modern design were marked by a concern to develop healthier, greener and more humanitarian environments; English garden cities and new towns reflect this reformist spirit
>
> (Rogers 1989 p.67)

Prince Charles' attacks on modern design were critical contributions to the rise of community architecture in the British Islands and the revival of the idea that people are entitled to enjoy healthier, greener and more humanitarian environments. His efforts to raise public interest in architecture and planning were, arguably, more successful than the efforts made by the architectural and planning professions. His vision of Britain was one in which traditional building and urban forms dominated (Charles, Prince of Wales 1989). In putting his principles into practice he engaged Leon Krier to design an extension to the town of Dorchester in England along semi-traditional lines (see Chapter 5). His quasi-vernacular vision is a response to an historical circumstance in which 'Half a century of planning activity has

transformed the built environment, but has failed to capture the public's sympathies.' (Economakis 1993 p.7) Nevertheless, English architects like Richard Rogers remain determined modernists, and in penning a polemic against the revivalist initiatives of Prince Charles Rogers claims that

> Before we can hope to overcome the ugly legacy of the last decades we must recognise both the fragile beauty of the universe and the enormity of the environmental crisis which is threatening mankind. . . We delude ourselves if we think that returning to a make-believe past can solve this crisis. In fact the danger we face is not being too modern but rather not being modern enough
>
> (Rogers 1989 p.69)

Rogers' sustainable city vision could not be further removed from that of Charles for his is a world in which '. . .buildings will dematerialise. . .The buildings of the future -. . .will be less like the immutable classical temples of the past and more like moving, thinking, organic robots.' (Rogers and Gumuchdjian 1997 p.165).

Contradictions abound in this realm. Although it is potentially radical, a green approach to design is being adopted in a spirit of conservatism rather than conservationism, whether it be in the urban design of places like Seaside and Windsor in Florida by Duany and Plater-Zyberk or Poundbury by Krier (Kunstler 1998 pp.150–152, Duany and Plater-Zyberk 1993, Krier 1989, 1993), or the hi-tech Anglo-Teutonic architecture of Rogers, Foster et al. (Rogers and Gumuchdjian 1997, Davey 1997b). The design conservatives see green design as a foundation for anti-modernist approaches to space and form, the modernists see it as the development of a healthy tradition, and the progressives see the radicalism in it as the basis of an approach to design unfettered by historicism.

It is often difficult to discern any logical continuity between the different fashion phases of architecture. And if there is any, it has little to do with ecological sensibilities, as architects remain obsessed with aesthetics and form-making to the virtual exclusion of anything else – 'Perhaps the fundamental continuity between Modernist and Postmodernist architects derives from the reassertion of the power of form, and hence the primacy of design, to the exclusion of other strategies for improving cities and living conditions.' (Ghirardo 1996 p.27). Relating the activities of architects to urbanism, Ghirardo asserts that design clearly ought to be part of any urban program, but that it cannot be used for mere form-giving as an isolated component. If the integration of architecture at the purely formal level is lacking, there would seem to be little hope for anything more profound and subtle.

It has been claimed that the work of the iconoclast Robert Venturi '. . .opened up a new pluralistic permissive architecture, a contextualism of outlook, and a concern for the environment.' (Watkin 1996 p.572) but in the mainstream of architectural practice and in the shaping of urban environments, design is not seen as integral to ecology, and vice versa, whilst instrumental, technical fix conceptions of ecological design and development are characterised by worthy, but dull, contributions such as the adoption of 'sustainable practices' in the construction industry (Langston 1997).

3.2 Integration

The Second Generation of Ecological Design

If there is to be effective, meaningful shift towards an integration of ecology, architecture and urbanism an effective, meaningful shift in thinking is required. If what Cowan and Van der Ryn term the 'first generation' of ecological design was about small-scale experimentation and gradual adoption of alternative building techniques, renewable energy, and so forth, then

> The second generation of ecological design must effectively weave the insights of literally dozens of disciplines. It must create a viable ecological design craft within a genuine culture of sustainability rather than getting entangled in interdisciplinary disputes and turf wars. It is time to bring forth new ecologies of design that are rich with cultural and epistemological diversity
>
> (Cowan and Van der Ryn 1996 p.32)

This is an ideological position. Yet the issue here is to maintain a system of values without resorting to ideological constipation.[2] Prefacing his tome on Flesh and Stone ('a history of the city told through people's bodily experience') Sennett quotes Aristotle 'A city is composed of different kinds of men; similar people cannot bring a city into existence.' (Sennett 1996) Even more than the buildings they contain, cities are the containers for politics and debate, and although they may be shaped or destroyed by these invisible human forces, they cannot be constructed or sustained by them.

Ecopolis was conceived with such ideas of socio-political inclusivity in mind. Somehow it had to embrace a wide spectrum of human affairs, society and politics, yet it needed to have clear purpose derived from ideological and political understandings. Any ideological positioning thus had to do with avoiding dogma, and any political understandings had to be about the politics of community rather than any ideas of card carrying political correctness. The key to integrating the disparate agendas of the community was to focus on the community itself as a living thing and to place it in an ecological framework that linked all the socio-political workings of that community with the environmental functions of the city. Fortunately, there have been some pertinent studies of human settlement ecology that offer useful grist to the milling of this problem in the making of built environments. It would seem, for instance, that the 'second generation of ecological design' is part of the 'fifth ecological phase of human existence'.

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[2] Every utopian seems to make the error of believing that successful architecture or city making can proceed on the basis of ideological or political rectitude.

Four Ecological Phases of Human Existence

Boyden et al. identified four ecological phases of human existence. The following is derived from Chapter 1 'Ecological Perspectives' (Boyden et al. 1981 pp.9–18) and presents the characteristics of those phases in tabular form:

Table 2: Four Ecological Phases of Human Existence (*adapted from Boyden et al. 1981*)

	Phase 1 – The primeval phase	**Phase 2 – The early farming phase**	**Phase 3 – The early urban phase**	**Phase 4 – The modern industrial phase**
Characteristic Behaviour	Human populations behaving in similar fashion to other omnivorous mammals. Tribal relationships.	Domestication of animals, plants and people. Predominantly tribal relationships.	Larger aggregations of people with 'in-group/out-group' distinctions.	Very large agglomerations of people. Alienation common.
Primary Ecological Impact	Spread of human species across the five inhabitable continents.	Significant increase on Phase 1 impacts, e.g. replacement of forests by farmland & transportation of other species around the globe.	Disproportionate impact of cities on the biosphere but natural biogeochemical cycles still intact.	Global damage to ecosystems & disruption of biogeochemical cycles: Nitrogen, phosphorous & carbon cycles.
Key Technologies	Use of fire. Animal & human power only (somatic energy).	Manipulation of biotic processes (monocultures, selective breeding, etc.). Watermills, windmills & ships.	Urban dependency on agriculture. Advent of occupational specialisation.	Introduction of machines powered by extrasomatic energy (partic. fossil fuel). Chemical synthesis of novel compounds.
Duration – Commencement	60–70,000 years ago (2,500 generations).	12,000 years ago (480 generations).	5,000 years ago (200 generations).	200 years ago (8 generations)
Population Doubling Rate	Not estimated	1,500 years or more.	1,500 years.	35 years or less.
Form of Settlement	Nomadic. A few individuals.	Less nomadic. Small groups & villages.	Increasingly urban but few cities larger than 100,000.	Primarily urban. Many cities larger than 1,000,000.

Table 1: (continued)

	Phase 1 – The primeval phase	**Phase 2 – The early farming phase**	**Phase 3 – The early urban phase**	**Phase 4 – The modern industrial phase**
Patterns of Ownership	Tribal & individual possessions that could be carried.	Animals, crops, stored grain in communal ownership.	New concepts of individual & family ownership.	Private ownership & large disparities in wealth.
Conditions of Life	Determined by the environment.	Simplification of diet. Increasing susceptibility to parasites & pathogens.	Narrowing nutritional base. Deficiency diseases and pestilence common.	Improving practices in public health & medicine.

The authors of 'The Ecology of a City and Its People' make the point that 'some of the values of modern Western society, such as the contemporary Western Idea of Progress, are, for ecological reasons, incompatible with the long-term survival of civilisation.' (Boyden et al. 1981 p.375).[3] They nevertheless reject doomsday scenarios and propose that there is, or needs to be, a fifth ecological phase of human existence which is ecologically stable and 'compatible with the long-term survival of civilisation' (Boyden et al. 1981 p.369). They list the 'Ecological and experiential characteristics of Phase 5' and the 'Societal conditions associated with the transition to Phase 5', making it quite clear that they see the survival of the biosphere, and thus of human beings and their civilisation as being inextricably entwined. Key elements of their long list of attributes for Phase 5 include:

- maintenance of a state of ecological equilibrium between human society and the biosphere
- avoidance of human-induced climate change
- minimum interference with natural biogeochemical cycles
- a stable population
- experiential variety
- a sense of belonging to and responsibility towards neighbourhood
- aesthetic characteristics conducive to well-being
  (Boyden et al. 1981 p.370–371).

These may also be taken as defining attributes of ecocities.

[3] There is, nevertheless, an implied acceptance of this conventional idea of progress in the proposition that humanity can move on to a '5th Phase'.

Three Urban Phases of Human Settlement

White and Whitney identify three major stages of urban development that correspond approximately with Boyden et al.'s stages 3–5. The following descriptions are based on theirs, with some modifications that I have made (White and Whitney in Stren 1992 pp.9–13):

Stage I – Pre-modern Quasi-sustainable Settlements

Found throughout most of the world prior to the industrial revolution and characterised by a system of cities that were supported by the carrying capacity of their hinterlands. Those hinterlands were largely determined by the physical geography of the region and were limited by the technological and economic capacity of their urban centres to recycle waste and deal with transportation costs. The size and number of cities in a particular hinterland depended on their respective powers for extracting food and resources from rural populations. White and Whitney insist that the coercion and social inequity required to do this means Stage I cities cannot be regarded as fully sustainable.[4]

Stage II – The Colonial/Industrial Revolution Unsustainable Stage

These are the dominant settlement types of the present era in which some settlements have breached the carrying capacity of their hinterlands and expropriated the hinterlands of other settlements by processes of colonisation, amplified by industrial capabilities. Agricultural and industrial advances gave some settlements the ability 'to accumulate disproportionate amounts of wealth and power, enabling them to increase the carrying capacity of their regions and to appropriate the hinterlands of neighbouring centres, causing the latter to contract or atrophy.' (White and Whitney in Stren 1992 pp.9–13) In some cases this appropriation extended beyond national boundaries in a pattern of colonialism that continues to the present day with rich and powerful centres usurping the resources of other regions, and at the same time undermining the capacity of those regions and their centres to extend their own zones of resource capture. The unequal exchange, economic domination, social inequities and injustice inherent in this pattern of development render such settlements hopelessly unsustainable.

Stage III – Sustainable Cities of the Future

White and Whitney's model for future sustainability is essentially one in which previously richer and more powerful settlements adopt policies that redistribute their wealth so that settlements previously disadvantaged could repossess their former

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[4] This recognition of 'quasi-sustainability' fits the ambivalent assessment of various authors as to whether or not green/sustainable/ecological cities have ever existed.

appropriated carrying capacity. White and Whitney say Stage III settlements would 'require new political and decision-making structures, global planning and management, and a diminution of national sovereignty far beyond anything envisaged in the Brundtland Report.' (White and Whitney in Stren 1992 pp.9–13) This, however, appears to reflect the bias of one of their primary references, the World Bank, and implies an agenda for globalisation that runs counter to the ethics and temperament of ecocity advocates who are seeking more regional and civic self-determination. The analysis seems limited by the language of economics and a focus on historical notions of material equity.[5]

Mainstream Sustainability

Capello et al. define the notion of a sustainable city as 'a concept which refers to the potential of urban agglomeration to ensure an environmentally benign development of a city through focused environmental and energy initiatives which stimulate a balance between economic progress, social equity and environmental quality.' (Capello et al. 1999 p.V) Whilst the authors announce their 'optimistic perspective' that cities can play a strategic role in achieving sustainable development and emphasise local initiatives, their work, in the final analysis, is about maintenance of the status quo by way of carefully 'balancing' economic, social and environmental concerns. Their focus is on the European environment. Although Europe is a place of constant change as the epicentre of two world wars and numerous economic and social upheavals, it has maintained a more or less stable population in recent decades and most of its environmental damage and ecological reshaping is a matter of history rather than current concern. There is little that is radical, or outside dominant conceptual frameworks, in the European models of urban sustainability. Their situation is one of refining existing models of urban design, development and maintenance rather than one of having to evolve models for rapidly changing environmental conditions and social demographics (notwithstanding climate change and African immigration). Europe offers useful models for working and workable solutions to a number of urban system problems (particularly in transport, medium-density housing and street design) but lacks the contextual imperative for addressing urban-rural systems relationships and massive population growth rates. These are primarily new world and third world problems. In their discussion of urban sustainability Capello et al. confine their attention to urban agglomerations and do not address the broader regional context of urban systems.

In focusing on urban centres, Capello et al. claim that there are significant advantages in dealing with energy and environmental issues at this 'local' scale. Of particular interest are the observations that:

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[5] There appear to be limits in the scope for imagining the shift in economic power that is available in modern economies exploiting low resource content production and the 'factor 4' equation (doubling wealth – halving resource use) reported to the Club of Rome by Lovins et al. (1997).

> urban areas are becoming recognized institutional policy units with a clear competence and with the possibility to operate in a flexible and innovative manner
> an urban orientation of energy and environmental policy may also encourage a direct involvement of citizens, as such policy initiatives are usually source-based, effect-oriented and visible, so that a sufficient local support base may be generated
> finally, urban areas are also a suitable spatial scale for systematic data collection, monitoring and analysis of proper energy/environmental indicators
>
> (Capello et al. 1999 p.15)

The first point can be seen as supporting one of the contentions of this book that city governments are appropriate vehicles for achieving rapid change, the second point supports direct citizens' engagement in energy and environmental initiatives and the third point reinforces the idea that the urban scale assists in the management of complex systems by making appropriate information more readily accessible and comprehensible.

> The experiences with urban sustainability policies so far are rather limited. Clearly, many cities have introduced urban environmental policies, but mostly they are of an ad hoc nature and not integrated in an overall balanced urban development perspective
>
> (Capello et al. 1999 p.39)

Compare a typical mainstream definition of a sustainable city with the definition of Ecopolis, i.e.

> The idea of a sustainable city refers to the future of the city, to effective local policy-making at the interface of economic, social and environmental objectives with a view to long-term continuity of the urban area
>
> (Capello et al. 1999 p.249)

versus

> Urban systems consciously integrated into the processes of the biosphere with the intent of maintaining the optimum functioning of the biosphere for human purposes.

One looks in, the other looks out. One is focussed on the city, the other is about global patterns of sustenance.

Which Analysis?

Despite the decades of work by Boyden et al. which clearly links biophysical urban system issues with human culture there remains a tendency to separate what may be termed 'environmental impacts' and 'livability'. This results in some debate as to the appropriate tool to employ in analysing city ecosystems. For instance, in the chapter on human settlements in an Australian state of the environment report we find that:

> The 'ecological footprint' model and other systems that focus on resource flows in settlements help us understand their extended impact on the environment. But they do not help to assess whether or not we can reduce requirements for resources while maintaining or improving livability
>
> (Taylor 1996 pp.3–5)

Therefore, the authors (Newman et al.) go on to say, in their chapter on human settlements 'the extended metabolism model is used in preference to the ecological footprint model'.

Planners and commentators are beginning to draw particular attention to those aspects of sustainability that are to do with livability and the human experience of urbanism rather than the technical potential of appropriate technologies to save energy, resources and water but there remains a gap between knowledge and experience that leaves people mute. In the 1990s Alexander observed that people were emotionally and spiritually effected by the ecology movement but that 'people who speak for ecology' had not yet made that clear (Alexander 1997 p.214). Two decades later, there are speakers for the emotional effects but they seem to be most strongly linked to green consumerism, whilst much of the spiritual effect has translated to Al Gore's 'moral obligation' to act on climate change.

Health, Technology and Ecology

> Civilisation. It's all about knives and forks
>
> (*Civilisation* by David Byrne 2004)

Knives and forks are tools that extend our capacities. Cutting up food reduces the need for chewing and makes it easier to digest; it saves energy. Every tool starts out as an attempt to extend our reach and minimise the effort we have to expend as individual organisms. The first tools were rudimentary knives and objects like spears and clubs that helped to capture moving food; early humans in cold climates fashioned 'second skins' to give their bodies less work to do in staying warm; later, we made 'third skins' and fashioned walls, roofs and windbreaks to reduce the animal effort needed to keep warm, dry, shaded, and sheltered. As social creatures who have always needed to live in groups to survive, our earliest makings of shelter were almost certainly done in a communal way and from this we gained more control of the territory that supported us and provided food, water and the resources to make tools. In this lies the basis of the city. All of this is not only a consequence of consciousness. As Mumford reminds us 'Even the technological complexity of the human town does not lack animal precedent', and along with the beavers, from the beginning our efforts at colonizing territory brought about 'a deliberate re-moulding of the environment' (Mumford 1961 p.14). The earliest tools have evolved, but are with us in an only slightly modified form. The earliest knives and spears have a lot in common with the knives and forks that symbolise civilisation.

Sennett describes how 'The designers of the eighteenth century had sought to create a healthy city on the model of a healthy body.' (Sennett 1996 p.347). The building technology of the time was not up to the task, being drafty, stuffy, uncomfortable and thermally inefficient. Now we are contemplating the creation of healthy cities modeled on healthy ecosystems, and as in the 18th century, we find that the present understanding and application of building technologies is insufficient to the task.

Now the challenge is to conceive of buildings in the context of an ecosystem, rather than a body, and to see each building as either an organism, or a smaller ecosystem within the larger one of the city. Technological advances are as much to do with application as they are to do with the availability of contrivances.

The technological advances of early industrialism enabled an increasing separation of human beings from nature. Ductwork made possible the provision of air without windows, electric light made interior spaces ever more independent of windows and natural light (and enabled the creation of spaces hitherto impractical), elevators made multi-storey construction viable by eliminating the body's physical effort needed to ascend many flights of stairs. After nearly one-and-a-half-centuries, or six generations, of design evolution it has become normal to regard the interiors of buildings as environments quite separate from the exterior, particularly in urban contexts and notwithstanding the modernist device of 'connecting' the outside and the inside with the visual device of unrelieved glazing.[6] In ecological architecture, however, the preoccupation is to do with the functional connection of 'out' and 'in' rather than separation. The difference between out and in becomes the means by which comfort conditions are sustained and the building envelope returns to its role as a flexible mediator between exterior and interior realms rather than a rigid separator.

This difference in conceiving of the problematic and the approach to its solution has been reflected in built form. Industrialism celebrated the capacity of technology to separate with the ironic device of plate glass. Lightly clad and perfectly warm, one could stand indoors and watch the snow fall on a frozen landscape; in the tropics, one could coolly sit and look out at scenery of sweltering heat. Plate glass became an icon for architects seeking building forms that could be shaped independently of climatic concerns. The designer's mental context became more powerful than environmental context. Culture over-rode nature. The natural experiences of life were dis-integrated by the architecture of cities.

In the post-industrial architecture of ecologically informed design, the imperative to seek active connectivity through the building skin may lead to some changes in approach. This has already been demonstrated in the work of Ken Yeang and his bioclimatic high-rise buildings where the slick skin has given way to multi-layered, textural, irregularly sculpted forms (Powell 1999). This manifestation of different thinking in practice has not been the universal response. Norman Foster and other more traditional modernists have sought to continue making slick skins even as they have addressed permeability and connectivity in the actual construction and performance of their buildings (Davey 1997b). This setting of architecture into the environmental flux and the concomitant rediscovery of how we sense

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[6] The concept of 'interior architecture', for instance, implies that there is such a difference – and independence – between the interior and the exterior of built form that they can be formally separated as distinct 'architectures'. This distinction has, in places, been given academic respectability, e.g. by the renaming of 'School of Interior Design' as the 'School of Interior Architecture' at the University of South Australia, betraying an epistemological bias that denies fundamental environmental connectivities.

'place' is reciprocated in the placing of sensory experience at the heart of the architectural problematic – an approach that is the essence of Frampton's critical regionalism. Architectural and bio-regionalism provide important bridges between the theory and praxis of ecocity making and are dealt with in more detail in Chapter 9.

Cultural Strata

> The propensity to 'engineer' environments is ancient. Today people make over the global environment. Clothed and bespectacled inside an automobile, connected by phone wires and radio waves to modems, cellular phones, and bank machines, supplied with electricity, plumbing, and other utilities, we are transforming ourselves from individuals into specialized parts of a global more-than-human being. This metahuman being is inextricably bound to the much older biosphere, from which it arose. Metals and plastics represent the newest realm of matter 'coming to life.'
>
> (Margulis and Sagan 2000, p27)

Margulis and Sagan are not the first to observe that we are becoming, or have become, a trans-planetary species living with networks of communication that girdle the globe, connecting our individual consciousnesses into a noosphere. In achieving this we have created technologies which continue to extend linkages and networks and amplify our capacity for at-a-distance communication. The materials for doing this come from mining the planet's skin of rock, an increasing amount of which is now being transformed for the purpose of making cities.

The metahuman creature who we now are, lives entirely within the framework of urban structures. Even the most remotely located individual, calling on a cell/mobile phone from their SUV/four-wheel drive parked somewhere out in the American range/ Australian outback is intimately connected with the services and processes of the city. As the metals and plastics come to life so the physiology of the metahuman organism is extended beyond the reach and capacity of any of its individual component bodies.

In archaeology the 'cultural stratum' is that layer of earth which develops on the sites of human settlements and contains artefacts of human activity. In looking at the making of cities from a long term perspective, we should ask what kind of cultural stratum might be left by our urban constructions, and whether future generations of archaeologists would be able to tell if our cities enhanced the functioning of the biosphere, or damaged it.

3.3 A Sense of Place

> Today, order means lack of contact
>
> (Sennett 1996 p.21)

Placing the Architectural Experience

There is a relatively weak history of concern with the function, existence or concept of place amongst architects, planners or geographers (Relph 1976 p.1). Nevertheless, in modern architectural theory there is one distinct strand of theoretical development which seeks to formulate an expression for place-specific architecture allied to a profound appreciation of the tactile and the experiential. Under the rubric of regionalism this has been not so much a movement as a tendency, not so much a school of thought, as arena of similar thinking. The focus of the regionalist architectural problematic tends to be on the how and why of sensing 'place', on how to build in accordance with the spirit of local construction customs, climate and culture. In this approach to place-making mediated by architecture, the regionalism is not vernacularism just as 'thinking locally' is not synonymous with provincialism.

Critical Regionalism

It is a noticeable characteristic of regionalism that it gets accused of a preoccupation with the vernacular, and there is confusion about the relationship between the two, even in the literature (Tzonis and Lefaivre 1987, Amougis et al. 1987). This confusion arises, perhaps, because vernacular architecture is, as a general rule and from necessity, suited to its place and purpose, and is thus, to that extent, 'regional'. Kenneth Frampton coined the phrase 'critical regionalism' in order to more clearly differentiate the regionalism from vernacularism, and to emphasise the notion of regionalism as a critique of modernism rather than a simplistic rejection of what is modern (Frampton 1987, 1996). At the core of regionalism is an implied critique of the objects and processes of mass-production, mass-society and the modernist worldview.

> Critical Regionalism. . ..while it is critical of modernization, nonetheless still refuses to abandon the emancipatory and progressive aspects of the modern architectural legacy
>
> (Frampton 1996 p.327)

The built environment must exist to be experienced, except vicariously. Modernism lays the groundwork for architecture as something to be appreciated at a distance, as a virtual, vicarious experience. The Miesian glass box aesthetic employs machine-replicated components to eliminate decoration and reduce appreciation of the architecture to a detached, cerebral experience. In the organic traditions of architecture where one can discern common ground with the history of ecocity ideas, it is a sensuous experience. Critical regionalism emphasizes the tactile as much as the visual, as Frampton notes,

> It is aware that the environment can be experienced in terms other than sight alone. It is sensitive to such complementary perceptions as varying levels of illumination, ambient sensations of heat, cold, humidity and air movement, varying aromas and sounds given off by

> different materials in different volumes, and even the varying sensations induced by floor finishes. . ..
>
> (Frampton 1996 p.327)

No matter how much a building may be written about, photographed, discussed and dissected, the architecture cannot be fully understood without being moved through, sat in, leaned against, touched and directly experienced.

Experience of place happens through our five senses and, perhaps, other electromagnetic and sensory capabilities. In writing about organic architecture I identified the role of these senses in perception and its relationship to the creation of healthy environments:

Seeing – about seeing the reality of a place and understanding the needs of people in their daily lives.

Touching – about textures and the depth of surface to things, feeling the difference between walking on marble or wood, or between touching a handrail of timber or steel.

Smelling – every room and place has its own smell. Research has shown that productivity and well-being are strongly affected by olfactory stimulus. Architecture is aromatherapy on a massive scale.

Tasting – have you ever tasted the mustiness of an old library? Do you sense the plastic on your tongue in new shopping malls and office buildings sealed-in and air-conditioned to sickly mechanical perfection?

Listening – listening to the people who use the buildings and listening to nature for inspiration and direction. Being in buildings is an auditory experience too – we hear buildings as much as we see them.

And it is about our sixth sense. Organic architecture recognises and works with earth energies and avoids electromagnetic pollution. Our watery bodies are weavings of electromagnetic energy in a highly energetic universe and it would be remarkable if it did not affect us. We have evolved over the eons within the Earth's natural resonance of 7.83 cycles per second – which NASA discovered they needed to replicate to keep astronauts in space from getting sick (Downton 1996c,d).

Growing from Place

Regionalism deals with the technology of place-making through the construction of human settlement. It thus deals with the universal problems of shelter-making and structures, the need to respond to climate and circumstance that is at the core of making architecture. In regionalist architecture the meaning of the building creates the image, rather than the image creating the building,[7] i.e. the image of the building

[7] From a statement by Rohan Young, architecture student, during a Critical Regionalism seminar in my class at the old South Australian Institute of Technology in second semester 1990.

is not created first as a fetish object by an omnipotent designer, instead the building grows from the demands of people and place and the meanings inherent in each become manifest through the fabric of the built form in a process in which the architect is an enabler.

Furthermore, regionalist architecture extends the presence of the building beyond the physical boundary of the building's sculptural envelope to include the territory which it occupies or establishes. A regionalist building cannot be understood properly without the context of its site and even when taken in isolation regionalist architecture implies the conditions and circumstances of its site in a way that is alien to modernism. A regionalist building is unlikely to contain the overt historical references endemic in post-modernism, and it establishes its thrall over a definite place rather than an abstract site. The act of building may or may not cease, and can begin or end at any time (Brand 1997), and in the regionalist view of architecture the *time* of the building is an integral component of its place. The presence of regionalist architecture implies a pattern of land settlement related to it and denies the relevance of free-standing, or non-site specific architecture, as having anything other than ephemeral importance.

> In many ways a house can sum up a region. It can tell about the land – its weather, its materials, its topography, even its safety from invasion. But a house is not predetermined by these elements. A house, however simple, also tells about its inhabitants – where they have come from, what they believe, how they live. At its best, a house is a fusion of commonsense and poetry. Because of its natural and primal role, the house often leaves a mark on subsequent generations of buildings and, in so doing, creates a legacy – a regional identity, perhaps – that can be very powerful indeed. Through the house we sometimes manage to create a precious cultural gift – a genuine sense of place
>
> (Speck and Attoe 1987)

Being Critical of Regionalism

A critical view of regionalism suggests that '. . .all architecture is regional because it responds to the regional market and to the regional culture or counter-culture' (Colasuonno 1989 p.56) and architecture cannot be critical as an object whether it is crafted in place or mass-produced because only the praxis of architecture can be critical – Frampton defined critical regionalism as a kind of practice rather than a type or style of building.

> Only thought and action can be critical. When all we produce is immediately turned into consumption there is no possibility for a product to be of a critical nature
>
> (Colasuonno 1989 p.57)

Bioregionalism

Bioregionalism also offers a critical view of the relationship of human settlement manufacture and habitation in a region that accommodates, and is accommodated

by Frampton's critical regionalism. In effect, bioregionalism recognises the primacy of nature but simultaneously acknowledges the role of culture in shaping place. But if culture is an agent in the landscape (and the natural area is the medium) then the result is a cultural landscape. As different cultures occupy the landscape, rejuvenation or superimposition takes place. The natural landscape is fundamental, supplying the materials from which the cultural landscape is formed, but the shaping force lies in the culture itself. (Sauer 1925 p.46). Frampton offers a similar route to a deeper relationship with place; a cultural intertwining with geography mediated through architecture. His view is essentially western and positivist, whereas with its dual traditions of objective observation and mythic knowing, bioregionalism is perhaps one of the strongest manifestations of western culture returning to its own roots and recognising 'its embeddedness in history, mythology and nature' (Cameron 1998 p.9).

In architecture and urban design this promises an antidote to the modernist preoccupation with the visual which has precipitated architecture's escape into a pseudo-rational universe of aesthetic theory which has suppressed, through architectural culturisation, the ability of architects to appreciate the full impact of what they do. It is, perhaps, about the difference between viewing and seeing.

> The big dilemma, which Isaac Asimov referred to in one of his books, was the difference between viewing and seeing. That is the difference between the mental, scientific approach and the emotional, spiritual approach. Definitions of regionalism and the response to these definitions by architects, landscape architects and planners can be defined as the difference between viewing and seeing
>
> (Antoine Predock in Amourgis et al. 1987 pp.157–158)

This reflects something of the Situationist critique of modern mass society and Debord's proposition that 'All that was once directly lived has become mere representation.' (Debord quoted by Boy 1996)

Creating Situations

Critical regionalism is a post-industrial phenomenon. It is part of the attempts being made to create the framework for identity in a pluralist, shifting environment where what you do can change at any time and where consumerism lacks the substance to do anything more than entertain. Regionalism treats the architectural experience as a totality, as part of the life of living, breathing, feeling, fully-functioning human beings and is as anti-thetical to Post-modernism as it is to modernism. Regionalism parallels the struggle for sensory survival that accompanies all attempts to lift the experience of art and life away from the view on an electric screen. It seeks to distinguish between the prospects of soul-less repetition and monotony and the promise of art for all. The intertwined histories of industrialisation and urbanisation reinforce the mutual relevance of theoretical frameworks like Critical Regionalism and Bioregionalism with the otherwise apparently unrelated ideas of Situationism and create an imperative to understand relationships between architecture, politics

and the making of cities. Both kinds of regionalism are concerned with the nature of boundaries (and the boundaries of nature), Situationism seeks to transcend them. Any propensity for architectural preciousness on the part of Critical Regionalism can be tempered by the abiding concern with the realities of place and culture that is heart of Bioregionalism, and both may be saved from being too pompous by the cultural savvy and playfulness promised by the unitary urbanism of the Situationists:

> Unitary urbanism acknowledges no boundaries; it aims to form an integrated human milieu in which separations such as work/leisure or public/private will finally be dissolved. But before this is possible, the minimum action of unitary urbanism is to extend the terrain of play to all desirable constructions. This terrain will be at the level of complexity of an old city
>
> (Guy Debord 1959 in Knabb 2006 p.69)

By developing a critique of both the aesthetics and the processes of modern industrialism, regionalism offers a route past the de facto consumerism of the object fetishists. By focussing on the experiential reality of construction rather than an intellectual construction of reality, it allows for the development of an architecture which can respond to the rich tapestry of daily life and turn on the full range of human senses. By exploiting the full range of built-form responses to modifying the climate, regionalism creates an architecture which makes a radical return to the task of providing shelter. By reminding us that technology can provide us with much richer delights than the products of consumerism, Situationism provides the necessary antidote to the banal pragmatism that threatens to overwhelm us when we approach any task to do with combating environmental decay.

By knowing its place in the broader sweep of the ecology of the living landscape, be that city or country, regionalism offers the prospect for the making of architecture – and thus cities – an integral and intelligent part of human land-use. In that role, critical regionalism may occupy the radical middle ground between the excesses of rationalist obsession and the virtuous absolutism of irrational Luddism or, as Frampton (1987) might put it, between the Neo-Avant-Gardists and the Neo-Historicists. By rescuing architecture from the society of the spectacle (think of modern Dubai) and placing itself firmly in the nexus between the future and past, science and art, regionalism offers firm ground on which to stand and deal with assailants from the dogma of right and left, and with the ageless struggle between substance and image, the real and the lie, at a time when that struggle is intensified as ‘virtual reality’ and media narcotics blunt the edge of experience.

3.4 Taking the Long View

> Every week urban growth corresponding to a large city the size of Birmingham, Adelaide, Kitakyushu, or Aleppo occurs on the face of the Earth
>
> (Girardet 1992 p.177)

The temporal and spatial scale of 'the urban problem' is enormous. Stewart Brand has identified 'six significant levels of pace and size in the working structures of a robust and adaptable civilisation.' From fast to slow his levels are:

Fashion/art
Commerce
Infrastructure
Governance
Culture
Nature
(Brand 1999 p.35–36)

The pace of change in culture and nature are slow and evolutionary rather than rapid and revolutionary. The scale of operation of 'culture' and 'nature' encompasses entire societies and biomes. 'Culture is the work of whole peoples.' (Brand 1999 p.38). An ecocity theory has to be tested against these scales of time and geography of reach rather than those of 'commerce' and 'fashion' – and yet has to accommodate those too. Cities are one of the few constructions that humans create with a long-range timeframe, that work in the realm of Brand's 'Long Now' (see Chapter 4). Yet they have never been purposefully designed to accommodate change and are certainly not, as yet, being designed for climate change.

Cultural change is difficult to observe in real time, it is best understood historically, and ecological adaptation takes place over longer timescales than any civilisation has existed. It is intrinsic in the Ecopolis theory itself that it needs time for the processes of participation and engagement in design and development to evolve.

Scenario Planning

Human imagination is capable of planning for the future and in so doing it can either extrapolate (and be wrong) or use 'imaginative scenario planning'. Brand tells us that prediction is more or less pointless. It is always going to be wrong, and rigid planning on the basis of prediction will necessarily go awry. He favours 'imaginative scenario planning' which 'by giving up on any hope of accurately predicting the future, yields strategies made robust by their wide scope of alertness and swift adaptability. You don't plan for a single certain future but rather for multiple possible futures, each based on a different theory of what's really going on.' (Brand p.118). Imaginative scenario planning allows for various possible future conditions and builds resilience and responsiveness into forward planning. In the context of city-making, this supports the idea of constructing a range of built-form and development scenarios in the urban skein as a means of testing in time and context, thus to get a clearer sense of what does and does not work.

> One surprising by-product of the scenario-planning process is increased responsibility. Corporations discover the need to take care of their industry as a whole, or to protect the natural

> environment, or to promote civil liberties. This comes not from virtue but solely from the ability to engage longer periods of time. While twenty-year forecasts are a complete waste of effort, twenty-year scenarios are common and useful. Any organization confidently thinking twenty years ahead is compelled to grapple with long-term needs, such as an educated workforce and a sustainable regional economy. Rigorous long-view thinking makes responsibility taking inevitable because it responds to the slower, deeper feedback loops of the whole society and the natural word
>
> (Brand1999 p.118)

The case studies in Chapter 7 which are partial tests of the Ecopolis theory, have been developed by taking the longer view, they are based on imaginative scenario planning and should be seen in the context of the 'Long Now'.

3.5 Changing Places

> In a world that's quickly heating up and drying up, you can't go home again – even if you never leave
>
> (Thompson 2008 p.70)

Making architecture and building cities has always been about changing natural environments into places that operate primarily for the benefit of humans. When those changes took place relatively slowly, people adapted and empathised with their environments, feeling a strong sense of being in place, and belonging. But now the character of many places are changing rapidly, challenging the sense of security obtained by years of living in place.

With some kinds of development, e.g., when open-pit coal mining rapidly and radically changes a familiar environment, the sense of displacement can be so severe as to raise suicide rates. Climate change has already brought about such rapid changes in the natural environment that people in some places are reported to be feeling a 'deep, wrenching sense of loss as they watch the landscape around them change.' (Thompson 2008 p.70). Research by environmental philosopher Glenn Albrecht about this 'new type of sadness' has led him to identify a syndrome he calls 'solastalgia' – 'the pain or sickness caused by the loss or lack of solace and the sense of desolation connected to the present state of one's home and territory. It is the 'lived experience' of negative environmental change. It is the homesickness you have when you are still at home.' (Albrecht 2008[8]). Albrecht describes the syndrome as 'that feeling you have when your sense of place is under attack.' He suggests that with the speed and spread of environmental change, particularly that associated with shifting climate regimes, it may become much more common.

[8] http://healthearth.blogspot.com/ (accessed 30 March 2008)

Ecological Architecture for a Changing Climate

Nature does not negotiate, a species doesn't get a second chance and architecture must comply with the biological demands of ecosystems as much as it must respond to the physics of construction and laws of gravity. Ecological architecture, like critical regionalism, is about making buildings that fit their place in both practical and metaphorical ways.

> Ecological architecture takes nature as the foreground and not as the background, actively works with ecological processes, and uses ecology not only in practical ways but metaphorically, so that organism becomes the metaphor for buildings, not object.
>
> A building is an organism. Some buildings can actually be considered ecosystems, and buildings are part of larger ecosystems. I think this shift in metaphor implies a whole different design process and a different set of concerns than the traditional ones in architecture
>
> (Van der Ryn 1994)

With the climate changing rapidly and affecting the nature of 'place' around the planet, it may seem odd to continue arguing for a 'sense of place' and responsiveness to place in the making of the built environment, but we must now proceed to build with the simultaneous tasks of reducing environmental impacts that drive negative change whilst reinforcing any remaining sense of place.

The bottom line for architects and planners and the underlying theme for the theory and praxis of architecture and design in the idea of Ecopolis is that:

> Humanity is part of nature, and humans are subject to the same immutable ecological laws as all other species on the planet
>
> (Beder 1993 p.83)

Chapter 4
Weavers of Theory

Beginning with Kropotkin's Mutual Aid the study of human ecology has taken a more positive turn: witness... above all, Patrick Geddes's lifelong effort to develop a sociology on the basis of biology, and a social art on the positive foundation of our biological, psychological and sociological knowledge...
(Mumford 1938 pp.302–303)

Threads

Knowledge is a product of culture; culture is informed by knowledge. No idea exists in isolation from the society that produces it and the history that precedes it. All ideas have a history, they are generated by people who inhabit a culture, living in a particular time and place with their minds tied to corporeal reality, buoyed on currents and cross-currents of sensation and communication. There are far more inputs to the development of the Ecopolis idea than are catalogued here, but I think it is instructive to identify the ones that have made a particular difference. It is easy to forget where ideas come from, or even the issues they were intended to address. How many planners use the layered format of geographic information systems without recognising the contribution made by Ian McHarg in his seminal 'Design With Nature', or discuss town planning without having read Geddes? When working on a design I find it highly advisable to continually return to the original brief to refresh my focus and check that the design process has not wandered away from the point of the exercise. Likewise, I never throw away notes or sketches of my earliest concepts because they represent the best record of my thoughts when I first tackled the given brief. A deliberate routine of 'returning to source' is a sensible way to avoid what might be called 'conceptual drift'.

So here, in this chapter, are some of sources for the concepts, principles and techniques that are required to create human settlements that fit within the ecological systems of the biosphere whilst sustaining their biogeochemical functionality. Although they may not yet have been integrated into a structure of knowledge which clearly connects the various disciplines with each other and the universe of culture and cultures within which all the ideas spin, that integration is part of the Ecopolis idea and the intent of providing this list.

The encouraging truth is that the necessary tools and ideas for creating Ecopolis already exist. Like reels of different sewing threads, those tools and ideas range in colour and texture across the spectrum, each waiting to be woven into a tapestry.

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Just as each tapestry is unique, so the permutations from the crossing threads of each of these weavers of theory can produce endless unique variations. The listing of theorists in this chapter is intended to encourage incorporation of any of their positive ideas into the design and reworkings of the urban ecological fabric.

Picking up the Pieces

> We do not have to begin from scratch. Under the lava flow of contemporary urbanization, there is an important tradition of socio-urban 'humanistic' thinking (from William Morris to Geddes and Mumford), but most vitally a rich territorial heritage ready to be enhanced by new social actors willing to nurture it
>
> (Magnaghi, 2000, transl. Kerr 2005 p.2)

The concept of 'Ecopolis' has arisen independently on at least 4 continents. In Australia it has been strongly linked to the emergence of a popular interest in urban ecology. Urban Ecology Australia (UEA) is a community-based non-profit organisation I co-founded in 1991 with Chérie Hoyle and Emilis Prelgauskas. It evolved from the Greenhouse Association of South Australia – one of the first community organisations anywhere focussed on combatting climate change. UEA ran the 1992 Second International EcoCity Conference at which Richard Register was a keynote speaker. Other speakers included Rusong Wang, a professor of urban ecology with many years of experience (he was the general secretary of the 1984 First National Conference on Urban Ecology in Shanghai) who presented a paper on 'Ecopolis Planning in China' (Wang 1992). Wang and his colleagues have continued to develop the Ecopolis concept with research and conferences, including the 2004 International Ecopolis Forum in Ningbo City, China[1].

The first public use of the term 'Ecopolis' in the sense intended in this book, was at the Ecopolitics IV Conference held in Adelaide, South Australia in 1989 when I presented the paper 'Ecopolis – The New Frontier', later published in the proceedings of the conference (Young and Dyer 1990). Subsequent media interest resulted in published newspaper and electronic media use of the term and an illustrated article 'Ecopolis Now!' was published in Habitat[2] in August 1991 outlining some of the main aspects of the evolving theory (Downton 1991b). As a consequence of information received through involvement with the EcoCity 2 conference in 1992 I became aware of the use of the term in China and Eastern Europe. Since EcoCity 2 the term has been adopted by a number of organisations including Jerry Brown's 'We The People' organisation in Oakland (Brown 2000)[3]. Brown ran for office and was elected on an 'Oakland Ecopolis' platform. In Italy, at the end of the 20th century 'as the outcome of multi-disciplinary research by the so-called Territorialist School', Magnaghi wrote that the 'theoretical development of our vision

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[1] At which Richard Register and I were invited speakers.

[2] Journal of the Australian Conservation Foundation.

[3] Which adopted the 'Charter of Calcutta' on their website for some time.

began with Ecopolis, the city of villages which emerges from the disintegration of the metropolitan peripheral conurbations. . .' (Magnaghi 2000, transl. Kerr 2005 p.123–124). Girardet concluded his 'Cities People Planet' with 'a practical vision of a truly liveable and sustainable city' using EcoPolis[4] 'as a generic term for the sustainable cities of the future' and described a city which, after two decades of transformation, 'draws on the best available knowledge on sustainable development from around the world' and has 'enshrined the rights of the public to participate actively in decision making' through the election of a new strategic authority, and the city knows its place on the planet as 'Its people have applied a purposeful global perspective informed by great cultural energy and ethnic diversity to their local situation.' (Girardet 2004 pp.266–267). In 2006 New Scientist published an 'Ecocities Special' edition with a vibrant front cover carrying the headline 'Ecopolis Now' and an article by Fred Pearce that brought together many of the key issues that define an Ecopolis.[5]

An important, but rarely discussed, difference between various ecological or sustainable city concepts is to do with the extent to which they engage with the biosphere. Typically, ecological city models have a pragmatic focus with straightforward objectives eg: integration of transport and land use, energy conservation and efficiency, waster reduction and recycling, etc. (Koskiaho 1994), whereas Ecopolis sees pragmatic particulars simply as issues to be addressed in order to further a larger, consciously evolutionary goal.

The scientific foundations of the Russian Ecopolis program came from Vernadsky (Florova 1985, Ignatieva 2002) and there is a direct line of scientific enquiry reaching from his work through to the Soviet space program and the work on closed ecological systems undertaken by Gitelson et al. (Allen and Nelson 1989 p.67). The privately funded Biosphere 2 project shared a scientific and intellectual umbilical with Vernadsky and the idea of populating the cosmos with humanity (Allen 1991). The idea of terrestrial experimentation with model biospheres is central to long-term goals for human settlement of Mars and the successful creation of space habitats.

The Ecopolis program at Moscow State University focussed on the study of a small town (Pushchino) as a means to investigate the functioning of urban ecosystems. This research commenced at the same time that integrative urban studies began in China so the birth and growth of urban ecological studies appears to have begun more or less simultaneously in both countries. In addition, the classic study of Hong Kong by Australian researcher Boyden et al. was published at this time (Boyden

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[4] For which he graciously gave me credit at the book's Adelaide launch.

[5] Although Pearce curiously misrepresents Christopher Alexander as an advocate for inflexible cities that deny the value of neighbourhoods whereas the truth is quite the opposite. Alexander and his cohorts have been responsible for some of the most influential work (see this chapter) in favour of the making of meaningful, workable neighbourhoods as part of empowering people to make and shape their urban environments. It is not "Alexander's philosophy that has turned many cities. . .into social and ecological disaster areas" (Pearce 2006). The reasons for that are more to do with the workings of global capital and the interests of oil companies and the motor industry than any planning theory.

et al. 1981). It is unclear whether early Russian research directly informed the development of urban ecological studies in China. Despite the lack of evidence of direct references in published literature it is hard to believe that this was not the case.

Although there is apparently coincidental synchronicity in the appearance of Ecopolis around the world, a closer look at history reveals the kind of connections between people and places that invariably informs the birth of new ideas. Although Vladimir Vernadsky's work has never been widely recognised outside of Russia, his influence has been pervasive and his fundamental ideas have informed the evolution of ecocity ideas. The architects and planners of the Biosphere 2 project in Arizona were deeply influenced by the work of Vernadsky and Russian ecologists (their organisation used to promote and sell such books as 'Traces of Bygone Biospheres'). They interwove these insights into ecological function with the ideas that Paolo Soleri promoted – the man who first publicly linked 'architecture' and 'ecology' to create designs and philosophies for revolutionary city 'arcologies'.

A century ago, Scotsman Patrick Geddes wrote of 'Cities in Evolution'. His work directly inspired the prodigious Lewis Mumford in his historical and philosophical exploration of the patterns and purposes that drive the making of cities, and fellow Scot Ian McHarg and his seminal work on 'Design With Nature'. Geddes and Mumford both influenced and were inspired by the Arts and Crafts movement, championed by the outspoken socialist William Morris, author of 'News From Nowhere', and the organic architecture movement, characterised by Frank Lloyd Wright, who wrote such books as 'The Living City'. Wright, who was impressed by the early advances in the Soviet Union, ran residential apprenticeship-based educational programs at his 'Taliesin' establishments and promoted the value of democratised 'head and hands' (intellect and labour) work as the basis of an organic society. Soleri spent a formative year with Wright before moving on to create Cosanti and Arcosanti and a fellowship/apprenticeship system modelled on Wright's Taliesin. Soleri was deeply inspired by the Roman Catholic theologian Tailhard de Chardin and his interpretation of the noosphere, a concept originally developed by Vernadsky (Ignatieva 2002). Soleri's alumni included the architect Phil Hawes, one of the architects responsible for Biosphere 2 who introduced me to Vernadsky's work in 1990. The first published book (in the 'West') to include the term 'ecocity' in its title was 'Ecocity Berkeley – Building Cities for a Healthy Future' (1987) by Richard Register, another Soleri alumni, who founded an organisation to promote Soleri's work that later transmogrified into the non-profit group 'Urban Ecology' which ran the 'First International Ecological City Conference' in Berkeley in 1990. The formation of Urban Ecology Australia was directly inspired by my participation in that conference.

Categories

> . . .there is little published research which has developed methods, techniques or criteria for dealing with the natural environment in planning settlements
>
> (Owen 1991 p.16)

I have classified as 'urban ecologists' or 'ecocity theorists' those whose work contains sufficient concern with urban systems, community affairs, ecosystem function, design issues and their inter-relationships, that they are clearly operating in the realm of ecocity theory, or what Richard Register calls 'ecocitology'. Their work may emphasise one or another aspect of the field, be it design, planning, or politics, but they are pathfinders on the way to ecocity making (a pathway reduced to Seven Steps in Chapter 11). They include Geddes, McHarg, Fisk, Hough, Boyden, Bookchin, Spirn, Soleri, Register, and Mumford. These are people who have added to the sum of knowledge or otherwise made a difference to the evolution of this fledgling concern with fitting cities within the processes of life.

Relationships that connect people, places and things are more important than differences, and the categories I have used are not for the sake of pigeon-holing, but to identify some of the patterns of connectivity that inform the Ecopolis idea. The characteristics of separation are easier to define, very often, whereas the characteristics of connectivity are subtle. This is especially true with living organisms and living systems – the apparent separation of organisms in a forest, for instance, does not make it clear to the casual observer that they are all sublimely linked through ecological processes. Separation is readily informed by obvious boundaries and surface appearance and is, typically, immediately obvious. Connectivity is often to do with processes in time and thus requires longer study to become manifest. But it can help to name the parts of the forest to understand how they are related. Thus, visionaries and utopians paint the big picture of what might be possible, 'process people' demonstrate methodologies for achieving some of those possibilities, 'pattern people' identify intrinsic relationships in the making of human settlement that manifest in patterns of design, 'pragmatic people' acknowledge the status quo as the framework for action, 'principled people' consciously connect values and morality to the deed of making habitation and 'political people' create the invisible foundations of culture for an 'ecological' future[6].

4.1 Picture People – Visionaries and Utopians

> There is less and less reason to assume that the human race is purely an aggregate of individual phenomena forced to a promiscuous existence by the limited envelope of the earth. A mental sphere is gradually thickening and ribbing itself around the biosphere. The liveliness

[6] Part of creating such a culture is the need to establish professional approaches to sustainability. Architects and planners around the world have formally recognised the need to integrate environmental sensibilities into the mainstream of practice, evidenced by the adoption of environmental policies by professional bodies like the RAIA in Australia (1995). In Chicago, June 1993 at the World Congress of Architects convened by the International Union of Architects and the American Institute of Architects the profession adopted a 'Declaration of Interdependence' later formally adopted as policy by the National Council of the Royal Australian Institute of Architects on 1 October, 1993.

> of this noosphere, as Teilhard de Chardin calls it, is the conscious and unconscious concern of mankind
>
> (Soleri 1973b p.15)

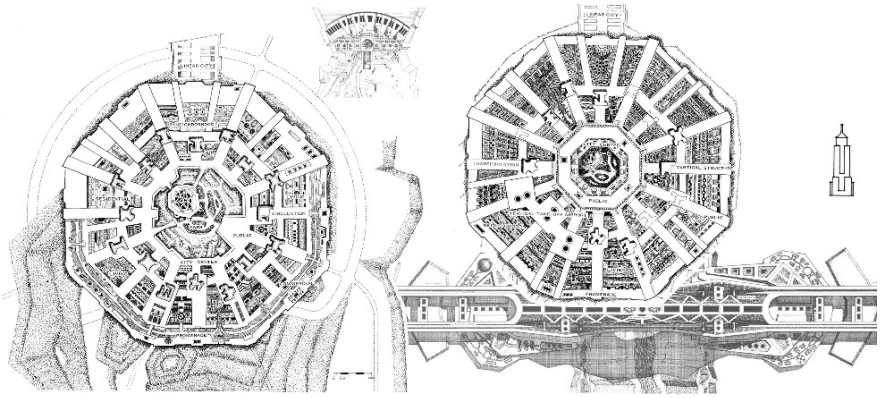

Figure 4: Arcology Babel IIC, proposed city for 340,000 people to be constructed over an open mining pit. 850 metres high, 1750 metres in diameter (just over 1 mile). Note Empire State Building for scale to the right *(Soleri Archives)*

Soleri

Arcologies and Spiritual Complexification

> A passenger liner is the closest ancestor of arcology. The common characteristics are compactness and definite boundary; the functional fullness of an organism designed for the care of many, if not most, of man's (sic) needs; a definite and unmistakable three-dimensionality
>
> (Soleri 2006/1969 p.23)

Soleri is one of the most important and influential ecocity philosophers and one of the earliest, most pertinent and trenchant critics of the suburbs.

Growing numbers of urbanists point to the essential nature of the city as a place of community, culture, social invention and shared experience – the livable city where human progress is most evident and where civilised values have their gestation and greatest degree of realisation (Lennard and Lennard 1995 p.1). Italian-American sculptor and architect Paolo Soleri, born in 1919, a key figure in the development of eco-city theory, and a major influence on US pioneers like Register[7] maintains that suburban crime rates actually exceed urban crime rates, per capita, and that densification adds to the quality of life. For Soleri, the dysfunctional nature of suburbs

[7] Whose formation of the original 'Urban Ecology' activist organisation in 1975 was directly inspired by Soleri's work.

is evident in the '. . .waste inherent in the inhuman scale of the suburban scattering with its logistical paradoxes and its unending and negative power of segregation.' (Soleri 1987 p.14).

Soleri's response to this sprawling dysfunctionalism has been to envisage a coherent urban construction able to take an active role in the protection and evolution of the biosphere. In his view of urbanism cities are potential crucibles for the evolutionary advance of humanity towards a spiritually higher state of being. These he calls 'arcologies' (ARChitecture + ecOLOGY). Publication of Soleri's 'Arcology: The City in the Image of Man' was greeted with enthusiasm (Skolimowski 1971). It has, if anything, increased in influence. Filled with dense, rich drawings and sometimes obscure text, the book is a powerful manifesto for a radically different approach to the creation of human settlement. Soleri inspired a generation of alternative thinkers with his uncompromising vision of these 'arcologies' and has been building one in the Arizona arid lands since 1970. 'Arcosanti' is now a major tourist attraction for many visitors to the American South-West.

Soleri's work is inspired by the work of rebel theologian Teilhard de Chardin. He believes that the way we make our cities can actively advance the spiritual evolution of the human species. In his vision, arcologies represent the progress of the cosmos from dispersed atoms to complex organisms with consciousness as 'matter becomes spirit' (Soleri 1973). Miniaturisation, and complexity are keywords in this vision.

> 1. Arcology, or Ecological Architecture
>
> This is the definition of urban structure so 'dense' as to host life, work, education, culture, leisure, and health for hundreds of thousands of people per square mile. The weak veneer of life ridden with blight and stillness, which megalopolis and suburbs are, is thus transformed and miniaturized into a metropolitan solid, saturated with flux and liveliness
>
> (Soleri 1969/1973 p.31)

Teilhard de Chardin uses the term Noosphere to refer to '. . .the actual layer of vitalised substance enveloping the earth' although he tells us that Vernadsky meant it to refer to the 'terrestrial zone containing life'. Either way, the noosphere is a powerful idea, to paraphrase de Chardin, it is a biological entity without precedence on earth – an added planetary envelope of thinking substance (de Chardin 1964 p.163). These ideas were transmuted by Soleri into the idea of cities as entities which created concentrated nodes of human consciousness within the noosphere. Soleri took this to be a means of accelerating the socio-spiritual nature of humanity to bring about de Chardin's Omega Point. For Soleri, it is a central tenet of arcology 'that the city is the necessary instrument for the evolution of humankind.' (Soleri quoted in Wilson 1999 p.8)

Vernadsky was an aetheist who pictured life on Earth as a global chemical reaction (Sagan 1990 p.39). In either case, cities are hot spots of matter transformation.

Soleri's arcologies are megastructures. His view of complexity may be simplistic[8]. The structure of his visually complex arcologies is probably simpler than an

[8] Doyle suggests that the reading of complexity as equivalent to progressive and having implications of superiority is a Western cultural position (Doyle 2000 p.76).

equivalent traditional urban centre of about the same population. A characteristic of all his published designs is that, if they were built, they would be relatively inflexible environments. Unlike conventional cities or towns where buildings may be constructed or razed to the ground largely independent of the rest of the urban fabric, any alteration in the giant sculptures that are arcologies would have substantial implications for the rest of the structure. This inflexibility might be regarded as fundamentally unecological because it reduces the capacity for the physical adaptation of the city to new circumstances and because it literally concretises social relations and values that may be questionable or inappropriate now, or in the future. Ironically, although there is no small element of authoritarianism in Soleri's vision the partly built arcology of Arcosanti in the Arizona desert would not exist except for the efforts of libertarians, freewheelers and counter-culture advocates all seeking new visions of the city.

Hubbard has observed internal contradictions in Soleri's challenging approach to rethinking urban life, noting that 'because of Soleri's denial to see Arcosanti as a prototype community as well as a construction site, social and economic development has not been seen as important to further the cause of arcology.' (Hubbard 2000 p.8). Soleri appears to be trying to resolve this contradiction as he approaches the end of his life; since 1999 he has begun to demonstrate 'a new openness to collaboration' (Hubbard 2000 p.9)

> After the Paradox 1999 conference[9], Soleri announced at a meeting with Arcosanti residents that he is now willing to allow and acknowledge the role which community development plays in building Arcosanti. With tears in his eyes he confessed that since the idea of arcology had come through the individual, he felt that he must be the one responsible for seeing to its creation. He believes that arcology is such an important idea for the evolution of humanity that he could not dare give it over to democratic forces. This, of course, meant that he was the sole director in order to make sure that the project did not get side-tracked or compromised to death. But now he realizes that it is time for a change. He is willing to allow the community to start playing the music. . .
>
> (Hubbard 2000 p.10)

The apparent inflexibility of Soleri's designs and his reluctance to embrace community as an active agent in the design and development of arcologies is understandable, given the strength and focus of his vision. His relevance is not universally accepted; the organisers of EcoCity IV did not initially understand why he should be invited[10] and his work does not rate a mention in Girardet's concise presentation of the urban problematic and solution in the Gaia Atlas of Cities (Girardet 1992). Nevertheless, for many of us in the ecocity movement, since the early 1970s Soleri's work has been an essential irritant and inspiration, constantly challenging notions of what it means to be 'ecological' or 'urban'[11].

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[9] Paradox is a program initiated "to explore the connection between arcology and cyberspace".

[10] Personal communication with Richard Register, April 2000.

[11] To the point of logical absurdity, with proposals like 'Asteromo', an arcology of 70,000 people located somewhere in space! (Soleri 1973a p.116–118)

My personal experiences with trying to initiate and sustain Ecopolis projects in Australia (see Chapter 7) have taught me something of just how hard it is to make a difference in the hidebound world of building and development, and my study of people and ideas has taught me that there have been very few truly original and incisive thinkers regarding the urban realm (nearly all of them are referenced in this chapter). As a consequence, my view of Soleri's work has regained its sense of wonder. Soleri's legacy reaches much further than is apparent from reading conventional planning theories and history. His critique of the automobile-suburban sprawl is more pertinent than ever. His fundamental proposition about the way to make cities is as valid as ever. The inspiration of his vision is needed more than ever, perhaps nowhere so much than in China as it pursues urban development unparalleled anywhere else on the planet – a prospect that Soleri's latest project, the SOLARE Lean Linear City, is intended to address.

Register

From Vegetable Cars to Ecocitology

> Cities, we learn from ecocity studies, could be rebuilt to fit gracefully, non-destructively, even regeneratively into their bioregions. They could become instruments accomplishing two priceless goals: (1.) fuller creative evolution of society and the individual, and (2.) healthy coevolution and mutual support with nature
>
> (Register 1987 pp. 7–8)

Soleri inspired others to undertake a radical rethink of the city in ecological terms. A common thread binding ecocity theorists and advocates is dislike of the car. Soleri designed cities that completely excluded the car. In the 1970s peace activist Register enjoyed some fame in the USA as the creator of the 'Vegetable Car' – a 'gas guzzler' converted into a planting box in memory of the Western Hemisphere's first motor vehicle fatality and as an artistic commentary on the dominant car culture. He has long spoken out against the deadly, daily danger of 'car wars', noting that more people die each year in car smashes than in all the world's wars.

Figure 5 Vegetable Car Sketch

Register trained as a sculptor and worked for many years as a carpenter. He lives as an 'ecocitologist' and is responsible for the first book to be published with ecocity in the title[12]. Working from outside the academic milieu, he has published many papers and articles expounding on the ecocity concept. These include a description and syllabus for a teaching program 'Ecocitology 101'. Register has been working on a theory of 'ecocitology' for a number of years and has published two editions of 'Ecocities', bringing together the wealth of experience and ideas he has accumulated during more than four decades of political radicalism and ecocity visioning[13].

Register was one of Soleri's early acolytes and was there on the day Soleri began physical construction of what was supposed to become the first arcology.

> It was July 23, (1970) the first day of a new era. I was certain of it. The rainbows assured me. The lightning and the distant rumbling had been reminding me from the moment we first stepped into that distant landscape so dramatic yet welcoming. Though I'd worked on many construction crews, fantasyland theatre and movie sets, and at an archaeological fly camp digging up 1200 year old Indian towns, I'd never helped start a whole new city, much less the first city of a new age
>
> (Register 1996)[14]

He soon progressed from belief in rather grand designs to a commitment to finer grained, human centred, city-making.[15]

The terms 'Ecocity Zoning' (Register 1987, 1993a p.9) and 'access by proximity' (Register 1987, 1993b p.48) can be attributed to Register. The SHED Step 5 of 'Proximating' described in Chapter 11 owes its inspiration to Register, whose descriptions of the benefits of locating things close together to save energy and resources parallels Mollison's Permaculture zoning concept. Register was inspired by Soleri's arcological imaginings and his concept of super-dense, car-free, cities that exploited three-dimensional form in order to maximise the proximity of people and activity, reducing energy and resource requirements and amplifying the potential for social interaction. Register maintains that 'THE primary principle at the base of both evolutionary change and city functioning has to do with access by proximity, that is, the occurrence of many things and functions close together.' (Register 1993b, p.48). Reflecting Soleri and de Chardin's views, he relates this to the evolutionary imperative by observing that evolution 'seems to move toward ever more functions at ever smaller physical distances' (Register 1993b p.48). With a similar concern for reducing unnecessary traffic and increasing social interchange, Engwicht concluded that the very purpose of cities was to maximise exchange whilst simultaneously minimising travel (Engwicht 1992 p.12).

---

12 'Ecocity Berkeley: Building Cities for a Healthy Future' 1987.

13 Personal communication. At the age of 21 he was the originator of the US 1970s 'No War Toys' campaign.

14 From the manuscript of Register's work-in-progress 'Ecocity', draft chapter 10 'One Person's Ecocity Odyssey', circa 1999.

15 From Register's work-in-progress 'Ecocity' circa 1999.

Figure 6: Ecocity downtown *(Register)*

Register and his cohorts formed the organisation that was to become Urban Ecology in 1975 and published the tenth anniversary issue of their newsletter in 1986. In the bibliography of recommended readings in Ecocity Berkeley, Register lists 16 books, two of which are federal government publications dealing with the energy saving potential of compact cities and the cost of sprawl, the remainder include authors cited in this review of theories, in particular Alexander, Soleri, the Todds, Jacobs, McHarg, Mollison, Van der Ryn, Calthorpe and White (Register 1987). 'Ecocity Berkeley' describes the eco-city vision by using Berkeley as a case study to show how it might be achieved by planning for higher density housing, car-free streets and creek restoration and using mechanisms like transferable development rights. Although Register's images and text can be fanciful, the vision is practical and achievable with its roots in the needs and aspirations of the community. Register's vision is typified by the drawings reproduced here. Characteristic features of his ecocities include high level bridges, exotic forms, extensive plantings and roof gardens. His vision has not simply been about promoting a particular aesthetic, but an aesthetic that embodies a way of thinking; it displays in its line quality and naive sophistica-

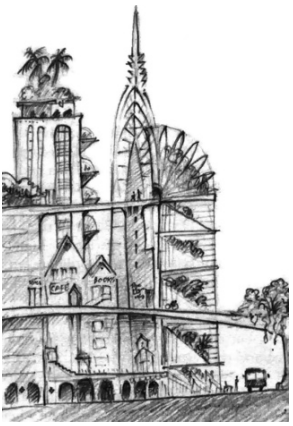

Figure 7 Elevated foot and cycle paths in Ecocity downtown

tion, an approach to designing human settlement that is clearly opposed to rigidity, central control and conformity in the name of economy and consistency. This is not just a series of responses to energy and transport efficiency, pollution reduction, water conservation, and so on, these are ecocities conceived as holistic, highly interactive and unpredictable entities. They include, if only by implication, all of the technology and processes for their existence, but do not dwell on the details. They show what could happen. They represent exercises in imaginative scenario planning.

The Urban Ecology group Register formed in 1975 and Ecocity Builders in 1992 were fairly loosely structured and reliant on a degree of charismatic leadership but they both promoted ideas about greater citizen involvement in the making of cities. Register and Urban Ecology were direct influences on the form that Urban Ecology Australia took and his visionary manner of presenting ecocity ideas reinforced my own predilection for employing provocative imagery in the exposition of ecocity ideas. Since 1990, when I first met Register at the Ecocity conference in Berkeley[16], a fairly continuous correspondence has been sustained between UE/Ecocity Builders and UEA as part of consciously trying to develop an ecocity movement. Register's 'access by proximity', his proposals for urban planning based on armatures of creek restoration, and his concept of 'shadow planning' (see Section 10.7) have all had a significant influence on the development of the Ecopolis theory by reinforcing ideas of smaller, denser, city forms; planning around the structures of ecological corridors; and long-range, goal-directed (rather than extrapolative) planning.

The on-going series of International Ecocity conferences are a consequence of Register's unwavering commitment to the dissemination of ecocity ideas, and in

[16] The First International Ecological City Conference (Ecocity 1) was convened by Urban Ecology under the leadership of Register in Berkeley in May/April 1990. The conference linked mainstream with fringe, and wild with respectable, to create a milestone event in the evolution of the ecocity movement. At the time of the conference 'green', 'sustainable' and 'ecological' cities were not on the agenda of governments, planners or mainstream environmentalists. After my participation in Ecocity 1 Urban Ecology Australia was in turn inspired by the activism, radicalism and energy of the American organisation. Register was one of the first advocates of rebuilding the world's cities as a practical and positive antidote to war.

recent years Register has been one of the key people responsible for extending and developing connections with China's urban ecologists and ecocity advocates, particularly through his association with the inimitable Dr Rusong Wang.

Fuller

Dymaxion Domes on Spaceship Earth

> Bucky Fuller once said something like – if you took all the theories about urbanism and sent them off into orbit around the Sun, the world wouldn't notice. Things would just carry on. But if you took all the hardware in the world and dumped it in the middle of the ocean, within three months millions would die a miserable death
>
> (Anson 1996 p.190)

> Fuller's epitaph reads simply 'TRIM TAB'[17].

The creative legacy of Buckminster Fuller deserves attention because his work has both theoretical value, linking whole systems thinking with human settlement conceptualisation and creation, and it has inspired a diverse and influential range of design practitioners. Most ecocity and ecodesign advocates and practitioners eventually refer to the work of Fuller. Not so much because of the artifacts or designs he produced – although he is credited with creating one of the first new structures in centuries when he invented the geodesic dome in the early 1940s (Kahn 1978 p.109)[18] – but for the way he thought, and the way he changed the way we think about design on an endlessly moving planet.

> Bucky said that biology balanced entropy. Humans were the most powerful (known) antientropic force of all, because we accumulate and purvey knowledge, adding local order to Universe in the same way that a plant synthesizes air, sunlight, and soil nutrients into botanical life
>
> (Baldwin 1996 p.226)

Fuller gave us the concept of 'spaceship earth' before we ever saw the photograph of our biosphere from space. His terminology was mechanistic but apt, and able to strike a chord in the collective consciousness – once the photograph was published. Fuller's whole world view inspired Brand et al. to produce a catalog[19] that evolved into a touchstone for the decentralist, organic, anti-authoritarian movement the media learned to call 'hippy'. Hippies built the geodesic domes as statements of the difference between their worldview and that of the establishment. Fuller had designed the geodesic dome as an ultra-efficient industrially produced high-tech structure for that dominant establishment culture of centralised, bureaucratic industrialism (Kahn 1978 p.109).

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[17] (http://www.zverina.com/2001/1003.htm)

[18] The 60 atom buckminsterfullerene molecule was named in his honour; typically referred to as a 'Bucky ball'.

[19] *The Whole Earth Catalog*.

The influence of Fuller and his ideas have been pervasive and as technology has advanced the capacity to undertake projects using his principles has increased. The largest dome built during his lifetime was the United States pavilion at Montréal's 'Expo 67' with a diameter of 76.2 metres (Baldwin 1996 p.167)[20]. Bucky imagined much larger structures, including domes encapsulating Lower Manhattan (Baldwin 1996 p.189) and 'Cloud Nine' sky cities contained in spheres 1 mile (1.6 km) in diameter, containing thousands of people, floating in the sky. The spheres would float because

> A straightforward surface-to-volume calculation shows that the structural weight of a half-mile (0.8 km) diameter sphere would be one-thousandth of the weight of the air inside. When trapped solar energy and human activity heated the air inside just one degree above the surrounding air temperature, even an unskinned sphere would float like a huge hot-air balloon
>
> (Baldwin 1996 p.190)

The science of the idea was sound but the technology, he knew, could not exist until some time into the future. In Cornwall, south-west England linked geodesic domes of up to 130 metres span have been built for the 'Eden Project' to contain 23,000 square metres of biomes in the world's largest greenhouse. Opened to the public in the early part of 2001, the structure is lighter than the mass of air it contains (Pawley 2001). The Eden Project demonstrates the convergence of high technology with ecological concerns that was a central tenet of Fuller's philosophy.

It is possible to imagine the ideal urban ecologist as someone akin to Fuller's 'Comprehensive Designer' – a modern nomad, seeing the world as an information system, determinedly seeking psychological integration and an holistic view of the planet whilst designing 'advanced livingry' to facilitate the equitable and rational distribution of resources across a beleagured biosphere, all the while thinking in a 'cosmically adequate manner' (Turner 2006, p.57–58). Fuller's model for the Comprehensive Designer derived a great deal from Wiener's cybernetics and the inspiration that came from the 'interdisciplinary migration *(hence nomadism)* and multi-institutional collaboration' that characterised the military research in the era of the Cold War (Turner 2006 p.58). Fuller did not seem to see cities as essential systems in his view of a reworked planetary system, whereas it is a core precept of Ecopolis that the city is of central importance to understanding and managing human affairs in relation to the biosphere[21]. The concept of using urban fractals as a means of changing the direction of development of a city, and thence the larger culture of which the city is part, fits Fuller's idea that an individual could redirect

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[20] The skin of the dome was burned off in a spectacular fire in May 1976 but left the structure undamaged. In 1995 the dome was refurbished (but left unskinned) as 'La Biosphère' environmental education centre (Baldwin 1996 p.166).

[21] For a fuller understanding of the curious dynamics that created the unlikely marriage of ideas between the 'establishment' and its putative nemesis, the reader is directed to Fred Turner, who has written eloquently on the synergies of the counterculture and the military-industrial beginnings of cybernetics (Turner 2006).

the direction of larger social development in the same way that a small 'trim tab' turns the big rudder that, in turn, redirects the movement of a mighty ship.[22]

Howard

The Garden City

> His prescription for saving the people was to do the city in
>
> (Jacobs 1962/1984 p.27)

Ebeneezer Howard (1850–1928) was both progressive and reactionary. As we have seen in Chapter 3, according to one's critical or ideological position, his ideas for Garden Cities have provided inspiration, disinformation, or both, to past and present generations of planners and urban advocates.

Howard was an original thinker. He saw the need for cities that absorbed and re-used their own waste and conceived Garden Cities on the basis of integrated land-use and 'a self-sufficient financial plan' (White 2002 p.45). One of the most intransigent problems of managing cities is to do with establishing and maintaining an optimum size to suit their function. Even if an ideal size can be ascertained, there remains the problem of how to maintain it despite pressures of growth (or, more rarely, retraction). According to Mumford "The first valid approach to this problem was not made till Ebeneezer Howard broached it at the end of the nineteenth century in the book that became 'Garden Cities of Tomorrow'." (Mumford 1991 p.184).

City limits are crucial to the definition of ecocities. It is necessary to establish the boundaries of an ecosystem in order to analyse its operations. Ecocities intrinsically, by definition, require identifiable boundaries, be they 'soft' or 'hard' (see Chapter 10). Howard's insistence on urban limits to growth may be his largest contribution to the development of ecocity theory.

Nevertheless, it should be clearly understood that 'garden cities' are not necessarily synonymous with ecocities and the idea of Ecopolis is expressly *not* that of a garden city.

Morris

News From Nowhere

> Grounded in the practical study of the folk traditions of construction, this (Arts and Crafts) architecture represented a quiet revolution against the assumption that the products of industrialization were superior and offered the only possible future
>
> (Farmer 1996 p.91)

William Morris (1834–1896) started a civil war in England in 1952, the same way that Ernest Callenbach was able to stage the secession of California, Oregon and Washington State from the rest of the United States of America in 1980 – by

[22] Hence Fuller's epitaph

imagining it. This device of using literature to explore an alternative reality has a long history. Utopian (and dystopian) novels have been effective vehicles for presenting ideas for two reasons: they exploit the preparedness of every reader of fiction to suspend disbelief in order to enter the world imagined by the author, and they allow the author the opportunity to present ideas about society, culture, economics, technology, architecture, planning, politics, or whatever, in an integrated way, without the burden of having to write from the basis of any particular academic discipline or specialism.

Hubbard points out that until Thomas Moore wrote of 'utopia' as 'no' place, the word was properly spelt 'Eutopia' and meant 'good' place[23] – her point being that our understanding of the basic terms of debate in the vexed field of ideal urbanism is not always as well informed as it might be. Literary utopias are, perhaps paradoxically, a means of becoming better informed. Morris' utopian imaginings and central position in the Arts and Crafts movement (Davey 1995) have made his work enormously influential for many in the ecocity movement.

Morris' image of the future was horticultural:

> England. . .became a country of huge and foul workshops and fouler gambling-dens, surrounded by an ill-kept, poverty-stricken farm, pillaged by the masters of the workshops. It is now a garden, where nothing is wasted and nothing is spoilt, with the necessary dwellings, sheds, and workshops scattered up and down the country, all trim and neat and pretty
>
> (Morris 1890/1970 p.61)

This bucolic fantasy was clearly a reaction to the grimy industrialism of his day and it is concordant and contemporary with Howard's garden city and Kropotkin's 'Fields, Factories and Workshops' (Kropotkin and Ward 1974). Its anti-urban escapism marks it as a troubled source for any ecocity theory, but its influence is still felt, and can be seen carried through my own work from the time of the Beverley project in 1974–1975 (see Section 6.8) to the Ecopolis projects in Chapter 7. It is worth noting that whereas the Garden City prescription included rigid zoning and separation, Morris' vision scattered the built environment and the functions it housed across the entire landscape, marking his notion of urban as much closer to Wright (see below) than Howard.

Callenbach

Ecotopia

> The Ecotopians must be positively allergic to paint. They build with rock, adobe, weathered boards – apparently almost anything that comes to hand, and they lack the aesthetic sense that would lead them to give such materials a coat of concealing paint. They would apparently rather cover a house with vines or bushes than paint it
>
> (Callenbach 1975 p.9)

Ecotopia is Ernst Callenbach's vision of a near-future ecological utopia made up of the states of California, Oregon and Washington after their succession from the

[23] Presentation at Ecocity IV conference in Curitiba, Brazil, April 2000.

USA. It captures the optimistic spirit of mid-1970s counter-cultural America, and paints a surprisingly convincing picture of a place in which ecological values are dominant. Callenbach's book was a best-seller and, amongst other things, spawned a journal (Seriatim, now out-of-print). There are still people on America's West Coast who refer to themselves as 'ecotopians'. Ecotopia is the twentieth century equivalent of William Morris' News From Nowhere.

Despite their 'nowhereness' both Morris and Callenbach's Utopias are place and culture specific. News From Nowhere is inseparable from its Thameside location and the radical socialist milieu of its author, Ecotopia is firmly about a particular part of the USA (with the original book cover showing a map of California, Oregon and Washington State as a separate 'country') and is a product of the American West Coast sub-culture.

Roelofs tells us that Callenbach included many now-common green city features in his 1975 descriptions of Ecotopia and that 'his ideas are embodied in the theory and practice of the extensive California urban ecology movement.' (Roelofs 1996 p.14). Register makes explicit reference to Callenbach as a way of describing what ecocity communities might be like:

> Imagine an ecologically healthy, culturally vital future, for a moment... about 100 years ahead in time... The giant megalopoli of the world have broken up into galaxies of smaller, more compact, far more diverse communities, similar to those depicted in Ernest Callenbach's rambunctious, prescient novel, *Ecotopia*
>
> (Register 1992b p.28)

Callenbach and Morris together provided the model for communicating the complex interweaving of fact (place specific locations) and fiction (future environments, processes, and imaginary people) needed to represent Ecopolis ideas. The storytelling form of writing about a future environment as if it had already happened is a powerful device and useful for presenting ecopolitan scenarios (see Chapter 12)[24].

Wright

Broadacre City

Frank Lloyd Wright's life (1869–1959) was long, his early work was innovative, influential and accessible and the latter part of his remarkable career began when he was past what we would now regard as the conventional age for retirement.

> Both Wright and Soleri have been dubbed 'organic' architects by some critics, though it is difficult to conceive of another architectural worldview which could foster such opposites
>
> (Elkington 1974 p.60)

---

[24] Something I have tried over the years, beginning with 'Letter from Kangaroo Avenue' in 1990, followed by 'The Art of Living' 1991, 'Frogs Fight Back' 1992 and 'Whyalla, Why Not?' in 1996 which was used to facilitate community processes in the public participation program of the Whyalla EcoCity Development consultancy (see Chapter 8).

With his architectural credo of organic processes and the idea that built form should exhibit a sensitive response to its environment Wright weaves a major strand of the ecocity vision, but he was not an urbanist. Wright was famously anti-city. In his illustrated polemic 'The Living City' he lays out his ideas for a city of organic architecture, of creative individuals, and self-sufficient communities, covering the landscape in carefully designed sprawl. His vision of Broadacre city was barely a 'city' at all but the logically absurd extrapolation of motor-driven, un-centred, sub-urban spread. The city as pancake. Wright's ideas about cities, like Howard's, are at the heart of the problems with the modern metropolis rather than its solution. As White and White put it 'With Frank Lloyd Wright's city to end all cities, we reached the climax of anti-urbanism.' (White and White 1962 p.209)

> Garden and building may now be one. In any good organic structure it is difficult to say where the garden ends and where the house begins or the house ends and the garden begins – and that is all as should be. . .
>
> (Wright, Future of Architecture, p.260–261)

He was questioned about what this might mean for the countryside:

> We are talking about the countryside itself developing into a kind of building in which will lie naturally building becoming part of the countryside, buildings belonging there naturally with grace
>
> (Wright, Future of Architecture, p.265–266)

The irony in this is that, by 1939, the English countryside had long been an artificial construct – and a successful one (see Alexander in Section 6.8). Though he seemed to have missed the point that an enormous proportion of the world's landscapes have already been shaped by humans through centuries of occupation Wright's concept of Broadacre City was prescient. He foresaw a landscape entirely worked over by human activity but his major, and perhaps underestimated, contribution was to propose that the human impact on the land be a result of integrated design that served the needs of both the landscape and its occupiers.

By simultaneously recognising that architecture was potentially great art, that it was expressive and culturally important, and then bringing it down to earth with 'a hod of mortar and some bricks' (Wright 1945 p.202), Wright sketched the creative complexity of architecture in a manner that connected it with the mundane reality of construction. In this, he was unusual. His awareness of regional subtleties in building was integral to the organic view and the connection of buildings to place that is an essential part of making ecologically viable human settlement (see Sections 3.3, 9.7 and SHED Steps 1 and 2, Chapter 11).

Wright's impact on architecture has been ubiquitous, by the middle of the 20th century he was described as 'in all probability, the most influential architect of his time.' (Blake 1960 p.9). I fell under his influence at an early age and, for good or ill, his work has continued to inform and inspire me. There is some irony in the knowledge that Wright was such a poor urbanist, but one might conjecture that his organic architecture/anti-city ethos has acted as something of an antibody in the circulation of ecocity ideas.

4.2 Process People – Understanding the Nature of Cities

> Human activity has encroached upon every realm of nature. Consequently, nature is no longer completely natural
>
> (Fisk and MacMath 1998 p.24)

Much of the relevant work done on urban ecology is concerned with the management of *extant* urban systems and how to make them work better (Boyden et al. 1981; Hough 1984, 1995; Spirn 1984). These 'process people' are those particularly strong on analysing human settlement in a way that fits it in an ecological context. Their prescriptions are less to do with proclaiming visions of the future and more to do with identifying the processes that might enable us to have one.

Geddes

A View from the Outlook Tower: Cities in Evolution

Geddes gave us the first modern view of cities.

If there is one person to whom the fundamentals of human ecology and ecocity theory can be attributed, it is Patrick Geddes (1854–1932). A contemporary of Howard (1850–1928), they first met in July 1904 at the first of a series of three lectures Geddes gave to the newly formed Sociological Society (Kitchen 1975 p.218, Beevers 1988 p.98). Although the two men maintained contact over 10 years and shared an holistic approach to planning theory, there does not seem to have been any particular outcome from their acquaintanceship. Howard was a clerk with a rather mechanistic turn of mind whereas Geddes was a biologist by training and '. . .regarded a city as an organism rather than an artifact: its form was to be determined by the activities of its citizens, their relationships with one another and with the environment.' (Beevers, 1988, p.98).

To introduce and position his work it is difficult to do better than quote from the Introduction to Kitchen's critically sympathetic biography:

> Patrick Geddes believed passionately that, given reasonable social conditions, man (sic) is a cooperative animal. He also believed that, treated properly, the earth is fundamentally a co-operative planet on which to live. He aimed to find out how to achieve those 'reasonable social conditions' and to teach people how their environment might be 'treated properly'. He was the most comprehensive, if least acknowledged, father of civic renewal and bio-social ecology as we are beginning to understand them today.
>
> Born in 1854, his influence is directly felt by only a handful of people. He saw western thought become pessimistic, introspective and hair-splitting; yet to the end of his life in 1932, by his actions even more than by his words, he demonstrated his conviction that education, participatory citizenship, and appreciation of the natural world, would save industrial society. Like the morally-earnest Victorian which he partially was, he had his own Latin motto: *vivendo discimus* – by living we learn: or, fieldwork and civic action are better than indoor study and book-writing
>
> (Kitchen 1975 p.15)

Geddes was one of the first to recognise that, with the rise of industrialism, urban centres were no longer cities as Plato might have understood them, and that the term needed redefinition. He put forward the term 'city region' to convey the idea of an expanded sphere of influence (Bendixon 1975 p.45) and held that humanity had the wherewithal to leave the smokestacks of early industrialism and enter a 'neotechnic age' with the promise of relief from drudgery and waste (Geddes 1968/1915 p.85)[25].

> (There is a)...better future now dawning – in which the applied physical sciences are advancing beyond their clumsy and noisy first apprenticeship, with its wasteful and dirty beginnings, towards a finer skill, a more subtle and more economic mastery of natural energies; and in which these, moreover, are increasingly supplemented by a corresponding advance of the organic sciences, with their new valuations of life, organic as well as human
>
> (Geddes 1968/1915 p.93)

In 1892 Geddes took over a building at the top of Edinburgh's High Street and transformed it into the Patrick Geddes Centre For Planning Studies. Part of the building became the 'Outlook Tower' which was intended to be Geddes' supreme 'thinking machine'. The tower was conceived as a tool for regional analysis and as the 'world's first sociological laboratory'. Each level presented a view of the world from the global scale to the local and from its top, via a camera obscura, the viewer could see a panorama of the region in which the city was placed[26].

> Geddes developed a deep fascination with the organization of human societies and their spatial manifestation in the city and the country. Geddes propagated a highly individualistic theory of societies and cities drawing from regional theories in biology and geography, philosophical ideas (especially those of Plato) and political anarchist thought
>
> (McGrath 1998)

Geddes was supportive of what he called 'constructive anarchism'. Honoré (Elie) and Elysée Reclus, both prominent in the international anarchist movement, influenced Geddes with their stress on the organic relation of the city to the country and predictions of their eventual integration (Wiebensen, 1968? P.16). Elysée, like Kropotkin, was an eminent geographer and Elie was a respected anthropologist. Both were well-known to Geddes who often engaged Elysée to lecture in his summer school programs (Wiebenson, 1968? P.16). Reclus and his brother's son, Paul, produced the major globes and relief models for the displays in Geddes' Outlook Tower (Kitchen 1975 p.136). Reporters working for *The Scotsman* were instructed not to cover events at the Tower because of its known associations with anarchists. Stained-glass windows to the stair landing in the Outlook Tower contained images designed to symbolise ideas that Geddes valued, and they included the anarchist black flag.

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[25] Similar to the 'post-industrialism' of later parlance, Geddes' concept of 'neotechnic' has some of the overtones of Bookchin's post-scarcity anarchism.

[26] The Outlook Tower http://www.cce.ed.ac.uk/geddes/outtow.htm accessed 14 April 2001.

> His widespread interests were not the result of a pursuit of pure knowledge, but of an attempt to clarify and emphasize – in an increasingly specialized world – the inter-relations between all branches of knowledge
>
> (McGrath 1998)

At the time of the First World War with its novel display of technological power and horror, Geddes was writing about the peaceful transformation of 'cities in evolution'. Although Geddes was not very well known in his own lifetime and published little his work was enormously influential, leaving its traces in much modern thinking about urbanism and human relations with the planet. One biographer called him the 'founding father of town planning and environmentalism' (Kitchen 1975), Lewis Mumford was impressed that 'Geddes coupled thought to action, and action to life, and life itself to all the highest manifestations of sense, feeling, and experience. . .' (Mumford 1963 p.384). Through his work, Mumford discerned that Geddes was practicing 'the reclamation of science by citizenship', and, through his wide-ranging activities, was bringing together 'provinces of thought: isolated and sterilized by their failure to begin and end with that unity which is life.' (Mumford 1963 p.386). Geddes' inclusive and integrating approach to human knowledge and civilisation was capable of bridging the cultures so that 'Far from rejecting the primitive elements in our civilisation (he) insisted that they were an integral part of man's (sic) inheritance. . .' (Mumford 1963 p.388).

> In Geddes' life and the sundered fragments of the modern world were restored to unity, not by returning to their original simplicity, but by going forward to a more highly developed synthesis and to a more inclusive pattern of action: a synthesis that was always open to the test of fresh action, to the challenge of fresh experience, to the incursion of fresh ideas and ideals
>
> (Mumford 1963 p.389)

Patrick Geddes' conceptual tool of Place-Work-Folk presented in Appendix I of Kitchen (1975 pp.323–327)) can be reinterpreted as Ecology-Activity-Community and related to the Ecopolis Development Principles described in Chapter 11.

Mumford

Cities, Technics, Ecology and the Green Matrix of Regionalism

Mumford provided us with the most comprehensive view of the history of the city and its relationship with technology and culture.

Lewis Mumford (1895–1990) was one of the most consummate urban theorists and historians of the city, whose enormous body of work on the history and theory of cities remains unsurpassed in its scope and depth nearly twenty years after his death. His work is notable, amongst other things, for its consistent emphasis on understanding the city in context with its region. He was an early proponent of an ecological worldview. His work on the evolution of cities built on the foundations laid by Geddes and, like Geddes, he was an advocate of regionalism and his work informs Ecopolis Proposition 1, that city-regions determined the ecological parameters of civilisation.

> The maintenance of the regional setting, the green matrix, is essential for the culture of cities. Where this setting has been defaced, despoiled, or obliterated, the deterioration of the city must follow, for the relationship is symbiotic. The difficulty of maintaining this balance has been temporarily increased, not merely by the incontinent spread of low-grade urban tissue everywhere, dribbling off into endless roadside stands, motels, garages, motor sales agencies, and building lots, but by the rapid industrialization of farming itself, which has turned it from a way of life into a mechanical processing business no different in content or aim or outlook from any other metropolitan occupation. . .. What is vital is the preservation of the green matrix in which urban communities, big and small, are set: above all the necessity to prevent the uncontrolled growth of urban tissue from effacing this matrix and upsetting the entire ecological pattern of city and country
>
> (Mumford 1961/1991[27])

The ecocity vision typically contains that curious tension between the global and the local which is so much part of the post-industrial condition, with an appeal to regional allegiances on the one hand and planet-wide responsibilities on the other.

> We can no longer leave soils and landscapes and agricultural possibilities out of our calculations in considering the future of either industries or cities. For the era of the callous pioneer, who laid waste to a particular area, looted its natural resources, and moved on, is over: there is no place left to move. We have reached the end of our journey, and in the main, we must retrace our steps, and, region by region, learn to do intelligently and co-operatively what we hitherto did in such disregard of the elementary decencies of life. The grasp of the region as a dynamic social reality is a first step toward a constructive policy of planning, housing, and urban renewal. . ..
> In its recognition of the region as a basic configuration in human life; in its acceptance of natural diversities as well as natural associations and uniformities; in its recognition of the region as a permanent sphere of cultural influences and as a center of economic activities, as well as an implicit geographical fact – here lies the vital common element in the regionalist movement. So far from being archaic and reactionary, regionalism belongs to the future
>
> (Mumford 1938 p.305–306)

Writing before the advent of the internet, Mumford saw the human prospect such that:

> We must now conceive the city. . .not primarily as a place of business or government, but as an essential organ for expressing and actualizing the new human personality – that of 'One World Man' (sic). The old separation of man and nature, of townsman and countryman, of Greek and barbarian, of citizen and foreigner, can no longer be maintained: for communication, the entire planet is becoming a village; and as a result, the smallest neighbourhood or precinct must be planned as a working model of the larger world
>
> (Mumford, 1961/1991 City in History, p.652–653)

This critical, but hopeful, stance taken by Mumford typifies his approach and it may well be that his influence on me has not only been through the expression of ideas and historical analysis (the essential idea of a 'cultural fractal' is implicit in the 'working model' concept) but also in the tone of critical optimism that pervades and adds promise to his writing.

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[27] The City in History, Graphic Section Four, Plate 58.

Everything we build involves some kind of technology and alters flows of matter, energy and information. When I first started reading Lewis Mumford many years ago I was struck by his observation that the term 'technology' was routinely used without a clear sense of its meaning. Taking Cues from Mumford, my understanding of technology is that it is not simply about 'things' but it is also about how we use them. Thus: technology = tool+use. This is a powerful little equation. You can take a tool, say a hammer, and hammer nails into wood to build a shed, and you have a creative technology; taking the exact same tool you can choose to smash someone's head in – and you have a weapons technology. In both cases the tool stays the same. The difference is in its use, and its use is informed by decisions based on value judgements. The generation of sets of values and their application is at the core of what we call culture. We already have many tools; we have had sufficient tools to reshape an entire planet to the extent that we have undermined our own hopes for survival; now we need to apply a different set of values, ones that reinforce regenerative, life-sustaining behaviours that become integral to everything we build. Mumford's brilliantly pertinent observations described this necessary future many years ago.

McHarg

Designing with Nature

> It is not a choice of either the city or the countryside: both are essential, but today it is nature, beleaguered in the country, too scarce in the city which has become precious
>
> (McHarg 1971 p.5)

Ian McHarg took the intellectual baton from Mumford (who had taken it from Geddes) and applied ecological thinking to the problems of planning human settlement. In the Introduction to McHarg's seminal work 'Design with Nature' Mumford called him 'an inspired ecologist' (McHarg 1971 p.vii).

> Let us accept the proposition that nature is process, that it is interacting, that it responds to laws, representing values and opportunities for human use with certain limitations and even prohibitions to certain of these
>
> (McHarg 1971 p.7)

McHarg applied his perceptions of nature and propositions of process to the task of designing a system for 'designing with nature'. His resulting approach, developed over many years, was tested through practical application in difficult environments, typically where urban development pressures threatened nature. With case studies undertaken in places like the Potomac basin that cradles Washington DC, the Baltimore region and metropolitan regions elsewhere in the USA, McHarg used a technique of 'layering' various analytical maps of a region one over the other so that the patterns of the place were revealed: thus hydrology, geology, soils, drainage, historical landmarks, vegetation, wildlife habitats, slope, and scenic values might all be layered to disclose the places most likely to be suitable for recreation, residential

development, and so on. This powerful technique was employed without the benefit of computers and was the preamble to the computer-generated geographic information systems that are now essential to environmental planning.

The legacy of McHarg can be seen across the planning world, in such competent publications as Hendler's well-illustrated 'Caring for the Land' (Hendler 1977) which is almost cartoon-like in its clarity, in the work of ecologically responsive planners like Hough, whose work continues to develop McHarg's insights on process and form, and in the systematic approach to ecological design propounded by Fisk and Vittori. McHarg's methodology of analysis by uncovering layers of patterning in the natural and human landscape was a revelation to me when I stumbled across his text in 1975 and it has long since continued to inform the Ecopolis idea and underlying mode of thinking. This can be seen, to some extent, in the layered analyses of the Halifax EcoCity Project and Whyalla Ecocity Development (Chapter 7) where 'ecological (habitat) corridors' form armatures for inner-city urban design.

Douglas

The Biogeography of the Civitas

Ian Douglas provided one of the earliest and most comprehensive texts that dealt with an 'integrated bio-socio-physical' approach to cities. In his introduction to 'The Urban Environment' (1983) Ian Douglas notes the value of the *civitas/urbs* distinction as a means of analysing and understanding urban systems. In the body of his book, Douglas explains key aspects of cities and their function in terms of both physical and social eco-systems. He regards the city as an economic system and as an ecosystem; considers food supply, raw materials and their environmental impact; energy and water balance in the city; geomorphology, biogeography, and urban health and disease.

Douglas includes a review of biological views of the city which explores definitions of cities as organisms and ecosystems. He suggests that approaches to modelling cities as ecosystems 'offer a great attraction to urban managers and planners' (Douglas 1983 p.13) but it seems that it is only in recent years that this approach has begun to regain any traction and it is still very rare, with the Baltimore Ecosystem Study being 'one of only two Long-Term Ecological Research sites located in an urban environment' (BES 2007)[28]. Writing in the early 1980s, Douglas observed that

[28] The website of the Baltimore study discusses and provides 'tools' for 'Linking Science and Decision Making' and states that 'While all ecology educators would assert that understanding the environment has utility, here is the opportunity to test this relationship in a bold and long-term fashion.' (BES 2007). The section on 'Revitalizing Baltimore' states that the project goal is 'to demonstrate human and natural system connections and equip people to care for natural resources, while employing these resources to revitalize neighborhoods', (http://www.beslter.org/frame9-page_7.html, accessed 28 January 2008)

progress towards adopting an integrated approach to that linked ecological analysis to analysis of 'the processes by which humans exploit or are affected by the urban ecosystems' was slow and there is little evidence that even Baltimore's urban managers are, as yet, greatly attracted to the ecosystem model as a primary planning tool. 'The Urban Environment' is an important document, providing a coherent and still useful overview of the key issues that need to concern anyone trying to reconcile urbanism with long-term ecological stability. Its final chapter is a perceptive and prescient look at people, government and the ecological future of cities that remains pertinent.

Two decades after publishing 'The Urban Environment' Douglas was co-chair with Rusong Wang of the Chinese Academy of Sciences of the Ecopolis SCOPE project (2003–2007), 'examining the development of more sustainable, ecologically sound cities' (see also Wang and the Chinese Urban Ecologists). He is still active in the movement towards ecological cities.

Boyden

Human Culture as a Force in Nature

> The future of our species will depend on the outcome of our efforts to apply our capacity for culture to the control of culture itself, in the interests if humankind and the rest of the living world
>
> (Boyden 2004 pp.158–159)

Stephen Boyden has been researching and writing about civilisation from a biological perspective for over four decades[29]. In the 1970s he initiated 'the first comprehensive ecological study of an urban population' as director of the Hong Kong Human Ecology Program. In Chapter 3 we have seen an example of how his work has long been about achieving a deeper, biologically informed understanding of the human condition and how the 'ecological and experiential characteristics' of the Fifth Ecological Phase of Human Existence make excellent defining attributes for ecocities.

Well aware that cultural reform is no easy thing to hope for, let alone realise, Boyden argues that just such a reform is needed to achieve 'ecological sustainability and equity and peace among the peoples of the Earth' and that our culture must embrace 'a basic understanding of, and reverence for, nature and the processes of life.' (Boyden 2004 p.167). What he calls 'biounderstanding' would then lead to 'a new worldview and a seminal shift in the priorities of the dominant culture so that the health and well-being of living systems would assume top position in the hierarchy of priorities.' (Boyden 2004 p.167).

His prescient observations include the most important one of all, the corollary of which is the keystone of the Ecopolis propositions, that 'all the main threats to

[29] Although, officially, he retired in 1990.

the well-being and survival of human groups today, or to humanity as a whole, are consequences of the human capacity for culture.' (Boyden 2004 p.6).

Hough

Cities as Natural Process

Michael Hough looked at the city and saw that it was a human construction which could not be separated from the processes of nature. He described the necessary relationships that exist between human habitation and living systems and prescribed process-based approaches to designing and developing urban environments that fitted the processes of nature. He identified urban ecology as the basis for shaping cities (Hough 1995 pp.5–32) and climate as '. . .a common thread that influences all the other natural and human processes of water, plants, animals, urban farming and city life.' (Hough 1995 p.285). His view is broad and embraces human ecology, seeing community activity as inseparable from the achievement of workable built environments.

Published in 1984 'City Form and Natural Process: Towards a New Urban Vernacular' was the basis of the later 'Cities and Natural Process' (1995). In the Preface to the later book Hough notes that there has been such a change in people's perceptions of nature within cities that 'An awareness that natural processes and human affairs are inseparable issues is beginning to emerge.' (Hough 1995). Part of that emerging awareness is his own realisation that '. . .initiating change to the way things are done is influenced, at least initially, more by changes to deeply rooted values and traditions, than by economic imperatives.' (Hough 1995).

Alongside Spirn's 'Granite Garden' and McHarg's 'Design with Nature', Hough's work has provided some of the best available textbooks for students of urban ecology until very recently.

Spirn

In the Granite Garden

> It is time to expand what has been a romantic attachment to the ornaments of nature into a commitment to reshape the city in harmony with the workings of nature
>
> (Spirn 1984 p.37)

Landscape architect Ann Whiston Spirn has a poetic and practical view of the city that attracted Jane Jacobs' admiration[30]. Her 'Granite Garden' speaks of urban nature and human design and deals with the city elementally including four sections on Air, Earth, Water and Life.

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[30] From the book jacket comments on 'The Granite Garden'.

Spirn has inspired my confidence in holding to the view that the Ecopolis approach is based on a fundamentally correct view of urbanism and design. She says, quite simply, 'The city is part of nature.' (Spirn 1984 p.4)

Jacobs

The Death and Life of Cities

Grand visions of future cities have never been turned directly into reality. The utopianism, and implicit authoritarianism, of all such visions has always generated both excitement and foreboding. There have always been those who saw an imperative to work with facts rather than fantasy and within the frameworks of existing urban environments rather than on plans for imaginary places. Geddes was one such, another was Jane Jacobs. Both held powerful visions of how cities might be, but neither were utopians. A measure of how Jacobs' work was received can be gained from the observations of Theo Crosby:

> Her analysis of the processes by which planners have destroyed cities is devastating, and her pointers towards the real nature of city life and economy are the only civilised counter to the comic book vapourings of the super technologists, and the blind bureaucracy of planning orthodoxy.
> Mrs Jacobs' message is simply to revalue and regenerate what we have – the old streets with their contact and *camaraderie*, the economic use of old buildings, the necessity for diversity and the dangers of radical redevelopment. Above all, she stresses the possibility of regeneration through social and administrative means rather than through new construction
>
> (Crosby 1973 p.64)

This kind of sympathy links the outlook of urban theorists as diverse as Geddes and Prince Charles[31]. It is a view antipathetic to the propositions of Soleri, though his musings on urbanism contain some reflection of the same sensibility particularly in regard to the benevolence of the 'urban effect' (Soleri 1987 p.93). The propositions of this book are predicated on the importance of the elements that overlap in these views. Thus Soleri's crusade against sprawl is joined with Jacobs' passion for the life of cities and Geddes' clear vision of the profound interdependence of city and region. Whereas the 'big picture' visionaries tend to start with images of new cities as physical form, Jacobs saw urban renewal beginning best with a renewal of citizenship, an activist position that finds its most succinct expression in the work of Bookchin[32]. Jacobs offers useful rejoinders to those who would try and reduce urban problems to too few dimensions. The car is certainly part of the urban problematic, for instance, but Jacobs cautions:

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[31] Whose exhortations to work with the existing and traditional fabric of towns and cities preceded his commitment to building new ones.

[32] Bookchin valued Jacob's economic analysis of cities. 'It remains a lasting contribution of Jane Jacobs to have demonstrated in a very compelling way that our economic well-being depends on cities, not on nation-states.' (Bookchin 1995 p.202–203)

> Automobiles are often conveniently tagged as the villains responsible for the ills of cities and the disappointments and futilities of city planning. But the destructive effects of automobiles are much less a cause than a symptom of our incompetence at city building
>
> (Jacobs 1962/1984 p.17)

With her emphasis on revaluing and regeneration, Jacobs offers a philosophical position for ecocity making that is applicable to all urban environments. In the case of the Los Angeles Ecovillage (see Chapter 6) one can see the Jacobs' philosophy being put to the test by a community organisation, effecting the creation of a piece of ecological city in downtown LA[33].

Fisk and Vittori

Maximising the Potential of Building Systems

> There is a hint of the mad scientist about Pliny Fisk III
>
> (Lerner 1997 p.19)

Pliny Fisk and Gail Vittori have, through their research and design work with the Center for Maximum Potential Building Systems (Max's Pot)[34] at Austin, Texas, created images of ecological design that are mix of mechanical and earthy, using indigenous and recycled industrial building materials. Their real success has been in establishing the ideas of mapping and tracking as integral to construction, taking McHarg's 'layering' techniques and developing it as a means of identifying the 'at a distance' impacts of building. Fisk and Vittori's determinedly holistic approach to building '. . .sees built form as a product of an enlightened understanding of the environment in which it is set.' (Haslam 1997 p.54). By favouring local building materials and techniques the architecture 'takes into account the metabolism of the local environment' (Fisk quoted by Lerner 1997 p.29)[35]. Writing on behalf of Max's Pot, Fisk is optimistic about what can be achieved with an appropriate approach:

> We feel that the initial building process, the working metabolism of structures, even the final death of those artifacts, can work in harmony with the natural world around us
>
> (Fisk (ed) undated-a)

Fisk's concept of regional mapping defines the ecological and economical context and '. . .is used as a tool to identify plant species, soil types, rainfall, wind

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[33] Dialogue between Lois Arkin of the LA Ecovillage and UEA has mutually reinforced their community based ethos and determination to achieve ecocity goals in difficult inner-urban environments.

[34] A non-profit organisation formed in 1975.

[35] Much of the material for building in metropolitan Adelaide is from the region, close to the city. This reduces transport energy costs with the result that the delivered price of concrete aggregate in Adelaide is about half that of Sydney (SA Dept of Mines and Energy 1991).

strength and insolation. As such it defines the biome or bio-region – an area with a distinct set of climatic, vegetation and soil characteristics.' The economic connectivity of mapping is reflected in its use as '. . .a statistical base to identify human resources such as transport networks, manufacturing processes and job skills.' (Haslam 1997 p.54)

In the work of Fisk, Vittori and Max's Pot there is linkage of architecture and ecology with social concerns, as part of seeking 'to restore the co-operative imperative between natural and human systems to ensure their mutual survival.' Their uncompromisingly regionalist philosophy is 'born out of a rigorous understanding of context'. Again, it is possible to identify the theme of architecture as part of a social endeavour, people *with* environment, old *with* new 'akin to the tradition of a local building knowledge, but using the benefits of the computer age.' (Haslam 1997 p.56)

> As he stands surrounded by a useful profusion of tools, drill presses, lathes, and racks of clamps of all sizes, it is not hard to see that he belongs to the nuts-and-bolts school of environmentally responsible architecture
>
> (Lerner 1997 p.21)

Supported by the administrative and research skills of his wife and co-director, Gail Vittori,[36] the practical focus of all Fisk's work is closely linked to a theory about minimising transport distances, eliminating wastes through material reuse and use of local construction resources.[37] His hands-on approach to ecological design struck a chord with me and added inspirational fuel to the commitment to praxis that underlies the Ecopolis idea. His work on rewriting architectural and engineering guidelines for the state of Texas led to the development of Austin's Green Builder Program which 'was honoured by the United Nations at the Earth Summit as one of the twelve exemplary local government initiatives around the world.' (Lerner 1997 p.35). Although most of Max's Pot work is not set in an urban context[38] it offers important lessons for designing and developing in urban ecosystems.

> It can be said that the approach of Fisk and Vittori is radical in that they appear to have sought out every conceivable way to make their house and workplace environmentally responsible, right down to. . . its eventual dismantlement so that the construction materials will not be wasted
>
> (Jodidio 1998 p.47)

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[36] The relationship and roles of Vittori and Fisk appears to closely parallel that of the author and his partner and co-worker, Chérie Hoyle.

[37] Fisk and Vittori were among the first to use strawbale in modern construction and Fisk's experimentation with flyash as a cement substitute inspired the author's determination to use flyash content concrete in the Christie Walk project.

[38] Max's Pot have experimented with environmentally responsible materials and techniques intended to support flexible and participatory approaches to making urban space.

The Alchemy of the Todds

Bioshelters and Living Machines

> When I first walked into one of John Todd's bioshelters and living machines, I was struck not only by the fact that it worked, but by the fact that it was beautiful, in the sense of peacefulness that they have. I think that some of these outlaw designers, who are the pioneers of the area of ecological design, by offering us a chance to actually see and feel ecological design, even if it's very local, are prefiguring the kind of design process that has to happen in the future
>
> (Bateson quoted in Zelov and Cousineau 1997 p.322)

The work of John and Nancy Todd and the New Alchemists has been pivotal in the movement towards ecological design. They stand between the radicalism of fundamental thinkers like Fuller and the pragmatic interpretations and theoretical reworkings of practitioners like McDonnough.

Originating partly in a series of seminars held for biology students and born during the 1969–1970 American academic year, the New Alchemy Institute began by asking if there were 'biological analogues by which human populations might sustain themselves other than the present exploitive, dangerous, and biologically insupportable technologies?' and whether humanity could '. . .coexist in a mutually supportive and beneficial way within the biosphere. . .?' (Todd 1977 p.10)

Ecological design is about having an holistic scientific view, informed by humanism. Such an approach was outlined by John Todd in 'A Modest Proposal' in 1970. His proposed 'biotechnologies for small communities' (Todd 1977) were first realised experimentally in the late 1960s and early 1970s and have since led to a number of initiatives including the design and manufacture of 'living machines' that now treat sewage in locations ranging from American small towns to a chocolate factory in New South Wales[39]. These biotechnologies have now been available for some time but such practical programs and projects were not possible until the right historical circumstances allowed for their development, and their continued development has been dependent on other technological improvements.

> New Alchemy, while still a child of necessity, is also very much of this moment. Much of the work would be impossible without the profound biological knowledge of the present. Similarly, modern technology has provided us with materials that enable us to open structures to light and to monitor subtle ecological interactions that would have been unavailable to us until recently
>
> (Todd 1977 p.144)

The practical ecological technologies resulting from the work of the Todds and the New Alchemists has also informed the work and ideas of many others. The Todds and the New Alchemists have worked with some of the other people identified

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[39] 'Solar Aquatics' was initially identified to provide appropriate facilities for the Halifax EcoCity Project but turned out to be very expensive. 'Living Machines', is a direct spin-off from the New Alchemy Institute and in a commissioned report to the developers eventually selected for the Halifax Depot site, the author, through Ecopolis Pty Ltd, proposed a long-term goal of employing a series of these Living Machines in the nearby parklands.

in this chapter, including architect Malcolm Wells (Todd and Todd 1994 p.52) and among the mentors acknowledged by the Todds can be found Bookchin, Fuller, Brand and Bateson – reinforcing the sense that there is a strong community of ideas at the heart of developing ecological design theory. The Todds have made their operational principles explicit from the beginning of the New Alchemist enterprise. In 1984 they put forward a set of 'Emerging Precepts of Biological Design' which was reiterated and reinforced in 1994 (Todd and Todd 1994). They write that 'The years between the two editions have served to prove. . .that the original precepts underlying sustainable ecological design are not only valid but among the few promising epistemologies for the human future.' (Todd and Todd 1994 p.19) The New Alchemy Precepts are guidelines for design which 'grew from the confluence of New Alchemy's work with that of a number of other people who had been thinking along similar lines.' (Todd and Todd 1994 p.19) It is unclear why some precepts are 'shoulds' and others are 'musts' but it is interesting to compare them with the later Hannover Principles of McDonough (see below) which also stresses its evolutionary nature. McDonough appears to have been consciously or unconsciously influenced by the New Alchemists. Apart from the adoption of the same number of principles (nine) there is an obvious confluence of ideas and evidence of a fundamentally similar outlook.

A focus of New Alchemy has been the creation of 'living machines' conceived as operating in the manner of ecosystems. The Todds define a living machine as '. . .a device made up of living organisms of all types and usually housed within a casing or structure made of extremely light-weight materials. Like a conventional machine, it is comprised of interrelated parts that function together in the performance of some type of work.' (Todd and Todd 1994 p.167).

> When the late Buckminster Fuller attended the opening of the Pillow Dome, the first of New Alchemy's second generation of bioshelters in June, 1982, he inspected the building and then turned to us with a radiant and approving smile. He announced, 'This is what I always wanted to see happen with my architecture – this integration with biology'
>
> (Todd and Todd 1994 p.64)

Table 3: The New Alchemy Emerging Precepts of Biological Design and The Hannover Principles (compiled by the author)

New Alchemy Precepts of Biological Design	**The Hannover Principles** *Re-ordered and with emphases by Downton*
The living world is the matrix for all design.	2. Recognize interdependence. *The elements of human design interact with and depend upon the natural world*, with broad and diverse implications at every scale. Expand design considerations to recognizing even distant effects.
Design should follow, not oppose, the laws of life.	9. Seek constant improvement by the sharing of knowledge. Encourage direct and open communication between colleagues, patrons, manufacturers and users to link long term sustainable considerations with ethical responsibility, and *re-establish the integral relationship between natural processes and human activity.*

Table 3: (continued)

New Alchemy Precepts of Biological Design	**The Hannover Principles** *Re-ordered and with emphases by Downton*
Biological equity must determine design.	4. Accept responsibility for the consequences of design decisions upon human well-being, *the viability of natural systems and their right to co-exist.*
Design must reflect bioregionality.	5. Create safe objects of long-term value. Do not burden future generations with requirements for maintenance or vigilant administration of potential danger due to the careless creation of products, processes or standards.
Projects should be based on renewable energy sources.	7. *Rely on natural energy flows.* Human designs should, like the living world, derive their creative forces from perpetual solar income. Incorporate this energy efficiently and safely for responsible use.
Design should be sustainable through the integration of living systems.	6. Eliminate the concept of waste. Evaluate and *optimize the full life-cycle of products and processes, to approach the state of natural systems*, in which there is no waste.
Design should be co-evolutionary with the natural world.	1. Insist on rights of *humanity and nature to co-exist in a healthy, supportive, diverse and sustainable condition*.
Building and design should help heal the planet.	8. Understand the limitations of design. No human creation lasts forever and design does not solve all problems. *Those who create and plan should practice humility in the face of nature.* Treat nature as a model and mentor, not as an inconvenience to be evaded or controlled.
Design should follow a sacred ecology.	3. *Respect relationships between spirit and matter.* Consider all aspects of human settlement including community, dwelling, industry and trade in terms of existing and evolving connections between spiritual and material consciousness.
The formulation of these early precepts as they are applied and tested will contribute, in time, to the creation of a science of applied ecology which will serve in turn as a foundation for future technological design.	The Hannover Principles should be seen as a living document committed to the transformation and growth in the understanding of our interdependence with nature, so that they may adapt as our knowledge of the world evolves.

Allen and the Bionauts

Off the Planet in Arizona

Biosphere 2 is ecological architecture inside out. It is architecture containing an ecosystem rather than architecture in the context of an ecosystem. The project is 'engineering, biological stocking, sealing-off, and operating a materially-closed, energetically and informationally open, free energy accumulating life system' modelled on the workings of 'Biosphere I', planet Earth (Allen and Nelson 1989 p.55). John Allen, the man behind the project, is variously described by media and detractors

as ‘some kind of nut’. The expressed intent of Biosphere 2 includes the goal of prototyping off-planet settlement.[40] It was conceived one of the first steps to Mars (Maranto 1987) and is in the tradition of the off-planet aspirations of O’Neill’s space colonies (O’Neill 1975, 1981) and Soleri’s artificial asteroids (Soleri 1973a). This 200 million dollar (US) attempt to bottle an ecosystem, privately funded by billionaire recluse Edward Bass (Meredith 1991), raised many challenging questions about the viability of constructed ecosystems.

> The Biosphere II project is the first attempt to create a biospheric total system on what is thought to be the requisite scale of 5 million cubic feet
>
> (Space Biospheres Ventures 1986)

Following the idea that the earth is an evolving organism and that biospheres are potentially replicable assemblages, Biosphere 2 is the most recent of very few serious experiments that have tried to create a variant of ‘McHarg’s Cubicle’ – a capsule containing a mostly closed system[41] of air, water, algae, bacteria, light and a human (Sagan 1999 p.162). In the ‘bionautic’ view of the world, the intervention of humans in planetary processes provides a consciousness for the evolving entity of ‘Biosphere 1’ and ‘the biosphere becomes more powerful, more aware of and able to direct its own evolution’ (Sagan 1990 p.125). A not-dissimilar ethos underlies the concept of ecocities as the means by which we ‘can save the world’[42]. Regardless of differences in emphasis, the underlying proposition is that humans are such powerful manipulators of processes in the biosphere in any case, it is a rational and desirable (even survivalist) response for a technological civilisation to be ever-more conscious of its impacts and to seek not only to the minimise those impacts but engage in restorative, directed activity to enhance the sustainability of the living systems. Some of the outcomes that were hoped for from Biosphere 2 included the development of expertise in better managing ‘island’ ecosystems and designing cities that pump their dirt into the dirt, instead of into the air, they also included being able ‘to construct ecosystems anywhere on earth. . .for a price’. (Maranto 1987 p.43). As an experiment Biosphere 2 has been regarded as an inspiration and a failure; it has certainly provided a remarkable educational facility, now run by Columbia University. The attempt at a total systems approach with its integration of built form and ecosystem function make the project of interest for the design of ecocities. The problem of maintaining healthy natural systems in a quasi-symbiotic relationship with complex buildings is an acute case in microcosm of the problem faced by cities as they try to maintain a healthy symbiotic relationship with their host environments.

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[40] ‘The major motivation behind creating Biosphere II and developing the capacity to create other micro-scale viable biospheric systems is to assist the biosphere to evolve off planet Earth into potential life regions of our solar system, and eventually throughout the galaxy and cosmos.’ (Allen and Nelson 1989 p.54)

[41] Light is imported, heat is exported.

[42] I visited Biosphere 2 in the months just prior to its completion in April 1990 and Project architect Phil Hawes wrote strongly in support of the Halifax EcoCity Project in 1993.

Berg and the Bioregionalists

Reinhabiting Living Landscapes

> The archbioregionalist Peter Berg once likened the environmental movement to a hospital that was all trauma center and no birthing room, then went on to say that bioregionalism sought to be that birthing room; to bring forth something hopeful in the midst of all the injury
>
> (Mills 1995 p.2)

> The first of all of Gaea's daughters was Themis, to whom she entrusted the laws of nature, and it is the diligent study of those laws that we can best guide ourselves in reconstructing human societies for a bioregional world
>
> (Sale 1991 p.49)

Peter Berg and the bioregionalists are important contributors to the tapestry of ideas that constitute the Ecopolis theory and sporadic dialogue with Berg has helped to maintain the integrity of that fabric.[43]

Sale tells us that Berg and ecologist Raymond Dasmann brought the term 'bioregion' into the lingua franca of environmentalism sometime in the mid-1970s. It is defined by 'its life forms, its topography and its biota, rather than by human dictates; a region governed by nature, not legislature.' (Sale 1991 p.43). Sale suggest that a feel for the concept can be gained by

'Knowing the land' which, for the urban dweller, includes 'learning the details of the trade and resource-dependency between city and country and the population limits appropriate to the region's carrying capacity';

'Learning the lore' and recognising that 'Every place has a history, a record of how both the human and natural possibilities of the region have been explored' and that record may be embodied in myth and legend as much as in library or book;

'Developing the potential' to see what 'can best be realized within the boundaries of the region, using all the biotic and geological resources to their fullest, constrained only by the logic of necessity and the principles of ecology', and

'Liberating the self' from distant and impersonal market forces, governments and bureaucracies and finding a sense of oneness with the natural world (Sale 1991 p.44–47). 'Knowing, learning, developing, liberating – these, then, are some of the processes most central to the bioregional idea.' (Sale 1991 p.47).

The specificity of 'place' is pivotally important (Coyote 1978 p.97).

Peter Coyote (in 1978, chairman of the California Arts Council, and one of the founders of the Diggers) writes that the ancient, stable continuity of primitive cultures is inescapably bound up with an understanding of place. The 'earth they stand on' is not a general concept but very specific, evolved from the reality of a place and its history of human habitation (Ferlinghetti et al. 1978). Coyote noted that Peter Berg named this understanding *living-in-place* and defined it as:

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[43] We first met at the Ecocity 1 conference in 1990. Chérie and I had the pleasure of hosting Peter and Judy when they visited Adelaide in 1993.

> . . .following the necessities and pleasures of life as they are uniquely presented by a given place, and evolving ways to ensure long-term inhabitation of that place
>
> (Coyote 1978 p.97)

Ideas about living in a place are essentially political ideas because, of necessity, they have to do with social organisation and political economy. Culture contains politics and politics represents a major part of culture.[44]

Sale writes of the interaction between city and country as a 'social symbiosis' which, in a bioregional world, would bring the benefits of the country to the city, and vice versa (Sale 1991 p.113). His prescription for bioregional urbanism favours ecological cities with populations of between 25,000 and 250,000 depending on regional carrying capacity, after which cities need to be divided and communities dispersed in decentralised, smaller concentrations (Sale 1991 p.116).

Bioregionalism developed as a movement, fueled and informed by the ideas of Berg et al., which deliberately set out to link politics with place, yet at the same time it sought to avoid the reactionary 'blood and soil' approach to politics which characterised movements like Hiltler's National Socialism.

> Statism and centrism are the reasons for the destruction of communities throughout the world whether they be local, regional or national. . ...Here we must distinguish between the community of people and its political clothing. The prime loyalty of people is owed to their community, to their nation, rather than to the state
>
> (Gwynfor Evans quoted by Berg 1981)

With regard to its implementation, Sale observes that bioregionalism has the virtue of being possible only via a gradual process – 'low, steady, continuous, and methodical, not revolutionary and cataclysmic.' (Sale 1991 p.176).

Berg speaks of 'reinhabiting' landscapes, by which he means that a modern landscape can, and should, be conceptually revisited so as to understand better how to live in it. This involves becoming aware of its natural boundaries, conscious of its landforms, climate, fauna and flora, and seeking to understand the indigenous human history of the place. Instead of accepting the damaged places of modern urbanism as a reality to respond to in the continuation of urban development, places should be lived in as if they were in their pre-developed state. Looking out across a modern city, such as San Francisco or Adelaide, the lense of reinhabitation would see, not the exotic vegetation and built environment brought by European colonists, but the landscape as it was when occupied by its indigenous peoples. Access to the knowledge of place held in the customs and stories of indigenous peoples is a

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[44] The roots of the ecocity movement represented by Register, Berg, et al, can be found in the history of the American counterculture. Bookchin identifies Berkeley's People's Park as "the beginning of the Revolutionary Ecology Movement" spawning a 'Blueprint for a Communal Environment' that gave ". . .new communal, eco-viable ways of organising our lives. . .", while people's politics provided ". . .the means to resist the System." (Bookchin 1986 p.153). A powerful aspect of that dissent was that it emphasised having fun as a strategy for precipitating change and focussed on rearranging consciousness rather than the means of production. Berg was a very active member of the counter-culture and the work he has done with his partner Judy Goldsack and Planet Drum has been about re-thinking, re-invention, re-discovery, and re-inhabitation of place as deliberate means to achieve systemic change in the culture of society.

means of reaching back into past ecologies. To design new urban development to fit this pre-European environment is a radical but effective way to find some functional congruence between city making, the living landscape and indigenous culture.

Papanek

Designing for the Real World

Victor Papanek gained international attention for his ideas after the publication of 'Design for the Real World' in the 1960s. The theme of the book was that design should be a response to the real conditions of people, their bodies, and their lives. I was introduced to Papanek's work as a student of architecture in the early 1970s and remain acutely aware of the impact of his ideas.

In more recent years Papanek strongly embraced the ecology movement – unsurprisingly, given the content and tone of his work – and, perhaps more surprisingly, acknowledged the spiritual dimension of design.

> It is not difficult to find buildings that evoke the spiritual in us. What stirs this recognition of the spiritual and fills us with awe works on deep levels of our psyche. The eidetic image is constructed from the harmonic relationships between various parts of our bodies. Our biogenetic heritage also shapes our satisfaction from a preconscious recognition of the Fibonacci series, the golden rectangle, spirals, and rhythms connected to our heartbeat and the seasonal cycles
>
> (Papanek 1995 p.237)

Papaneks's comments demonstrate part of the connectivity of current thinking about aesthetics and nature, reaching back to D'Arcy Thompson and the mysteries of sacred geometry and forward to the concepts of biophilia and its claims for a kind of 'hard-wired' aesthetic preference for nature in the human psyche (see below). Papanek writes that design is 'goal-directed play' and speaks with the authority of a philosopher and practitioner who has already changed our view of what design is all about. We are getting past the questions of how things merely look or work, he says, and are now asking how they relate, so we find that this book contains chapters on 'Sensing a Dwelling' and 'The Biotechnology of Communities' (Papanek 1995).

Cowan and Van der Ryn

Ecological Architecture and Intellectual Coherence

> My life in design has, from the beginning, been driven by questioning the implicit assumptions that propel design, and the hope of finding better answers to the way we design and the products we produce. Nothing we design is ever finished. It just keeps evolving, just as everything else in life changes
>
> (Van der Ryn 2005 p.124)

Table 4: Cowan and Van der Ryn's Design Principles *(Cowan and Van der Ryn 1996)*

Ecological Design is the art and science of designing an appropriate fit between the human environment and the natural world.
1. Solutions Grow from Place Ecological design begins with the intimate knowledge of a particular place. It is small-scale and direct, responsive to both local conditions and local people. If we are sensitive to the nuances of place, we can inhabit without destroying.
2. Ecological Accounting Informs Design Ecological accounting traces the environmental impacts of existing and proposed designs. It is an accounting which links our actions to the health of sometimes distant ecosystems. The information is used to make ecologically sound design decisions.
3. Design with Nature By working with living processes, we respect the needs of all species while meeting our own. Engaging in processes that regenerate rather than deplete, we become more alive.
4. Make Nature Visible De-natured environments ignore our need and our potential for learning. Making natural cycles and processes visible brings the designed environment back to life. Effective design helps inform us of our place within nature.
5. Everyone is a Designer Listen to every voice in the design process. Everyone is a participant-designer. Honor the special knowledge that each person brings. As people work together to heal their places, they also heal themselves.

One of the most coherent and integrated published attempts to deal with sustainability, the built environment, and the need for holistic planning is that by Sim Van Der Ryn and Stuart Cowan, who argue that 'Sustainability needs to be firmly grounded in the nitty-gritty details of design' (Van Der Ryn and Cowan 1996 p.ix). Recognising that ecological problems derive from deep seated, cultural problems, they note that conventional design 'Divides systems along boundaries that do not reflect the underlying natural processes.' (p.27).

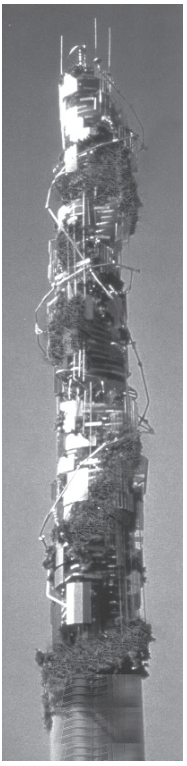
Van der Ryn was the architect behind Berkeley's retrofitted Integral Urban House[45] in 1974 (see Chapter 6.2) and his stint as State Architect for California during the Brown era gave him an extraordinary opportunity to put ecological design approaches into practice.[46] He has maintained an uncompromising commitment to those approaches whilst Calthorpe, who once worked closely with Sim Van der Ryn,

[45] Which had some influence on my early ideas about ecological design after I visited in 1977.

[46] Brown is presently Mayor of Oakland, California, elected on a platform of 'Ecopolis Oakland' for which he acknowledges the inspiration of the author's Ecopolis concept (personal communication 12 April 1997). Brown's mayoral website displays the 'Charter of Calcutta'.

co-authoring ‘Sustainable Communities’, has taken a lead role in the New Urbanist movement (see ‘The Village People and the New Urbanists’ below). Their ideological split was because Van der Ryn felt ‘that simply having higher densities and saving land was too narrow’ and because he thought it important to create models that weave nature back in.’ (Wheeler and Okamoto 1994 p.17). Van der Ryn and Calthorpe have independently continued to develop their work on linking ecological architecture and planning ideas to a broader vision of sustainable communities and design practice (Cowan and Van der Ryn 1996, Calthorpe 1993).

Van der Ryn acknowledges the influence on his own work of Frank Lloyd Wright ‘the most important architect of the 20th century’ (Wheeler and Okamoto 1994 p.1) and claims that he is ‘basically a libertarian and anarchist at heart.’ (Wheeler and Okamoto 1994 p.17). He insists that ecology has to provide the framework for the entire design process and maintains that not only is a building an organism ‘Some buildings can actually be considered ecosystems.’ (Wheeler and Okamoto 1994 p.1).



Tokyo Nara Tower
(Ken Yeang)

Figure 8 Tokyo Nara Tower
(Ken Yeang)

Yeang

Architect and Bioclimatician

> The continuous ascending terraces are like three-dimensional nature corridors, with insects and lizards, birds and tree frogs. The skycourts become small neighborhood parks. . .These vertical greenbelts and parks work in concert with the climate-tempering structures to help refresh and cool the air and support the biology and appropriate technology. All these become integral to one another (Register 2006 p.325).

Ken Yeang has produced remarkable, innovative, technologically sophisticated high-rise buildings and several publications that promote his propositions regarding ecological architectural design philosophy and techniques. Unlike Rogers, who is a late arrival on the eco-architect scene (see Chapter 3) Yeang has a pedigree that goes back to his student years as a researcher at the progressive Architectural Association in London. As long ago as 1974 he was writing on biological analogies in design, calling for design to be based on an understanding of biological systems and quoting Mumford from 1934 'we now realise that the machines at their finest best are lame counterfeits of living organisms' (Yeang 1974). His

Table 5: Ecosystems Hierarchy and Design Strategy *(from Yeang 1999)*

Ecosystem Hierarchy	Site Data Requirements	Design Strategy
Ecologically Mature	Complete Ecosystem Analysis and Mapping	**Preserve** 1. Conserve 2. Develop only on no-impact areas
Ecologically Immature	Complete Ecosystem Analysis and Mapping	3. Preserve 4. Conserve 5. Develop on least-impact areas
Ecologically Simplified	Complete Ecosystem Analysis and Mapping	6. Preserve 7. Conserve 8. Increase biodiversity 9. Develop on low impact areas
Mixed-Artificial	Partial Ecosystem Analysis and Mapping	10. Increase biodiversity 11. Develop on low impact areas
Monoculture	Partial Ecosystem Analysis and Mapping	12. Increase biodiversity 13. Develop in areas of non-productive potential 14. Rehabilitate the ecosystem
Zeroculture	Mapping of remaining ecosystem components (e.g. hydrology, remaining trees, etc.)	15. Increase biodiversity and organic mass 16. Rehabilitate the ecosystem

'bioclimatic' high-rise buildings have transformed architectural thinking about multi-storey structures and their potential for climate-sensitive design. The most radical and interesting of the new generation of high-rise buildings are clearly influenced by Yeang's work. His buildings provide inspirational evidence for the prospect of multi-storey structures of almost any scale and complexity being capable of fitting Ecopolis programs.

Yeang addresses the ecological context of his architecture and proposes a design strategy in which rehabilitation increases in proportion to the diminished integrity of the original ecosystem. (Yeang 1999 p.5). The Ecopolis synthesis allows for the incorporation of these, and other, approaches to analysis and design through the framework of the 'SHED' (Chapter 11).

Wang and the Chinese Urban Ecologists

Red Is Green

> Ecopolis is not a utopian, but an accessible goal, an adaptive process, an applicable strategy and technology, a philosophy about survival & development for all people, and an approach for comprehensive planning and management for sustainable human settlement
>
> (Wang 2004 p.5)

In China there has also been a long-standing interest in urban ecology[47] although Wang, as editor of Human Systems Ecology in Beijing, noted that the definition of human ecology 'is so general that most disciplines in either natural or social sciences and most walks of human activities can claim their work is concerned with the relationship between human being and its environment' (Wang in Wang et al. 1990 p.1)

Representing the Chinese Academy of Sciences, Rusong Wang was co-chair with Ian Douglas of the of the Ecopolis SCOPE project (2003–2007), 'examining the development of more sustainable, ecologically sound cities'[48]. According to the SCOPE website 'The Ecopolis Initiative goal is to develop comprehensive strategies in order to render cities more ecologically healthy and sustainable.' Concern with

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[47] As a result of the call for papers for the EcoCity 2 Conference by UEA, the conference organisers discovered that Professor Rusong Wang was a professor of Urban Ecology and that the subject had been extant in China for the best part of a decade. Consequently he was invited to be one of the main speakers at the 1992 EcoCity 2 conference. Wary about China's human rights record at the time, UEA did not develop further links, but through Richard Register, Ecocity Builders and the Ecocity conference series, there have continued to be fruitful and positive exchanges.

[48] http://www.icsu-scope.org/projects/cluster1/Ecopolis.htm, accessed 28 January 2008.

integrating extant knowledge and building links between existing disciplines and skill bases is clearly part of the program which identifies the fragmentation of environmental sciences involved and that 'urban public health, urban climatology, urban ecology, urban geology, and urban hydrology have relatively little to do with each other, and few connections with urban design, planning and management.' (SCOPE 2005). The SCOPE project is intended to 'synthesise and assess the science needed to make progress towards more sustainable cities.' and "The term 'Ecopolis' is used to imply an ecologically sound city or large urban area and its immediate periphery in sectors of cities and towns."[49]

The Wang model of Ecopolis processes has, as its second tier, the creation of 'Ecological Agricultural Counties', 'Comprehensive Experimental Communities for Sustainable Development' and 'Ecological Demonstration Districts' (Wang 2004 p.4). This recalls Ecopolis Proposition 4 regarding urban fractals, ie. that demonstration projects provide a means to catalyse cultural change and are clearly intended to contain sufficient characteristics, in process and form, to represent ecocities in microcosm. According to Wang, these demonstration projects have been 'spontaneously initiated' in some Chinese cities and towns where 'Ecopolis is a kind of administrative unit' with three aspects of ecological performance: industry, culture and landscape.

Wang has undertaken extensive research over many years and his work appears to represent a vigorous strain in Chinese scientific endeavour that, one must assume, is now informing the central government's decision to invest in major ecocity projects, including Dongtan (see Section 6.10).

4.3 Pattern People – Putting the Pieces Together

> In simple terms, the biosphere is our environment, the 'nature' in which we live. In his various works Vernadsky gave several definitions of the biosphere, always emphasising its two distinctive features. The first feature: 'the biosphere is the envelope of life, i.e., the area of existence of living matter', the second feature: 'the biosphere can be regarded as the area of the Earth's crust occupied by transformers which convert cosmic radiation into effective terrestrial energy: electric, chemical, mechanical, thermal, etc.
>
> (Lapo 1979/1982 pp.19–20)

Vernadsky and the Russian Ecopolis

Traces of Bygone Biospheres

Vladimir Ivanovich Vernadsky, was one of the pioneers of ecology and a key exponent of the concept of the biosphere (Lapo 1982).

The scientific foundations of the Russian Ecopolis program came from Vernadsky (Florova 1985, Ignatieva 2002) and there is a direct line of scientific enquiry

[49] http://www.icsu-scope.org/projects/cluster1/Ecopolis.htm, accessed 28 January 2008.

reaching from his work through to the Soviet space program and the work on closed ecological systems undertaken by Gitelson et al. (Allen and Nelson 1989 p.67). The Ecopolis program at Moscow State University focussed on the study of a small town (Pushchino) as a means to investigate the functioning of urban ecosystems.

There is a tradition of ecological enquiry from what was the Soviet Union that stems back to this earliest work on ecology. Extensive scientific studies on human settlements have been undertaken in conjunction with the Man and Biosphere program (Bozhukova and Kavtaradze 1983, General Editorial Board 1988).

The term 'biosphere' first appeared in scientific literature in 1875 in a monograph on the geological structure of the Alps penned by Austrian Edward Suess. Vasilievich Dokuchaev's works on soils continued to develop the concept which was brought to fruition by Vernadsky who published *The Biosphere* in Leningrad in 1926. This book showed '. . .that the biosphere of the Earth was. . .an integral dynamic system controlled by life'. Vernadsky '. . .showed that the leading factor which transforms the face of the Earth is life.' In the present terminology '. . .the biosphere of the Earth is considered to be a cybernetic system possessing the properties of self-regulation.'

Interestingly, given its rapid deterioration in recent years and environmental superstar status 'Vernadsky saw one of the most characteristic manifestations of the orderliness of the biosphere in the presence of an ozone shield which is located above the biosphere and absorbs ultraviolet radiation deleterious to life (for us this is a most dramatic manifestation of self-regulation of the Earth's biosphere as the cybernetic system). The composition of the gaseous envelope of our planet is fully regulated by life.'(Lapo 1979 p.21).

Whereas de Chardin took the Noosphere to be a vehicle for achieving a kind of global spiritual transhuman consciousness leading to the end of days – the Omega Point – Vernadsky's use of the term was to do with a teaching of biosphere science 'which stands in its own right and cannot be reduced either to geography or biology, but makes use of their advances and results, and, in turn, influences the development of geology.' (Lapo 1982 p.6). It is about the role of life in shaping the planet, and thus the importance of understanding the terraforming potential of a species with consciousness – discussed further in Section 8.2. Since Vernadsky, the terraforming capability of the human species has been recognised more and more widely and some geologists are calling for formal recognition of the term 'Anthropocene' to describe the new geological epoch in which humans have such a strong influence on planetary processes that we even affect the course of rock formation[50].

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[50] The request to formalise the name was reported in New Scientist 2 February 2008 (2641, p.5). The original proposal to formally name the era since the advent of the Industrial Revolution as the 'Anthropocene' came from Paul Crutzen of the Max-Planck-Institute for Chemistry in 2000. Writing in Nature in 2002, Crutzen noted that 'Mankind's (sic) growing influence on the environment was recognized as long ago as 1873, when the Italian geologist Antonio Stoppani spoke about a "new telluric force which in power and universality may be compared to the greater forces of earth," referring to the "anthropozoic era" Crutzen also noted Vernadsky's prescient work on the geological scale of impact of living systems. (Crutzen 2002 p.23).

Alexander

People, Patterns, Process and the Nature of Order

> The suburb is an obsolete and contradictory form of human settlement
> (Alexander et al. 1977, p.30)

When I first began making a serious effort to promulgate the set of ideas that is Ecopolis, I was anxious not to confound the meaning of the concept by the use of images. The concept itself was about process rather than product. For three years, I avoided presenting images of an Ecopolis and restricted myself to the painting of word pictures, and the description of processes and ideas. This strategy initially developed as a personal reaction to a tendency I had noticed, as an architect, for people to show more interest in drawings than the quality of the architecture that the drawings represented. But aesthetics is inseparable from building, and if it is important that the making cities and built environments is done according to a given set of principles or precepts that are about process rather than appearance, then the issue in communication becomes one of process too.

Alexander has addressed this problem with some alacrity and dedication over three decades. His 'pattern language' offers a system for linking specific aesthetic and built form outcomes to a process grounded in perceptions that appear to be common to most human populations.

Alexander's work appeals to the non-professional, but offers a set of ideas derived from a rigorous intellectual context. In the 1970s, Christopher Alexander, with the assistance of Sara Ishikawa, Murray Silverstein and colleagues at the Centre for Environmental Structure in Berkeley, California developed what was intended to be 'an entirely new attitude to architecture and planning'. His approach to architecture, building and planning was intended to provide an alternative to 'gradually replace current ideas and practice.' To some extent his hopes have been realised as his publications, in particular 'The Timeless Way of Building', 'A Pattern Language' and 'The Oregon Experiment', have become touchstone volumes for responsive, humanistic, organic design. What became known as Alexander's approach to planning, architecture and design has been widely recognized as offering a more humane alternative to mechanistic modernism. The work of Alexander and his cohorts has provided an abiding contribution to the problem of how to synthesis human ecological analysis in terms of practical architecture and design. According to Broadbent the Pattern Language represents 'a thoroughly Empirical, perhaps even Pragmatic, approach to Towns, Buildings and Construction.' (Broadbent 1990 p.234) with its 'straight linear sequence' for working through 253 'patterns' that create dwelling within a community within a region (Alexander et al. 1977). There is complementarity between Alexander's work and the intent of this book.

In Notes on the Synthesis of Form (Alexander 1964) Alexander showed an early inclination to regard design in terms that were congruent with the thinking of life sciences. He argued that every design problem begins with an effort to fit form with its context – 'The form is the solution to the problem; the context defines the problem' (Alexander 1964 p.15). So, he says, design is not just about form alone

but 'the ensemble comprising the form and its context.' (Alexander 1964 p.15) and he noted that the 'biological ensemble' of organism and physical environment was a familiar case in point in which 'we are used to describing the fit between the two as well-adaptedness.' (Alexander 1964 p.15). He went on to propose that in urbanism, the 'ensemble' is 'the city and its habits'. His overall proposition was that the design of objects cannot properly be considered outside of their context, and that concepts and categories associated with their perception can become misleading or distort consequences on the basis of values, e.g. 'England's nineteenth century low-cost slums were conceived only after monetary values had explicitly been given greater importance through the concept of 'economics' invented not long before.' (Alexander 1964 p.70). In developing his thesis, Alexander ended up with abstruse looking diagrams and formulae that obfuscated more than they illuminated, but put most simply his main insight would appear to have been 'it is not only the result which is important, but the process too.' (Alexander 1964 p.133).

In 'The Timeless Way of Building' Alexander begins with the proposition that 'A building or town will only be alive to the extent that it is governed by the timeless way.' (Alexander 1979 p.3) 'Life' and 'being alive' is the theme of the 'timeless way' but the definition of life is about a kind of quality that even inanimate objects may possess, e.g. some fires are more 'alive' than others. Part of the intent of the Ecopolis theory is to bring the power and 'rightness' of such ideas into concert with other concepts that share a goal of organic wholeness in order that their synthesis has the potential to reach as deep, and be as strong a force, as life itself. However, as Rudlin and Falk point out, a theory like Alexander's, based on ideas of natural, organic process, may be more useful as a way of describing past urban developments than it is as a tool for their creation in the future, the reason being that 'Just as in ecology or medicine, our understanding of such processes does not mean that we can or should recreate them artificially.' (Rudlin and Falk 1999 p.234). Alexander's efforts to put his ideas into practice have encountered problems, but the 'organic' method is intrinsically evolutionary and allows for learning adjustment and continuous improvement to take place.

In his later work the issue of process was developed in collaborative efforts with others in ways that led to the creation of a pattern language. This was intended to provide the pieces with which to build processes leading to the design of buildings and places. To be consistent with the overall aims of the evolving philosophy, each piece contained processes that were inherent to its realisation. Thus, process was addressed in a concrete, rather than abstruse, manner. In 'The Oregon Experiment' Alexander and his cohorts describe a master plan for the University of Oregon. But it was a master plan with a difference – intended to define a process capable of being adopted 'by any community, anywhere in the world.' (Alexander et al. 1975). The six principles on which the plan was founded are worth re-iterating because they are entirely congruent with the goals of this book, which is to describe the beginnings of a theory of ecocity making. Part of that theory is the proposition that there are already extant theories, processes and practices that can be effectively 'unified' in a pattern of use which fits the requirement to design, develop and maintain human

settlement that co-evolves with the biosphere. The six principles of the Oregon Experiment were:

> *The principle of organic order:* Planning and construction will be guided by a process which allows the whole to emerge gradually from local acts.
> *The principle of participation:* All decisions about what to build, and how to build it, will be in the hands of the users.
> *The principle of piecemeal growth:* The construction undertaken in each budgetary period will be weighed overwhelmingly towards small projects.
> *The principle of patterns:* All design and construction will be guided by a collection of communally adopted planning principles called patterns.
> *The principle of diagnosis:* The well being of the whole will be protected by an annual diagnosis which explains, in detail, which spaces are alive and which ones dead, at any given moment in the history of the community.
> *The principle of coordination:* Finally, the slow emergence of organic order in the whole will be assured by a funding process which regulates the stream of individual projects put forward by users (Alexander et al. 1975 p.5–6).

In considering the 'life-liness' or otherwise of buildings and cities, principle 5 is of particular interest because it effectively suggests the embedding of a healing process in the body corporate, in this case a university considered as an active system rather than a mere collection of built artifacts.

Alexander's work is also important for its description of tested, radical ways of engaging non-professionals in the design and development process without any of the lingering sense of condescension that can be discerned in other advocates of participation (like the community architecture movement in England). Later chapters in this book discuss the role of participatory design and describe my efforts to incorporate such practices in ecocity programs (see 10.4 Running Barefoot).

Historically, like the architecture it contains and is made by, urban design thinking has been informed by form rather than principle. As Broadbent pointed out, Alexander addressed this in his pivotal essay A City is not a Tree (Broadbent 1990). Alexander agreed that 'It is vital that we discover the property of old towns which gave them life and get it back into our artificial cities. But we cannot do this by remaking English villages, Italian piazzas, and Grand Central Stations.' (Alexander 1972 p.402) His observation is still pertinent that 'Too many designers today seem to be yearning for the physical and plastic characteristics of the past, instead of searching for the abstract ordering principle which the towns of the past happened to have, and which our modern conceptions of the city have not yet found.' (1972 p.402). Alexander identified the problem as a systemic one due to hierarchic organisation of conceptualisation in city design (the 'tree' structure) rather than thinking based on an understanding of the inter-related patterns of real human behaviour that possesses the structure of a lattice or web. He observed that it was very difficult for people to think in any other way because we appear to have a predisposition for reducing complex thoughts about the world to simplified, 'tree-like' forms. This may explain why the New Urbanist pattern book approach to urban design has been able

to generate so much interest and enthusiasm – it is easy to comprehend and to copy. More complex patterns contain overlap and multiplicity of purpose and intent. To be fair to the Congress of the New Urbanism, their Charter does promote mixed-use, but at the same time it calls for 'urban design codes that serve as predictable guides for change.'[51] (Congress for the New Urbanism, undated).

The final pattern in Alexander (1977) displays the strength of the approach for ordinary people and design for 'real life' and suggests why, despite accolades from many design professionals, there is an ongoing uneasiness amongst these same professionals regarding the pattern language, for Alexander concludes:

> Do not be tricked into believing that modern décor must be slick or psychedelic, or 'natural' or 'modern art,' or 'plants' or anything else that current taste-makers claim. It is most beautiful when it comes straight from your life – the things you care for, the things that tell your story
>
> (Alexander, 1977, p.1166)

This is anti-consumerist, and anti-establishment design, but it is design. Design conceived as a rich process of engagement by living creatures with their environment and with each other. It is intrinsically ecological. In order to achieve it the design process is different from the linear, compartmentalized process favoured by industrial society, it needs to be developmental, and it requires careful, continuous maintenance. It requires management of a different kind than that bequeathed by militarism and production line manufacturing processes. Alexander warns:

> If we have management processes which are categorically unable to respond dynamically, in time, to produce a living structure, then living structure isn't going to occur, right? All that's going to happen is that all this wonderful stuff about sustainable design, about solar energy, about earth materials, about pattern language, you name whatever you want, human participation and so forth, is all going to go down the tube, if, after it's all been thought out, it gets crunched into a management system which is incapable of responding to the way life really unfolds
>
> (Zelov and Cousineau 1997 p.264)

In each of the three Australian projects described in Chapter 7, this tension between the 'living structure' fundamentals of the projects and the deadliness of conventional management structures provided the most difficult and intriguing lessons about ecological development.[52]

Alexander's most recent published work deals specifically with the idea that 'life' in architecture, design and the development of villages, towns and cities. His definition of a 'living process' is 'any chain of differentiating steps, each of which

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[51] Principle #8 for The Neighborhood, the District and the Corridor.

[52] A tentative effort at using Alexander's Pattern Language to analyse the Christie Walk/Whitmore Square EcoCity Project, was undertaken by the late Nina Creedman, UEA intern during the Southern Hemisphere Summer and Fall of 2000. Creedman identified a number of Alexander's patterns in the design of Christie Walk. Although the design process was not directly informed by the work of Alexander et al, my contention is that a commonality of purpose and approach lends validity to the idea that this overall 'organic' humanistic line of thinking has intrinsic qualities and concerns that imply particular outcomes.

carries out the center-intensifying process by means of the fifteen transformations, applying them, iteratively, to the whole.' (Alexander 2002b, p.217) It is hard to escape the conclusion that much of what Alexander refers to when he discusses 'living process' and 'life' is dominated by aesthetic preoccupations and definitions. Although he rightly condemns the 'imposed image' as a means of designing, his antidote is driven by critical review of how things look and feel. He writes of 'unfolding processes' that are absent in the work of modernist culture heroes like Le Corbusier and favours the loose, the incidental, the responsive and the organic. His efforts to develop and demonstrate, and make replicable, the means to design and build in a manner that fully incorporates an on-going, systemic sensitivity to place, people and process is unparalleled. I believe that his methods represent the most structured, or formalised, evidence for the idea that buildings, done properly, are extensions of a human's being.

In effect, Alexander calls for (and sets out in his various books and collaborative ventures) a systematic approach to the design and development of human settlement that provides overall, shared frameworks of intent within which individual responses can be accommodated and all without a predetermined outcome except a faith that the result of appropriate processes and responses (following the principle of 'unfolding wholeness') will be places to live that are 'living' places.

He determines that non-linear, non-compartmentalized processes are essential to the realisation of buildings, neighbourhoods, towns and cities that are 'alive'. His great gift has been to make the effort to codify the patterns of objects and process so that others may adopt and adapt them. In order to make this adoption more feasible in a society that is governed by processes that are typically antithetical to his goal, his attention to process relates as much to contractual issues and procurement as to design. As we shall discover repeatedly, non-linear, non-compartmentalized processes are not only part of daily life but were, in a sense, re-discovered through necessity during the Second World War as the basis for management structures that could deliver innovation and responsiveness at a time of great social stress. The lessons of feedback-rich, non-hierarchic, multi-disciplinary teamwork were learned and adapted by Weiner and the cyberneticists, and later Brand and the 1960s counter-culture.

Alexander's work has culminated, in effect, in his four volume treatise on The Nature of Order. This work distills and redeploys the fundamental premises of his life's work to baldly present the view that making architecture, buildings and human settlement is about making life. The development of the Ecopolis idea is also about making life, with extensive discussion of living systems and so forth. Much of the Ecopolis treatise resonates with Alexander's work, but there are crucial differences. These are not so much about differences in opposition but, like those in living systems, difference in emphasis or function, with an overall fit into something more coherent when viewed as the larger whole. Perhaps the main difference, and most important complement to the Ecopolis thesis is Alexander's emphasis on morphogenesis. Morphogenetic processes as described by Alexander may be a profoundly useful aspect of maintaining a living world through the way we build, but he seems to rest heavily on form-giving (which is, arguably, an essential process

in any constructed environment) and somewhat neglects the necessary biological definitions of life and life processes in which form is something we observe rather than manipulate.

Life may or may not be 'in the very substance of space itself' (Ho 2003) but no amount of sensitive form-making can make up for a lack of knowledge about the fundamentals of living systems in terms of biology, ecology and evolutionary understanding. Buildings have to fit these realities. Alexander's contention seems to be that attention to the process of making form will provide ecological fit.

Alexander's attempts to codify degrees of appropriateness in architectural expression in relation to patterns of human living and perception is built upon aesthetic observations in a manner similar to feng shui. Both Alexander and geomantic practitioners seek out the favourable and unfavourable, the auspicious and inauspicious – what works and what does not. Much as I admire and respect Alexander's work, an aspect that I find frustrating is that although his work is all about patterns and understanding connections in the human environment, he never seems to cite or acknowledge the work of people like Bateson or other cybernetic thinkers – or the practice of Feng Shui. His seminal works, A Pattern Language and The Nature of Order, both lack references. I can't seem to shake the suspicion that the scientific credibility of Alexander's ideas could be upheld all the more convincingly, and his tendency towards aesthetically partial judgmentalism held in check, if he were to try and set the ways of observing, thinking and doing that he advocates in the realm of cybernetics and transdisciplinary enquiry.

Discussion of the nature of life is curiously stilted by the idea that it is immanent, rather than, perhaps, an emergent property of physical processes.

Mollison

The Productive Patterns of Permaculture

In Chapter 11, 'Seven Steps' are proposed to achieving ecocity development. Step 6 is 'Patterning'. Although the concept of patterning used here has some parallels with Bill Mollison's 'Patterning' (Mollison 1988 p.8) it is derived more from the work by Alexander et al. on a pattern language. As a concept it is also influenced by the scientific enquiry that is discovering patterns in chaos, and emergent qualities in every nook and cranny of the universe (Peitgen and Richter 1986). Just as patterns are not coincidences (Ball 1999) so design is not an accident.

Permaculture is of interest because of its concern with total system, landscape-based analysis and management of human settlement. In relation to the analyses and processes for site identification, occupation, use and disposal being discussed in this report, Permaculture has potential value as one of the most developed (though undoubtedly still flawed) means of integrating the various issues involved. Rather than attempt a extensive discussion here, the reader is directed to Mollison's publications

for further information, with the observation that land-use planning and development cannot be covered adequately in any single documented source and that an integration of methodologies awaits sustained and intensive research. Just as Yeomans' 'Keyline' system (Yeomans 1971) is fitted into the Permaculture system (Mollison 1988 pp.158–162) so may Permaculture be fitted into a design system for built environment domains.

Mollison makes large claims for the value of Permaculture. The following passage sets the tone – and identifies a central weakness in his approach, one that is not shared by Alexander:

> Permaculture as a design system contains nothing new. It arranges what was always there in a different way, so that it works to conserve energy or to generate more energy than it consumes. What is novel, and often overlooked, is that any system of total commonsense design for human communities is revolutionary!
>
> (Mollison 1988 p.9)

Mollison's intent is clear – he wants to draw 'ordinary' people into the permaculture enterprise by appealing to the universal quality of 'commonsense'. There is some intellectual dishonesty here because anyone with some scientific knowledge is aware of many 'counter-intuitive' and non-commonsensical things in science, and no system of total human settlement design – which is what Permaculture purports to be – can afford to lack scientific rigour.

I have often heard expressed the opinion that 'urban ecology is just like Permaculture', and there are certainly significant commonalities between them but Permaculture seems to occupy that same agrarian-bucolic ground as Garden Cities and Morris' 19th century 'soft' socialism. Permaculture favours the ecovillage rather than the ecocity.

Frampton

Critical Regionalism

Critical regionalism is a theory of architecture that connects building to place-making and ecology through its concern with a sense of place and with process. It 'tends towards the paradoxical creation of a regionally based 'world culture'. . . (and, at the same time) . . .tends to flourish in those cultural interstices which in one way or another are able to escape the optimizing thrust of universal civilisation.' It 'invariably stresses certain site-specific factors. . . emphasises the tactile as much as the visual. . .(and). . . is opposed to the tendency of 'universal civilization' to optimize the use of air-conditioning, etc.' (Frampton 1996 p.327).

As a linking concept between the concerns of architecture and bioregionalism, I have found Kenneth Frampton's exploratory definitions of critical regionalism of tremendous use and it is thus dealt with elsewhere in this book (see Section 9.7 and earlier commentaries in Sections 3.3 and 4.3).

Brand

How Buildings Learn in the Long Now

> The insights of Buckminster Fuller are what initiated this catalog
>
> (Stewart Brand 1968)

Edited by Stewart Brand, the Whole Earth Catalog fed challenging, practical and outrageous ideas and facts into the minds of people who were learning to enjoy learning about the world. Inspired by Fuller, Brand and his cohorts created a point of exchange for radical science, crazies, and some of the world's most creative thinkers about humans and the global ecology. The Whole Earth catalog spawned CoEvolution Quarterly, one of the world's first truly trans-disciplinary journals. 'CQ' published Gregory Bateson writing about the ecology of mind, O'Neill on space colonies, and some of the first articles by Lovelock and Margulis on the Gaia Hypothesis. Special issues dealt with topics such as bioregionalism, media, watersheds, computers, and the rights of non-human species. Brand has thus been a key person in the dissemination of concepts that are integral to the modern environment movement in its many guises. During the period of the personal-computer revolution and its related information revolution the balance of knowledge has shifted in favour of citizens and away from central authority. And as Brand argues 'The discovery was made simultaneously, in a whole array of sciences and arts, that truly adaptive systems grow from the bottom up, not the top down.' (Rheingold, 1994, p.5)

Architects, says Brand, are wedded to the idea that their designs are permanent monuments whereas real buildings evolve and change as they accommodate and respond to different occupiers and patterns of use (Brand 1997). If Soleri's megastructures are the antithesis of adaptability and authoritarian planning, then Brand shows us the other end of the spectrum, and uses examples of buildings that are known and loved, or hated, according to their capacity to support the changes that flow from a living community. If building is to be ecologically responsive over the long-term it must be adaptable (see Chapter 8). In 'How Buildings Learn' Brand deals with construction as a living process, rather than the accumulation of dead objects and he proposes that 'The needed conversion is from architecture based on images to architecture based on process.' (Brand 1994 p.71). Or, as Baldwin puts it '*House* is architecture. *Housing* is a social matter.' (Baldwin 1996 p.206)

This draws into question the approaches to ecological construction that, like Soleri's arcologies, adopt highly engineered, tight-fit design strategies. If the design and development of buildings is going to fit the definition of 'ecological' then it must fit the changing environment of the city through time. This necessarily implies responsiveness to community needs and desires. Buildings 'learn' from the occupants with whom they inter-relate as part of the urban ecosystem (Brand 1997).

Brand's insights into the way buildings learn and change over time look like ideas that should have already have been familiar to architects and designers, but they were not. Brand's insights extended the conventional horizons of architectural thinking by looking closely at the performance of buildings through time.

Brand tells us that 'Culture is where the Long Now operates.' (Brand 1999 p.38) Consideration of the making of cities takes us into consideration of timescales that

exceed the horizons of conventional commerce and politics. If cities are to be kept on the path of ecological fitness over time there need to be concomitant social and cultural structures and institutions to manage their passage. In 'The Clock of the Long Now' Brand (1999) draws attention to the lack of institutions or decision making systems that deal with very long-term planning. In traditional cultures there was a looking backwards and forwards across several generations, and even within the Western cultural tradition there is ample evidence of some sound, very long-term planning (e.g. Planting trees for replacing the timbers of buildings with a maintenance regime stretching over several centuries).

Brand demonstrates the different rate of change in the 'layers' that make up the fabric of built form (Brand 1997) and 'six significant levels of pace and size in the working structure of a robust and adaptable civilisation' (Brand 1999 p.35). These layers can be seen to constitute the basis of a maintenance regime for ecocities – the layers that move quickest needing most on-going maintenance (and acceptance of the need for innovation and change) with the slower layers requiring a more ruminative, long-term strategy that accepts changes only after thorough consideration of the consequences. Despite the experience of different cultures through history, there is no readily available model for the kind of decision making and value-maintenance needed for maintaining the ecological development of cities and civilisation across many centuries.

Wiener and Bateson

Pioneering Cyberneticians

> Now I want to talk about the other significant historical event which has happened in my lifetime, approximately in 1946–1947. This was the growing together of a number of ideas which had developed in different places during the Second World War. We may call the aggregate of these ideas cybernetics, or communications theory, or information theory, or systems theory
>
> (Bateson 1973 p.450)

> We are but whirlpools in a river of ever-flowing water. We are not stuff that abides, but patterns that perpetuate themselves
>
> (Wiener 1954/1988 p.96)

Norbert Wiener is regarded as the founder of cybernetics and introduced the idea of feedback which has since become a common figure of speech that is used in a way remarkably close to that intended by its original definition which is 'the property of being able to adjust future conduct by past performance.' It may be as simple as a common reflex or it may be of a higher order 'in which past experience is used not only to regulate specific movements, but also whole policies of behaviour.' (Wiener 1954 p.33). Negative feedback sets limits on behaviour, whether animal or machine, whilst positive feedback tends to pile input on input and send it out of control (like the screeching of amplified sound when a microphone picks up the amplified sound that it has just picked up. . .). Wiener's insights into feedback loops have been essential to understanding complex systems like the Earth's climate.

Wiener's cybernetic theories were developed in a rich scientific milieu that included Bateson. He 'ascribed the start of cybernetics not to technology but to biology' and traced it to the conviction that he shared with his close colleague Rosenblueth that "the most fertile turf for growth in the sciences lay in the 'no-man's land' between the established fields." (Conway and Siegelman 2005 p.177) He went out of his way to foster cross-disciplinary communication with colleagues in his university. His behaviour was convivial, but erratic and by all reports he would appear to have been the original role model for the absent-minded professor.

His a strong social conscience led to the writing of 'The Human Use of Human Beings' in which he predicted the collapse of rigid, top-down political structures that allowed no negative feedback and warned against the computer becoming a new Golem. Fuller's model for the Comprehensive Designer derived a great deal from Wiener's cybernetics and the inspiration that came from the 'interdisciplinary migration *(hence nomadism)* and multi-institutional collaboration' that characterised the military research in the era of the Cold War (Turner 2006 p.58). Wiener was absent from the bespoke Macy Foundation conference in New York in May, 1942 that was intended to foster the new interdisciplinary spirit, but Rosenblueth was there and Gregory Bateson 'was especially enthusiastic. He saw in Roesenblueth's brief introduction to Wiener's new communications concepts something he had been urgently seeking for years: a rich new resource for theory and research in anthropology and the social sciences.' (Conway and Siegelman 2005 p.134)

Bateson worked as an anthropologist, psychiatrist, social scientist, linguist and zoologist, but perhaps most of all, if only because it embraced all or any disciplines that he worked in, he became a cybernetician, working with information theory. His cybernetic view of the mind saw it as being immanent in the individual body and in the social system and integral to the planetary ecology.

> Thanks to the work of the cyberneticians, (Bateson) believed, citizens of the late twentieth century could finally recognise mind as a property of the aggregate interactions of the individuals with their surroundings
>
> (Turner 2006, p.123)

Bateson cautioned against the skewed logic of the syllogism – 'men die; grass dies; therefore men are grass'. It is the rhetorical refuge of every political scoundrel and spin-merchant and constantly confounds clear thinking. Sadly, it is a defining characteristic of many ideas that claim to be 'commonsense'. He famously defined information as 'a difference that makes a difference'. On the basis of this definition the theory of the cultural/urban fractal is about conveying information.

Margulis and Lovelock

Symbiosis and the Theory of Gaia

> As we go about our daily lives we are almost all of us engaged in the demolition of Gaia
>
> (Lovelock 2007 p.122)

Lynn Margulis has pioneered research and original thinking about cell biology and the role of symbiosis in evolution. Her 'Symbiosis in Cell Evolution' 'is one of the classics of biology in the twentieth century.'[53] She identified the Five Kingdoms of life as: bacteria, protoctista, animals, fungi, and plants. Where Lovelock is a political conservative, Margulis is socially and politically radical. She is the mother of Dorion Sagan, author of a number of works on the biosphere and coauthor with Margulis of a number of books in recent years which deal with the nature of life and the necessity for an holistic science of the biosphere. With James Lovelock she is co-originator of the Gaia Hypothesis, but takes a different approach to the idea:

> Lovelock would say that Earth is an organism. I disagree with this phraseology. No organism eats its own waste. I prefer to say that Earth is an ecosystem, one continuous enormous ecosystem composed of many component ecosystems. Lovelock's position is to let the people believe that Earth is an organism, because if they think it is just a pile of rocks they kick it, ignore it, and mistreat it. If they think Earth is an organism, they'll tend to treat it with respect. To me, this is a helpful cop-out, not science. Yet I do agree with Lovelock when he claims that most of the things scientists do are not science either. And I realize that by taking the stance he does he is more effective than I am in communicating Gaian ideas.[54]

And her understanding of science is clearly situated within a fairly clear-sighted understanding of human society:

> If science doesn't fit in with the cultural milieu, people dismiss science, they never reject their cultural milieu![55]

James Lovelock is well known for the Gaia Hypothesis but in recent years he has enjoyed notoriety for his support of nuclear power which he apparently sees as less to do with minimising carbon dioxide emissions to *prevent* climate change and more to do with ameliorating the effects of global warming by providing the power to run air-conditioning, desalination plants and food synthesising machines so that the decimated human population of the Earth still left by the end of the century can survive. His argument appears to be one of adaptation, not prevention. (Debelle 2007 p.12).

According to Lovelock the human presence is disabling the planet like a disease and that there are four possible outcomes: 'destruction of the invading disease organisms; chronic infection; destruction of the host; or symbiosis – a lasting relationship of mutual benefit to the host and the invader.' (Ticknell in Lovelock 2007 p.xvi–xvii). The theory of Ecopolis proposes that our city-making is the means by which we might hope to attain, and sustain, that symbiosis. That city-making must contain, and be a response to, robust cultural and social structures which provide health and equity, and sustain balance within human society as well as between humans and the rest of nature. The nature of healthy human society is the key to

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[53] Francisco Varela, http://www.edge.org/documents/ThirdCulture/n-Ch.7.html (accessed 18 November 2007).

[54] Margulis http://www.edge.org/documents/ThirdCulture/n-Ch.7.html (accessed 18 November 2007).

[55] ibid.

sustainability. Lovelock's focus on the state of the planet and overt 'big picture' concern for the future of civilisation obscures his failure to appreciate some of the fundamental requirements of a healthy human society and he is reported to have said that 'Nuclear power, although potentially harmful to people, is a negligible danger to the planet. Natural ecosystems can stand levels of continuous radiation that would be intolerable in a city.'[56] Cold comfort, given that cities are where most people live.

Lovelock has done wonderful science and, with Margulis, has presented the world with the Gaia hypothesis, a powerful, cohering concept that builds on the tradition of Vernadsky, but I fear that Lovelock betrays a number of prejudices in the way he views the world. He rails against inaccuracy and selective reporting but seems prepared to countenance both if it supports his arguments – and he resorts to syllogistic reasoning that would do any politician proud. He clearly finds wind turbines aesthetically offensive and in his vignettes about nuclear energy there is a sense of misplaced triumphalism about his personal health not having been affected by fallout from the military reactor at Windscale in 1956. (Lovelock 2007 p.100).

He writes that 'solar cells are not yet suitable for supplying electricity. . .mostly because. . . they are quite expensive to make' and that he finds it hard to believe 'that large-scale solar energy plants in desert regions. . . would compare in cost and reliability with fission or fusion energy, especially when the cost of transmitting the energy was taken into account.' (Lovelock 2007 p.87). Yet the expense of making nuclear power stations is so enormous that industry does not invest in them without obtaining massive financial subsidies from the public purse, whereas renewable energy industry investments have gone ahead without any equivalent subsidy; meanwhile the cost of fusion energy is, on a per kilowatt basis, almost infinite as the millions of dollars invested in it so far has produced no useable energy and its reliability cannot be estimated, for, as Lovelock himself tells us, there is no record of it providing any kind of power supply for public use. Then, of course, the cost of transmitting energy from a central solar power plant is essentially the same, pro rata, as it is from any central plant. If one accepts his implicit assumption that massive government subsidy of energy generation and distribution are necessary and acceptable, then there are renewable energy options that have at least as much potential as nuclear power – and do not require the apparatus of a police state to ensure the security of fuel and waste transport demanded by the nuclear industry[57].

Although Lovelock's views on the merits of nuclear energy are remarkably optimistic, his opinion about the state of the planet is not. He foresees catastrophe – even *with* the adoption of nuclear power – and proposes that we 'write a guidebook for our survivors to help rebuild civilisation without repeating too many of our mistakes' (Lovelock 2007 p.156). His new 'bible' would be a scientific manual written so well that 'it would serve for pleasure, for devotional reading, as a source of facts and even

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[56] 'Time for a Rethink', from the Introduction to Bruno Comby's book *Environmentalists For Nuclear Energy* – also published in The Independent, 28 August 2004.

[57] See, for instance, 'A Solar Grand Plan' by Zweibel, Mason and Fthenakis in Scientific American, January 2008.

as a primary school text.' (Lovelock 2007 p.157). Science and knowledge, however, are social constructs and deal with a universe that is far from immutable or fully known, and I suspect that his rebuilt civilisation might be very English – although Lovelock may find Tyndale's Bible a 'splendid read' he seems to be forgetting how culturally specific that perception might be. For me, the marvelous Mr. Lovelock is a constant reminder of what large feet of clay our heroes often stand on.

4.4 Pragmatic People – Getting from 'Here' to 'There'

> The car-centred, car-*dominated*, human habitat can now be viewed – like Leninist economics – as an experiment that has failed
>
> (Kunstler 1998 p.59)

Newman and Kenworthy

Auto Dependence

> Rebuilding our cities to reduce car dependence is an example of a policy that can enhance natural, social and financial capital
>
> (Newman in Nelson 2007 p.27)

Peter Newman and Jeff Kenworthy have become the international gurus of traffic and city energy analysis and powerful, accomplished advocates for ecocities. According to Kenworthy and Newman, automobile dependence has shaped our cities into unsustainable forms and only by freeing cities from this dependence can we hope to achieve 'sustainable cities'. Their comprehensive analyses of city transport energy use has informed and developed the debate about the relationship between transport modes, energy use and urban morphology worldwide. Their critique of energy hungry cities strongly supports Register's advocacy of 'access by proximity', Engwicht's demand for better 'exchange space' and even, arguably, Mollison's call for planning food production on the basis of zoning.

Kenworthy speaks of 'traffic sewers'; noting that Phoenix, Arizona has 1,500 car park spaces per 1,000 jobs whereas Tokyo has only 43. He refers to (relatively energy efficient) Asian cities as traffic-saturated rather than auto-dependant and observes that traffic flows like a gas rather than a liquid (which is why, when it is controlled by constricting road networks it compresses rather than bursts the 'sewer pipe'). He shows convincingly that rail systems are more efficient and more effective than non-rail public transport[58].

Newman and Kenworthy provide trenchant critiques of the car-dependent suburban city. They propose solutions based on traffic calming, light rail and urban

[58] From Kenworthy's presentation at the 2000 Ecocity IV conference in Curitiba.

villages. With the support of international case studies they illustrate the argument that Australian cities can be much improved by being more responsive to human needs (Newman and Kenworthy 1990, 1992). Their analysis does not extend to details of wider ecological impacts and their approach tends to be geared to making the message palatable to mainstream planners and politicians. Nevertheless, their work has been pivotal in Australia and worldwide in relation to critiquing 'car culture' and promoting 'sustainable city' strategies.

Peter Newman was invited to speak at the First International Ecological City Conference in Berkeley by Richard Register and Urban Ecology in 1990 and went on to become an advocate for 'sustainable' cities and a politically cautious, but forceful, supporter of ecocity concepts. He has suggested that there are two fundamental approaches to reconfiguring urbanism for long term environmental and social viability. He terms these the 'urban-commons' view and the 'rural-commons' view (Roelofs 1996 p.14). In his verbal portraits of the two kinds of 'commons', Newman paints images of what are essentially 'eco-village' and 'eco-city' options.

Engwicht

Calming the Traffic

Also in Australia, David Engwicht discovered his version of the eco-city vision after fighting freeways in Brisbane. The Campaign Against Route Twenty (CART) by Engwicht and his fellow campaigners resulted in victories for the community, changes in planning policies, and a fundamental rethink on the role of streets and the workings of cities. Apparently unaware of the work of Register, Soleri, Berg et al., or the work of other urban ecologists in Australia, Engwicht wrote a book called 'Towards an Eco-city' which, coincidentally, was published at about the same time as the Second International Ecological City Conference in Australia in 1992.

The scope of Engwicht's writing ranged more widely than Newman and Kenworthy at that time and encompassed ideas on education which, he maintained '. . .needs to change its focus from the accumulation of knowledge to the accumulation of experience and development of the skills needed to interpret and integrate that experience into creative thinking processes.' (Engwicht 1992 p.81). He proposes that students of engineering and town planning should be educated in life experience by being '. . .sent out to document a week in the life of a rubbish bin, a doorway, a chair, a sculpture, a tree, a step, a light pole, or a bus seat.' (Engwicht 1992 p.81) so that they can learn the roles of these objects in city life – and learn to adopt 'eco-relational' thinking as urban physicians rather than mechanics.

The Newman-Kenworthy-Engwicht analysis supports the idea that traditional city planning, prior to the dominance of cars, created workable, humane environments. Starting from an Australian sprawl perspective and 'looking backwards', their overall critique sits well with that of more European-oriented commentators

Figure 9 Caution Pedestrians

like Sherlock. In *Cities are Good for Us* this London-based architect author (who was chairman of Transport 2000, a UK public transport advocacy group, for five years) makes a well-argued case for high-density, low-rise (four to five storeys) people-orientated cities that service human needs rather than the imperatives of bureaucracy and the private transport lobbies. Sherlock's views, like those of Newman, Kenworthy and Engwicht, reflects the growing international consensus that close-knit communities, local shops and pubs, safe, attractive streets and good public transport are time-honoured ingredients in a well-tried and successful recipe for cities that are good for us.

Trainer

Abandoning Affluence

Ted Trainer is a respected Australian theorist[59] and advocate for a kind of 'Ecotopianisation' of the suburbs. His proposal for incrementally transforming suburban sprawl into a productive landscape of active communities is, perhaps,

[59] Other published Australian theorists include Deborah White et al with their prescient publication 'Seeds for Change'. Driven by the 'energy crisis' concerns of the 1970s and published in 1978, this book laid out a number of issues that bear on ecocity theory and relate to ecocity concepts, and is notable for taking the existing city of Melbourne as its case study for change, suggesting that not only was change desirable but that it was achievable on the basis of action focussed in existing communities and cities.

Australian Architect Roger Johnson published a book called 'The Green City' in 1979 in which he acknowledges the seminal influence of Geddes and McHarg. In this profusely illustrated, but rather 'patchwork' book, he makes a plea for an approach to urban design which is recognisably 'green' in current terms, advocating mixed-use development, low energy transport, roof gardens and people-orientated, rather than machine-orientated design but the book generally accentuates aesthetic concerns and neglects fundamental ecosystem issues.

particularly beguiling to the average suburbanite, although his proposition that Australians should 'abandon affluence' (Trainer 1985) may not be a popular suggestion to most consumers. Supporters of Trainer's vision argue that one of the strengths of his proposal is that 'one can see how we might begin to move towards its realisation' (Bamford 1992 p.665). As an ecocity strategy it lacks the means to address the structural problems of large metropolises and seems largely irrelevant to the conditions of developing country urban environments. The harshest criticism of Trainer's approach is that it can be seen as apologia for sprawl. Nevertheless, his strategy of incremental roll-back for peri-urbanism may be a necessary component of achieving ecocity outcomes in the medium term.

Girardet and the Vales

Inspirational Economy and the Global Urban Condition

Back in England, since the early 1970s there have been three notable contributors to the steady establishment of green architecture and city-making as credible concepts with practical consequences. Brenda and Robert Vale have shown by example that environmentally advanced building is possible within conventional budgets and building programs[60]. The Vales are now based in New Zealand. Robert Vale was part of a team that put together NABERS, the 'National Australian Building Environmental Rating System' commissioned by the Commonwealth Government and which at one time promised to provide one of the world's most comprehensive rating systems of its kind[61].

Herbert Girardet has been published widely and been a consistent advocate of ecovillage and green city ideas since he first wrote 'Garden Villages of Tomorrow' for the 'underground' magazine 'Undercurrents' back in 1976. At the time of the 1970s oil crisis researchers Brenda and Robert Vale were in Cambridge University in England studying 'autonomous houses' and in 1975 they published the first book on design and planning for self-sufficiency which was technically rigorous, by 1991 Their book on 'Green Architecture' gives a full account of the purpose, performance and practice of green architecture, citing working examples and visions for a sustainable future. It has become a standard text and contains a final chapter on 'Ground Rules for the Green City' (Vale and Vale 1991 pp.169–180), whilst Girardet's 'Gaia Atlas of Cities' (1992) has also become a standard text. It provides a trenchant analysis of the global urban condition which looks at the ecology of settlements and

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[60] As long ago as 1973 I was inspired by the Vales and their ability to produce low budget, high performance environmental buildings. Their 'no-nonsense' approach still holds great appeal.

[61] I was on the Steering Committee for the project as an 'expert advisor'. The version of NABERS that finally made it into the public domain was a much diminished variant of the original proposal, this being through no fault of its authors but more the result of conservative construction industry lobbying.

concludes with the proposition that cities should be sustainable, based in ecological principles, and fit for people. In a conference presentation in Adelaide Girardet made specific reference to the Christie Walk project as an example of what was needed to move Australian cities towards sustainability[62].

4.5 Principled People

Hackney and Charles

Community Architecture and Royal Blood

In the mid-1970s I was one of a number of architects and architectural students concerned about the apparent élitism of my profession. Like many others in Britain, I joined and contributed to something called the New Architecture Movement which tackled the profession with radical critiques and the promotion of community architecture.

Architect Rod Hackney became famous for his advocacy of community architecture and with Prince Charles was responsible for orchestrating the massive shift in thinking about the role of architects and architecture in 20th Century Britain. In his book 'The Good, the Bad and the Ugly: Cities in Crisis' he recounts his life and times and provides yet another sobering history of modernism in which he unequivocally identifies Le Corbusier as a negative influence in regard to socially responsible housing.

Pattern books have long been part of the history of the manufacture of the built environment. Typically, at least in Europe, these pattern books circulated among the wealthier part of society that made up the client base for formal 'architecture', i.e. those who could afford to build. In more recent times, we have become used to the wide availability of house plans and magazines devoted to 'the house beautiful'. There are even environmentally orientated versions such as Australia's 'The Owner Builder' magazine. One way or another, pattern books have been influential in shaping the built environment[63]. In briefly discussing the 'new urbanists' (below) we will find the use of patterns very much part of their management of urban aesthetics and, to a limited extent, community interaction (via the front porch, for instance).

In one of those curiously contradictory turns that defines British society, the future king of England became an advocate and spokesperson for popular taste in architecture, planning and design. With the publishing of 'A Vision of Britain' Charles cemented his position as champion of the rapidly evolving 'community architecture' movement. He also upset architects – many of whom began baying for royal

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62 Reported by attendees and UEA members Joan Carlin and Sharon Ede.

63 Although it should be noted that such magazines are part of the insidious work of the 'taste-makers' complained of by Alexander.

blood because the Prince's 'non-professional' pronouncements perturbed them so. His well illustrated book probably did more to popularise debate about architecture and cities than any other in 20th century Britain. Leaving aside his predilection for neo-classicism, Charles makes critiques of architecture and planning that are explicit and well aimed.

The point taken from the general thrust of the Prince's critiques is that ordinary modern architecture being done by ordinary modern architects in the context of ordinary places for ordinary clients, is extraordinarily bad. And if that situation is going to be addressed it is no good looking for the exceptional genius that moved great architects to create exceptional architecture. In their absence, something else is needed to ensure a worthwhile built environment that does not offend the majority of the population.

Hence, his provision of a set of guiding principles. The Prince's 'Ten Principles' for urban design are drawn from well-proven antecedents which have universal applicability and read somewhere between common-sense[64] and wisdom. A planning and design strategy wanting to lay claim to respecting both intellectual endeavour and popular taste might begin by adopting the Prince's Principles as a starting point. They support an approach to design which respects both the users of the buildings and the spaces and landscape they inhabit. These principles appeared in short form, with editorial comment by myself, as a chapter in the booklet published by Urban Ecology Australia in support of the Halifax EcoCity Project (Downton 1994 and 1996).

Figure 10: Poundbury–Princely Principles Applied?

[64] The dangers of which have already been noted – see Mollison above.

Day

Places of the Soul

> The science of building biology is still in its infancy and many of its assertions are challenged, particularly by industries whose products are threatened. But even in the absence of scientific data we can to some extent feel when a place is healthy and physiologically life-supporting and when it is not
>
> (Day 1995 p.21)

Christopher Day developed the arguments for linking physical well-being to emotional and spiritual well-being in his book, using as examples buildings he designed according to certain well defined principles, many of which are drawn from Rudolph Steiner and the work of the Anthroposophists. Day's rigorous attention to health in buildings is paralleled in the 'Principles of Baubiologie' set out by the Institute of Building Biology and Ecology in Germany.

Day's philosophy is that buildings are for people and if they properly reflect the whole nature of what it is to be human then it can be quite appropriate to speak of 'ensouling buildings'. His 'Places of the Soul' is one of those all too rare kinds of book that emanate from architects who practice what they preach. Day sees 'architecture and environmental design as a healing art'. His prescription for healthy building starts with the person as a soulful being and in the making of 'Cities for Life' he says:

> If we listen carefully to the needs of the human soul, differentially weighted and intensified by the urban situation, and to the needs of the spirit of a growing place, many opportunities begin to show themselves. Approaches to design can emerge in which nurture for the human spirit and economic benefit are coincident
>
> (Day 1995 p.179)

Day's gentle approach to architecture and design is also found in the work of one of the pioneers of earth-sheltered building, Malcolm Wells.

Wells

Architecting Gently

Malcolm Wells inspired my creation of the 'Frogstick' in 1991 (see Chapter 11). With his early (1969) 'Wilderness-Based Checklist' score sheets he designed what would now be termed 'indicators'. These indicators have fifteen criteria and a negative-to-positive scale that goes from destruction and waste to creation and provision of habitat. Most of Wells' criteria relate directly to natural processes, e.g. 'stores rainwater', 'uses solar energy', provides wildlife habitat', but his fifteenth criterion rates sites, buildings and cities on the basis of whether they are 'ugly' or 'beautiful'. Nothing quite like this appears in any Agenda 21, post-Rio exercises in the making of blanded-out, 'common purpose' indicators such as those described by Bell and Morse (1999).

Wells was one of the first architects to explicitly propose that ecological responsibility, human purpose and aesthetic delight were mutually complementary goals in the making of the built environment (Wells 1981). The theory of making ecological cities requires that they are, at the very least, not mutually exclusive. See below in 'Appearances Do Count' for further discussion on the issue of aesthetics.

4.6 Village People and New Urbanists

> The new urbanist neighbourhoods treat transport energy efficiency, environmental quality and the creation of community as key goals but are usually non-specific about important ecological aims
>
> (Barton 2000 p.79)

Calthorpe and Duany

Everything Old Is New Again

In the last two decades the failure of modernist urban planning has contributed to growing interest in the 'back to the future' program of the New Urbanists with increasing relevance to ecocity design and making as they have begun to incorporate environmentally responsible infrastructure planning to their otherwise aesthetically orientated urban design programs (Kunstler 1998). They are not ecocity advocates or theorists in the sense of seeing the city as the basis for socio-cultural change and often seem to be more concerned with style than substance. At the same time, the best of New Urbanist work possesses the sensibilities of Alexander who 'ably pointed out, what we perceived to be *things* in our everyday surroundings – buildings, walls, streets, fences – are more properly understood as patterns intersecting with patterns, *relationships* between other relationships.' (Kunstler 1998 p.83).

There has been a burgeoning of the anti-sprawl movement in the USA. The quintessential New Urbanists are Andres Duany, a 'refugee' from Castro's Cuba and his partner Elizabeth Plater-Zyberk. They have been extremely successful selling the anti-sprawl New Urbanist message in the USA (Kunstler 1998, Duany and Plater-Zyberk 1993, Duany et al. 1989) and Duany has received the approbation of Prince Charles for his carefully coded built environments and the 'extraordinary. . . modern, classical look' of Seaside, a resort town development in Florida (Charles, Prince of Wales 1989 p.14, p.143). Seaside stands as something of an icon for the 'NU' movement and is also 'a favorite target of abuse' for detractors (Kunstler 1998 p.150).

Despite the middle-class aestheticism of many New Urbanist developments, the mission statement of their peak body, the Congress for the New Urbanism, is forthright (and even radical by Australian standards). It addresses social and environmental issues and proposes what amounts to a wholesale remaking of the metropolitan landscape.

> THE CONGRESS FOR THE NEW URBANISM views disinvestment in central cities, the spread of placeless sprawl, increasing separation by race and income, environmental deterioration, loss of agricultural lands and wilderness, and the erosion of society's built heritage as one interrelated community-building challenge.
> WE STAND for the restoration of existing urban centers and towns within coherent metropolitan regions, the reconfiguration of sprawling suburbs into communities of real neighborhoods and diverse districts, the conservation of natural environments, and the preservation of our built legacy. (http://www.cnu.org/, accessed 7-9-00)

While the New Urbanists do make a muted call for increased democracy ('Civic buildings and public gathering places require important sites to reinforce community identity and the culture of democracy. . .'[65]), much of their program is based on a kind of looking backwards. Much of the appeal may be attributed to Middle American sentimentalism and prejudice, which some new urbanists have unashamedly employed in support of their goals.

> According to the Congress for the New Urbanism (CNU), a group of rebellious architects and planners who met here [Portland, Oregon] this past June, the nerds actually first wreaked their revenge in the 1950s.
> Immediately following World War II, new urbanists contend, an army of slide-rule-packing math clubbers in high schools from Buffalo to Bakersfield launched careers as civil engineers, mechanical traffic engineers and bureaucrats, and began their life's work – banging out tomes full of rules for urban living. They specified curb size, street widths and setbacks. They wrote zoning rules that outlawed mother-in-law apartments and corner stores in residential areas. They drew up lending requirements and mortgage tax credits that limited the flow of money to one type of housing 'product.'
> In short, the nerds dictated all the rules that forced us off the sidewalk and into cars – even for short trips. They thus condemned a couple of generations of former jocks and cheerleaders to spend several hours. a week carting their kids around to schools, dental appointments, baseball practice, and dance lessons
>
> (Tremain 2000)

The Charter of the New Urbanism describes a set of precepts that fit well with most ecocity concerns. The New Urbanist agenda may work well in the context of American prejudices in which it has evolved even though 'It is against the law almost everywhere in the United States to build the kind of places that Americans themselves consider authentic and traditional' (Kunstler 1998 p.109). Its precepts are almost universally relevant, but it suffers from being expressed in language too deeply embedded in the prejudicial American context to speak easily or effectively to those on the planet less blessed, particularly those in less developed countries. Ecocities need to work for all people, everywhere, and for that purpose New Urbanism may be something of an evolutionary cul-de-sac.

Cities are on the front-line of the war against the life support systems of our planet. New Urbanism may be about calling for some sort of truce, but ecocities are about achieving a lasting peace – and about creating a post-war economy of reconciliation and restoration. Despite its recognition of natural facts ('The metropolis has

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[65] From The Charter of the New Urbanism; The Block, the Street and the Building; Principle 7.

a necessary and fragile relationship to its agrarian hinterland and natural landscapes. The relationship is environmental, economic, and cultural. Farmland and nature are as important to the metropolis as the garden is to the house.') New Urbanism views cities in a landscape of limited horizons – if nature is as important as a garden is to the house, where does that leave apartment living?

> Planners are not prepared to be re-educated, but they are accustomed to following the law
>
> (Duany et al. 1989 p.71)

It could be argued that the New Urbanists have appealed to planners, not by dint of moral persuasion, but by recognising their role in the government of public space. It could even be argued that their commitment to authentic community (Duany et al. 1989 p.71) is, in the context of consumer society, subversive.

Peter Calthorpe expresses the New Urbanist mind-set well, neatly side-stepping the need to come to terms with the imperatives of non-human, living systems whilst at the same time appropriating the language of ecology:

> Against this false dichotomy of Modernism and Post Modernism ecology has come to represent, for me, the real counterpoint. Not the literal ecology which deals with natural systems and seems to stop just short of the human habitat – but a broader, more philosophic 'ecology' which teaches that diversity, interdependence, and whole systems are fundamental to health
>
> (Calthorpe 1993 p.11 –12)

Calthorpe's 'The Next American Metropolis' lacks references or an index and is really a pattern book and design brochure. Although its section on 'Guidelines', according to Calthorpe, deals less with aesthetic and architectural principles and more with 'context and direction for the built environment' (Calthorpe 1993 p.41) and contains a sub-section on 'Ecology and Habitat' it clearly places human preoccupations before other ecosystem imperatives. It also contains potentially self-contradictory precepts, e.g. In respect of natural features 'Public access should be permitted while important natural features and sensitive habitats are preserved.' (Calthorpe 1993 p.72).

The Ecopolis thesis argues that the search for, and understanding of, limits is at the core of designing and developing in an ecological context. Calthorpe's ethos is different. Although there is commonality in his approach with my understanding of urbanism and that expressed by most of the theorists in this chapter, his semantics are confused and his language is tailored to an intellectually uncritical readership. He writes:

> This book is part polemic, part tool, part proof by assertion, part manifesto, but mostly, I hope, *common sense*. Beneath the rationales, facts, examples, and guidelines is a simple ethos. This ethos provides a specific aesthetic of place – scaled to the human body, timed to a stride, patterned to ceremony, and *bonded to nature*. It is an aesthetic grounded in the notion that space is not an infinite grid, that time is not relentlessly progressive, that pattern is not formally mechanical, and that *boundaries are not limits*
>
> (Calthorpe 1993 p.11) (my emphases)

Calthorpe's work represents an effective working compromise between conventional developmental pressures and environmentally sensitive design, and although it does not specifically address the idea of citizen empowerment it does outline physical frameworks for supporting community life. Calthorpe's best defence for the pragmatism that permeates his approach is one that will be familiar to anyone who has tried to act on principles that produce results different from conventional expectations, and it is that compromise is inevitable and design ultimately becomes 'the art of the possible' (Calthorpe 1993 p.12). My criticism should also be set against the annotated bibliographic reference in Cowan and Van der Ryn's 'Ecological Design' which calls 'The Next American Metropolis' 'A perceptive study of ecologically sensitive approaches to town planning.' (Cowan and Van der Ryn 1996 p.186). There is little doubt that Calthorpe has been enormously influential in the mainstream of planning, contributing significantly to the rise of New Urbanism and the trend towards planning for neo-traditional communities.

What really betrays the innate conservatism of the New Urbanist approach to urban design is that it invariably favours traditional or neo-traditional architectural expression. Although it would be logically consistent with principles of sustainability and the pattern language approach of Alexander et al. to re-interpret vernacular elements in accordance with the critical regionalist approach identified by Frampton, there is, instead, reliance on formulaic building design that can be understood in traditional terms – a school looks like a school, a courthouse looks like a courthouse, etc. This mitigates against a more creative way of bringing age old humanistic and civic concerns into expression in concert with an architectural stratagem of greater subtlety and responsiveness to modern conditions. On the other hand, and herein lies the one of the 'traditionalist aesthetic vs. progressive politics' contradictions of the New Urbanist movement – 'Traditional town planning produces pictorial, or graphic, codes that any normal citizen can comprehend. *This is democratic and ethical as well as practical*.' (Kunstler 1998 p.148, my emphasis).

Corbett

Village Homes

> Village Homes predates the evolution of smart growth, new urbanism, sustainable development, and green buildings, among other contemporary causes or 'flavors of the month'
>
> (Wack 2008 p.36)

Michael and Judy Corbett were the developers of Village Homes in Davis, California which has been lauded as an excellent example of what amounts to a latter-day Garden City project (see Chapter 6). It could be mistaken for a New Urbanist project were it not for the absence of pseudo-traditional architecture. Corbett is not only a developer but a theorist, and he writes of how, after participating in community design as a planner, developer and citizen advocate, he has noted that people rarely make explicit the assumptions that frame their opinion-making and affect the

shaping of communities. He presents a set of 12 assumptions that he says 'seem to form the basis of a wholistic (sic) approach to community planning.' (Corbett 1981 p.10). His assumptions represent an important instance of where some explicit ecological principles underlie a significant community-oriented development that is recognised as a milestone in environmental design (Village Homes, Davis).

Corbett's expressed concern with ecological relationships and his reference to Bookchin for a critique of power relationships in urban planning are indications of the underlying radicalism in his approach. This is reinforced by his unequivocal advocacy of participatory democracy, which contrasts with Calthorpe's apparent silence on this subject.

Doyle (2000) is highly, and rightly, critical of 'California-style New Age environmental remedies, where the spiritual self is recentred and reinvestigated, and where the profound discrepancies between citizens' access to political power are overlooked and denied.' (Doyle 2000 p.148). The American body politic maintains implicit, and often incorrect, assumptions about the rest of the world's politics and social order and New Age obscurantism is endemic on the US West Coast. Nevertheless, exhortations for participatory, grass roots democracy by US citizens should not be confused with the democratic rhetoric of the American Empire, and it is important not to confuse the American directly democratic, individual-oriented politics of radicalism with New Ageism.

Judy later went on to become the Executive Director of the non-profit Local Government Commission which now 'provides one of the most popular web sites in the planning world according to Planetizen (www.planetizen.com).' (Wack 2005 p.38) Michael became mayor of Davis for a while and continued to work on similar projects to Village Homes, including the Covell Village proposal for a greenfields site in Davis which required annexation of agricultural land by the city. It was, perhaps a little ironically, voted down 59.9–40% by Davis citizens despite support from the city council in 2004[66].

4.7 Political People – Energy, Structure and Citizenship

> Civic life is what goes on in the public realm. Civic life refers to our relations with our fellow human beings – in short, our roles as citizens. Sometime in the past forty years we ceased to speak of ourselves as citizens and labeled ourselves consumers
>
> (Kunstler 1998 p.38)

Ecopolis requires that cities are developed on the basis of social justice as well as ecological fit. Social justice was never achieved by sitting in armchairs, relaxing on the beach, or manicuring a suburban lawn. Garden Cities and New Urbanism are about extending the comfort zone, making 'really very nice towns if you were docile and had no plans of your own and did not mind spending your life among others with

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[66] http://daviswiki.org/Covell_Village (accessed 24 March 2008).

no plans of their own' (Jacobs 1962/84) but in the Ecopolis idea, ecocities are really not about nice, comfortable places. They are about making vibrant, creative, civic places because cities *contain* difference. Although there may be differences between cities, the differences within them are greater. It is within the portals of civilisation that we see the creative conflicts of politics and society. At the same time, there is a discernible tradition of libertarian/anarchist political philosophy in the ecocity movement that can be traced back to Geddes, Morris, Callenbach, et al. I believe that there is no conflict between the fundamentally radical politics of ecocity theory and its eventual adoption as the building block of an ecological civilisation because the politics is realised at the level of community and through local democracy. This is explored to some extent in later chapters. Nevertheless, there are some key figures and political ideas that remain important to my development of the Ecopolis idea to date.

Turnbull

Invisible Structures

If an eco-city depends on maintaining a non-exploitative relationship with the biosphere then this attitude must be rooted in the culture of that city. The 'invisible' economic and social relationships, which characterise such a place, must be founded before the visible foundation stones are laid. If eco-cities are not to be simply constructs of bricks and mortar with a few solar collectors and trees on the roof, then the unseen structures which lead to the laying of the bricks must be dealt with from the start. Thus ecological cities must be founded on the basis of ethical behaviour, maximum social responsibility and 'clean' capital. Shann Turnbull introduced me to the ideas of invisible structures and the need to address the proper construction of these structures as the basis for any physical built environment.

Hawken

A Natural Capitalist

> A restorative economy is not going to lead to a life of dulling comfort and convenience. We have to recognise that we've reached a watershed in the economy, a point at which 'growth' and profitability will be increasingly derived from the abatement of environmental degradation, the furthering of ecological restoration, and the mimicking of natural systems of production and consumption
>
> (Hawken 1993 p.210)

With the collapse of centralised state economies there has been renewed interest in economic strategies that accept capitalism as a given and attempt to work within its constraints. Paul Hawken's 'ecology of commerce' (Hawken 1993) is a strong pointer to what is certain to become the dominant way of thinking in industry and, given the small likelihood of change in the fundamental existence of capitalist

society in the short-to-medium term, is important as a representation of the economic environment within which ecocity design and development must take place during the next one or two generations.

Illich

Energy and Equity

> It would be possible to control the patterns of urbanization if the organization of space were constrained by the power man (sic) has to move through it
>
> (Illich 1974 p.74)

Ivan Illich was a radical critic with a great deal of influence in the 1970s. His work on education and technology are still seminal. His most important contribution to ecocity theory was his book 'Energy and Equity' in which he raised questions and provided trenchant analysis about the efficacy of various transport modes which drew attention to the inequitable basis of conventional modern transport and its reliance on 'speed' as a measure of effectiveness. An appropriate relationship between energy and equity is fundamental to the function of an ecological city.

Kropotkin

The Prince of Mutual Aid

> . . .the ethical progress of our race, viewed in its broad lines, appears as a gradual extension of the mutual-aid principles from the tribe to always larger and larger agglomerations, so as to finally embrace one day the whole of mankind, without respect to its divers creeds, languages, and races
>
> (Kropotkin 1914 p.224)

Pter Kropotkin was a Russian prince and a geographer, contemporary with Geddes, as previously noted, and one of the most influential (and compassionate) anarchists in history. Kropotkin countered the mainstream political diminution of Darwin's concept of the survival of the fittest with the idea of mutual aid, and found evidence for mutual assistance being a major factor in successful animal and human societies, including in the Medieval city (Kropotkin 1914). In 'Fields, Factories and Workshops' (1912, republished in 1974 as 'Fields, Factories and Workshops Tomorrow') Kropotkin systematically explored the potential for (then) modern means of decentralised production and agriculture to provide all people's needs and established that the amount of effort and fuel required was such that ordinary people could be liberated from toil and that the use of machinery could '. . .reduce the time which is necessary for producing wealth to any desired amount, so as to leave to everyone as much leisure as he or she may ask for.'[67]

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[67] http://dwardmac.pitzer.edu/ANARCHIST_ARCHIVES/kropotkin/fieldsch9.html (accessed 24 March 2008).

Roszak identified Kropotkin as one of the world's first 'ecopsychologists', as a man who believed that society is 'a biologically deep and intricate system' in which 'the factor of innate conscience makes human community a great deal more than an agglomeration of people held together by a social contract.' (Roszak 1993 p.230).

Caine, Haggart and Crump

Street Farming

The Street Farmers are of interest because they represent an attempt to carry through the construction of an uncompromisingly ecological building on the basis of an anarchist philosophy and a radical vision of urbanism.

> The Street Farmers had arisen from the Architectural Association as a kind of radical eco response to the technological supremicism of Archigram. The main personnel were Bruce Haggart and Peter Crump. They produced two or three issues of a loose-leaf journal and would make public actions dressed in green boiler suits. A third Street Farmer, Graham Caine, built a full size experimental 'eco house' on the playing fields at Eltham, South East London, where he lived for a year[68].

Graham Caine, Bruce Haggart and Peter Crump called themselves 'The Street Farmers' and proclaimed a vision for remaking the city that was simultaneously a process of greening and an attack on its very existence. In their provocative collages published in Street Farmer One and Street Farmer 2 in 1972, they showed urban revolutionaries humanising the landscape by ploughing the streets, surreal images of buildings being gradually eaten away and replaced by vegetation, instructions for making a tree house – and a description of an ecological house, a variant of which they built whilst still architecture students at the Architectural Association (Crump and Haggart 1971, 1972)[69]. Godfrey Boyle and Peter Harper called them 'Clever and funny, practical anarchists and guerilla architects.' (Boyle and Harper 1976 p.272).

The Street Farm House had its parallel in the Southern Hemisphere with a 'Do-It-Yourself Autonomous House' built and occupied by architecture students on the University of Sydney campus at Darlington in 1975–1976 (Baxter and Grayson 1976). Two years later saw publication of Australia's first coherent attempt to outline an approach to human settlement (Melbourne) that connected local planning and community development to energy and resource issues in what we would now call a sustainable framework (White et al. 1978).

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[68] http://www.stefan-szczelkun.org.uk/phd103.htm (accessed 14 March 2008).

[69] It was, officially, Graham Caine's fifth-year architectural project. It was erected in a corner of the playing field of the Thames Polytechnic at Eltham on the understanding that it was an 'experiment' and was occupied by Caine, his partner and daughter for over two years (Boyle 1976 p.170). It claimed a great deal of media attention at the time and probably contributed to the popular perception that ecological buildings were necessarily unusual and confronting (I remember that there was very limited head room in the toilet!). In January 1973 I organised a visit to Cardiff and a lecture at the Welsh School of Architecture, during which I finally began to understand the essentially *political* nature of the ecohouse project.

Debord and the Situationists

Creating Situations in the Society of the Spectacle

> And you, forgotten, your memories ravaged by all the consternations of two hemispheres, stranded in the Red Cellars of Pali-Kao, without music and without geography, no longer setting out for the hacienda where the roots think of the child and where the wine is finished off with fables from an old almanac. That's all over. You'll never see the hacienda. It doesn't exist.
> The hacienda must be built
>
> (Ivain, Gilles (transl. Knabb, Ken) 1958)[70]

Anything I write about the Situationists will be wrong, one way or another, except to say that they were a libertarian group that were influential in the 1950s and 1960s and were probably responsible for some of the most enduring graffiti in the 1968 Paris uprising, including 'Be realistic – demand the impossible!' *(Soyez réalistes, demandez l'impossible!)* and 'Beneath the paving stones – the beach!' *(Sous les pavés, la plage!).* My interpretation of what they were trying to achieve rests on my perception that they understood that the 'bread and circuses' approach to pacifying the body politic was as much a part of the left wing of politics as the right, and that the commodification of everything and reduction of lived experience to one or another kind of spectacle was inherent to modern industrial capitalist society (left or right). Only by recognising this and challenging its consequences could social progress be made, and within the extant socio-political framework of western societies, 'artistic' interventions provided a means to make those challenges.

Some of the theoretical musings that come from their early work, such as Chtcheglov's 'Formulary for a New Urbanism' from 1953 is marvellously provocative in terms of how it addresses issues of urbanism, architecture and life, and remains pertinent and refreshing:

> Darkness and obscurity are banished by artificial lighting, and the seasons by air conditioning. Night and summer are losing their charm and dawn is disappearing. The urban population think they have escaped from cosmic reality, but there is no corresponding expansion of their dream life. The reason is clear: dreams spring from reality and are realized in it
>
> (in Knabb 2006 pp.2–3)

And from Debord's 'Situationist Theses on Traffic' originally published in 1959:

> To want to redesign architecture to accord with the needs of the present massive and parasitical existence of private automobiles reflects the most unrealistic misapprehension of where the real problems lie
>
> (in Knabb 2006 p.69)

Half a century later, that misapprehension remains unchanged.

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[70] Situationist text on urbanism.

Bookchin

The Limits of the City

> . . .the roots of the urban crisis today lie not merely in poor design, bad logistics, neglected neighbourhoods, and inadequate material support, but in the social system which has created these problems in the first place – and produced the modern metropolis
>
> (Bookchin 1986 p.viii)

Critical of the modern metropolis, Murray Bookchin distinguished it from the idea of the city, which is a liberating human invention that deserves careful analysis and passionate support as the essential home of human civilisation.

The city is more than a mere assemblage of space, and in evolving to its present state, wherever its geographical location, it has brought together strands of cultural development from across the globe. City history has been uneven and does not reflect a simple increase in civic virtue by any means but, says Bookchin, the city can only be understood by seeing it in terms of its history, and that history has been a cumulative one in which traditions of rationalism, morality and law have persisted even as the physical frameworks of cities have come and gone.

The Ecopolis idea shares Bookchin's view of the city as an ethical union of citizens, as the basis for the continuing improvement of the life of citizens and as the basis for collective human action on the world. It sees the city as the primary location for effecting social change. Taking this idea forward to look at how governance would work without the apparatus of the central state, Bookchin proposed a 'libertarian municipalism' in opposition to statism.

> The immediate goal of a confederal municipalist agenda is not to exercise sudden and massive control by representatives and their bureaucratic agents over the existing economy; its immediate goal is to reopen a public sphere in flat opposition to statism, one that allows for maximum democracy in the literal sense of the term, and to create in embryonic form the institutions that can give power to a people generally. If this perspective can be initially achieved only by morally empowered assemblies on a limited scale, at least it will be a form of popular power that can, in time, expand locally and grow over wide regions. That its future is unforeseeable does not alter the fact that its development depends upon the growing consciousness of the people, not upon the growing power of the state – and how that consciousness, concretized in highly democratic institutions, will develop may be an open issue but it will surely be a political adventure.'
>
> (Bookchin 1995 p.231)

He was not talking about simply using existing local government organisation as the means to effect change, but also to change local government and make it more direct and democratic.

> . . .libertarian municipalism is not merely an effort simply to 'take over' city councils to construct a more 'environmentally friendly' city government. These adherents or opponents of libertarian municipalism, in effect, look at the civic structures that exist before their eyes now and essentially. . . take them as they exist. Libertarian municipalism, by contrast, is an effort to transform and democratize city governments, to root them in popular assemblies,

> to knit them together along confederal lines, to appropriate a regional economy along confederal and municipal lines
>
> (Bookchin 1991)

There are parallels in this to the New Municipium of Magnaghi which recognises that on a globalising planet of increasing homogenisation and consumerist alienation it is vital to establish places where resistance to those forces can find the ground on which to gain a footing. As part of that approach the Ecopolis philosophy for the design, development and maintenance of ecological cities '. . .lends itself to modification, extension, continuity, and a decent regard for the great variety of needs that distinguish one community from another, not a blueprint that dogmatizes and rigidifies the idea of civic freedom into an inflexible credo.' (Bookchin 1995 p.241).

Chapter 5
The Aesthetics of Ecopolis

A city with many different people and many different cultures should have many different houses, and buildings that correspond to people's beliefs. My ideal is a city with buildings as varied as trees in a forest
(Hundertwasser in Verzijl 1998 p.3)

5.1 Altered States

Most architectural theory is barely worthy of the name. The 'theories' of architectural culture heroes like Le Corbusier mostly consist of culturally-bound opinions about aesthetics and fail to consider the nature and purpose of aesthetics itself. A notable exception can be found in the earlier work of Alexander and his cohorts in which they look for commonalities across human cultures and seek deeper constancies and purposes as to what makes good design or enjoyable aesthetics, but their work, though often acknowledged by the design community, is routinely ignored in the actual production of most designed built environments.

Meanwhile, the natural environment is affected by human activity. A lot. One can argue that the altered environment is built to the extent that it is changed from its natural state. The 'un-natural', built environment in turn shapes human physiology and consciousness, physical activity and expectations. We tend to discuss these things in relation to their appearance, but there is an intimate relationship between the shaper and the shaped which goes beyond mere appearances. Recognising that, as builders of altered environments we have a responsibility to learn how to articulate that relationship beyond simplistic concerns with appearances and understand the role of aesthetics in our altered environments so that we can learn how it can fit and facilitate the purpose of optimising the functioning of the biosphere for human purposes.

Fashioning the Future

> Across a species increasingly dependent on its mind and the technology that its nervous system generates, evolution will reward the wit to innovate, the ability to manipulate perspective rapidly, a capacity to understand forces and extrapolate consequences, brains that expect a world of cause and effect, and mental machinery that maps materials and tools into extensions of the hands. And human hands are the most flexible manipulators on the planet
> (Gould and Gould 2007 p.298)

P.F. Downton, *Ecopolis*, DOI 10.1007/978-1-4020-8496-6_6,

If our constructed environments, from gloves to gardens and houses, are to a lesser or greater degree examples of attempts to extend our capacities and viability as organisms, then the clothes we wear, the cars we drive, and the houses we live in are, in effect, manifestation of our attempts to extend our physiology. Organisms seek evidence of evolutionary fitness in their cohorts and potential mates (the showiest tails, brightest colours, best bower, etc.) and there is no reason to think that humans are any different in this regard, thus the apparent quality of any of our constructed artifacts might reasonably be seen as superficial expressions of traits worthy of reproduction, i.e. having evolutionary fitness.

If this is the case, then it becomes much easier to understand the universal preoccupation with appearances in human society. As new things come and go they are first presented through high culture to those that can afford them (modern architecture, horseless carriages, Paris catwalks), then in slightly modified, less extreme and more affordable form in the cultural mainstream (large windows, mass-produced automobiles, fashionable clothes). Successful objects and ideas, including forms of human settlement, eventually become orthodox, accepted and desirable social norms (suburban sprawl, fast cars, miniskirts) that help, in turn, to maintain a kind of socio-cultural stasis (in this case, consumerism). Seen as whole patterns of activity in the bubbling cauldrons of civilisation, this trajectory of ideas and creativity can be understood as our collective attempt to appropriate the environment for our own purposes. All aspects of the attempt are only possible because of our development of consciousness. Our reading of the value of all and any of the artifacts and ideas depend on cultural measures developed by consciousness (although we remain, for the most part, unaware of any larger trajectory for all this frenetic activity). But the important thing here is that instead of fashion being merely superficial and ephemeral and a kind of frothy, cultural aesthetic excrescence, it becomes understandable as an expression of something systemic and profound – a necessary result of our continual efforts to find ever more ways of extending ourselves and expanding our evolutionary niche. The fast lane of fashion connects with the slower rates of change. Changing human society so that it adapts to environmental change can, and probably must, begin with fashion.

Emergent Aesthetics

The aesthetics of cities may not be easy to describe but they are clearly bound up with the cultural dynamics of urban communities as they evolve to fit their place. Established, long-lived urban communities provide evidence of the potential for urban ecosystems to sustain human culture and society and maintain the continuity of essential functions in the physical environment over extended periods, albeit usually only for decades or centuries rather than millennia. Eid argues that these historic urban settings have, over the years, represented ‘the climax of invention, intuition and power’ and have brought together ‘ingenuity of design, the tools of economy, and the identity of culture’ to ‘weave unique urban fabrics, and establish the images of the urban environment.’ (Eid 2003, p.87) Using the example of the

district of Gamaleyah in Cairo and with particular reference to 'diverse European landscapes' and 'the rich labyrinthine structures of the Middle Eastern cities' Eid refers to such places as 'urbo-systems' and describes what are essentially urban fractals: 'small-sized, self-sufficient, *villagized* icons that exist within the overall urban environment' (his emphasis) containing 'elements and systems that can make the built environment durable' and which rather than degrading the natural environment, assist 'in fostering and nourishing the three domains that constitute community sustainability: society, the environment and the economy.' Implicit in this description is the sustained aesthetic representation of responses to the forces of society and nature as a device for maintaining, and being maintained by, the cultural fractal of patterns that generated the urbo-system. Eid acknowledges the possibility of 'an underlying nostalgic cry' to his historical references, but appears to be echoing something of Alexander's search for urban morphologies and architectural form-making that have stood the test of time and continue to provide aesthetic experiences which have positive and profound effects on the quality of life.

Regardless of the merits or otherwise of architectural determinism, it is ingenuous to argue that the pattern of streets and built form do not affect the behaviour and thoughts of the people who move in and through and observe those patterns. As Wiener tells us 'A pattern is a message' (Wiener 1954 p.96). When we make our urban forms we are generating messages that abide for decades or generations; with effects that continue long after the original form is damaged, or even erased, to exist only in memory. Archaeologists reconstruct ancient urban patterns in order to read some of those messages. The patterns emerge from the living activities of the city-makers, the denizens of the city, then become the message for future shapings. In an ecological city the activities of living must fit ecologically viable purpose and from this an appropriate aesthetic can manifest. The aesthetics of Ecopolis must ultimately be an emergent property of the city-making process rather than a consequence of imposed design if it is to provide an authentic aesthetic representation of its responses to the forces of society and nature as a device for maintaining, and being maintained by, the appropriate pattern of cultural fractals. Once the built form patterns have been developed and are understood, then they can be used to reinforce appropriate patterns of behaviour, just as the pattern of Lynch's celestial city, or a neo-classical government building reinforces the behaviour of authoritarian centralism, or winding Mediaeval streets reinforced a sense of communal purpose during daily perambulation or celebratory procession (Mumford 1961 p.322). With regard to urban design, there is no particular *style* that is correct for Ecopolis. If style is derived rather than imposed then we cannot yet really know what the Ecopolis style is.

Given that ecological architecture ranges from very low to high tech (Daniels 1995 p.90–95, Davey 1997b p.26–39) and displays a wide range of aesthetic interpretation it would be unsurprising if ecocity design did not display the same breadth of approach. There are very few published designs for ecocities. There are a small number of examples of plans for parts of cities designed on ecological principles and there are several ecovillage plans. Accepting a broad definition of ecocity, the following examples illustrate something of the existing and potential divergence of form and expression in ecocity design.

5.2 Diversity of Form and Expression

Measuring in Feet

Some of the extraordinary potential for aesthetic invention in a city defined by the scale of the pedestrian can be seen in the rigorously fanciful renderings and rationales, based on an apparent obsession with natural geometries, of the late Roger Ferri's 'Pedestrian City' in which a circular city a mile across is formed by six neighbourhoods with pedestrian streets set in a spiral pattern around the city's centre (Ferri 1980), in the megastructural imaginings of Soleri (1973a), the cartoon-like organicism of Register or the native organic formations of virtually any old town in Europe. Each of these examples appear to draw creative inspiration from the demands of a pedestrian environment that challenges the morphological norms of modern, conventional, car-dominated cities.

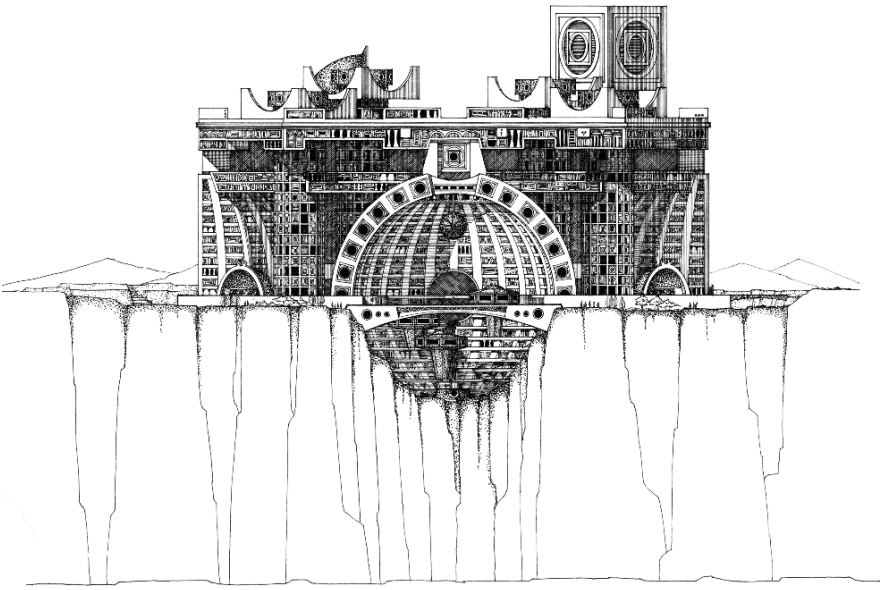

Figure 11: Arcosanti – a three dimensional pedestrian environment *(Soleri Archives)*

The pedestrian scale facilitates the creation of spaces that can be experienced as enjoyable places (Kroll 1987). I used the inherent design assistance in this approach in the ecocity projects for Adelaide and Whyalla. In addition to an organic aesthetic sensibility, however, the plan for the Whyalla EcoCity Development proposal was developed in response to public engagement in the design process (see Chapter 8).

If there is any discernible pattern in these examples it is that a certain degree of visual richness and complexity and a preference for indirect, non-linear circulation patterns. There are no grand avenues and very little in the way of completely undifferentiated repetition. If anything, notwithstanding Soleri's megastructure or Ferri's

Figure 12: San Francisco with 'some of its buildings modified, some missing, some added. *(Register)*

insistent spiral geometry the common theme is what might be call the 'Picturesque' or 'Empirical' approach[1]. In contradistinction to Rationalist and Modernist models of simplified, geometric, abstracted urban design the Picturesque generally complies with the kind of aesthetic principles advanced by Sitte (1965/1889). It is interesting to compare this with examples of New Urbanist planning, like the many offered by Calthorpe (1993), with their preponderance of semi-formal avenues and tendency to repeat regularised, spatially similar elements. The same patterns can be seen in Australian suburban development of the 1990s and early 21st century.

Hard and Soft Geometries

Despite their appearance of organicism, the designs of Soleri and Ferri could probably only be realised by means of an imposed order in a relatively authoritarian socio-political environment. They do not fundamentally depend on an organic process from which to derive their form but are designed as objects into which their inhabitants might be decanted. Neither offer any obvious ways in which there might

[1] For a very accessible discussion on general urban theory in which the Picturesque-Empirical approach is dealt with as a 'respectable' manner of design, see Part Three: Theories Into Practice in Broadbent 1990.

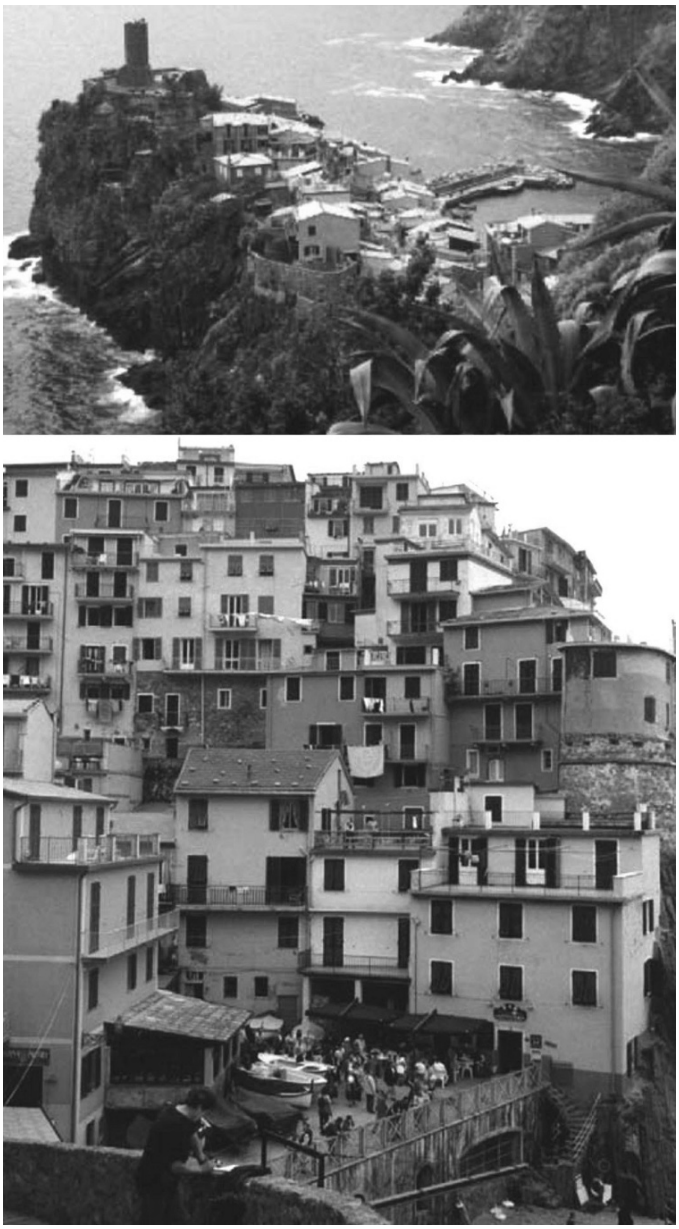

Figure 13: This European coastal town demonstrates a built form response to the conditions of the topography and climate it inhabits
(Effie Best)

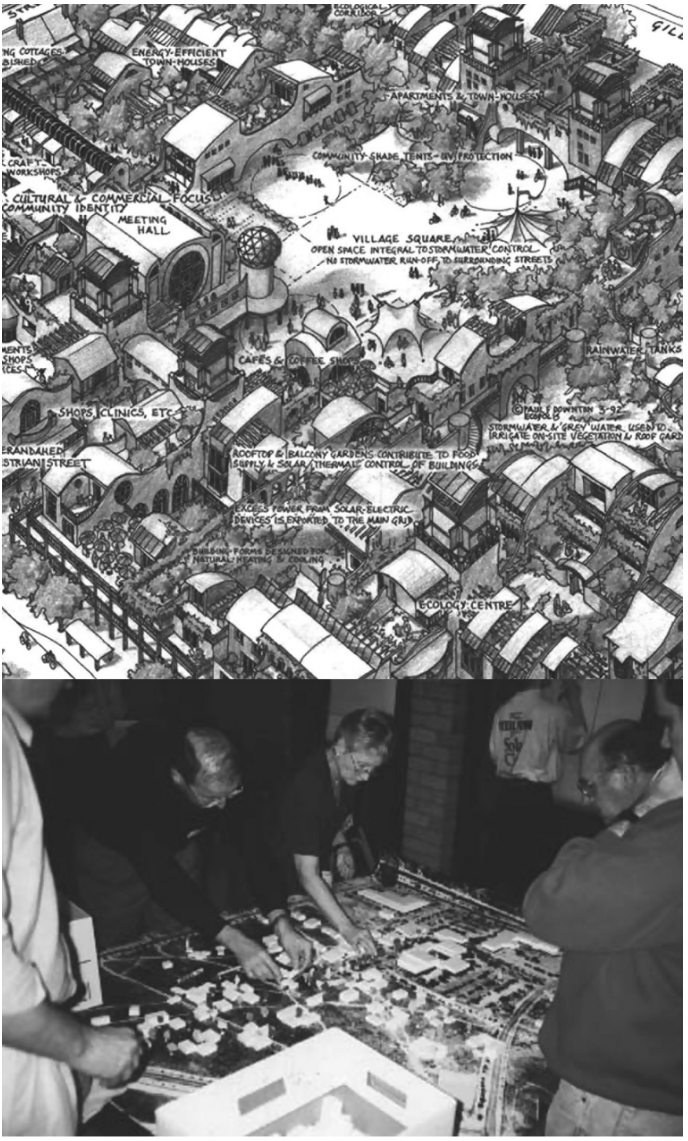

Figure 14: Halifax EcoCity Project perspective detail *(top)*; Whyalla EcoCity Development design workshop *(below)*

be engagement by the wider community in the making of essential, particularly public, spaces. This is not to say that such engagement is not possible, however, and the history of Soleri's Arcosanti strongly suggests that there is a deep organic sensibility at work which is at least partly manifest in a community ethos.

Lucien Kroll is an acute observer of the aesthetic tension that derives from the mechanical and the impositional approach to designing public space.

> An unconscious intellectual dishonesty prompts the design professions and their clients alike to pose militaristic spaces as models and to decide tacitly that no others exist. Yet it is shocking to witness faith in an (albeit prettified) geometric order. It is worrisome to note the overriding conviction that a public space can never be conceived by the public and grow out of its own disorder. It is painful to realize that contemporary public life no longer has the right or even the opportunity to project its own organic image. Rather, it must adapt to historical travesties, private geometries, and mathematical games. By denying the apparent disorder of certain collective actions that mold the landscape and are essential to its final form, the militaristic approach rejects in a heartbreakingly obtuse way the importance of collective action and participation in the birth of urban form. It also denies centuries of slowly evolving collective forms and condemns the power that today's residents could exercise on the urban fabric and its slow colonization by familiarity. And all of this is done for the benefit of a rather exotic intellectualism and a protective artificiality, based on a game of personal power over urban space. It is absurd and nasty
>
> (Kroll 1987 p.331)

The aesthetic message of what Kroll calls 'hard geometries' carries the charge of political meaning – exemplified in Hausmann's imposition of insistent axes and linearity on the fabric of medieval Paris (Watkin 1996 p.388).[2] Few organic street layouts exist in America (Moudon and Untermann 1987 p.132) or Australia because there has not been a history of incremental urban planning. Instead, there has been the wholesale imposition of gridiron patterns on landscapes that had no prior history of urbanisation. In discussing the merits, and otherwise, of gridiron street patterns Moudon and Untermann point out that street patterns represent *a principle of development* and that the gridiron 'follows a logic that synthesizes the demands of an orthogonal geometry with ideals of lot and street size' (Moudon and Untermann 1987 p.132). The logic of *organic* street networks is to do with following a purpose rather than imposing one.

> Thus, while the organic street network is a tribute to the history of urban development, the gridiron defines (at least in part) that history. In other words, organic streets have always had a purpose and responded to a need, while grid streets have defined an intent
>
> (Moudon and Untermann 1987 p.132)

Ecocity intents are about responding to need and thus the organic approach is to be preferred, but at the same time there is a need to set a framework within which that responsiveness can begin to take place – this was the intent of the Whyalla design methodology. 'Taking place' is what it is all about.

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[2] Which were justified in technocratic terms by the promise of 'progress' with modern, healthier infrastructure and the elimination of impediments to trade.

Real cities are, in a word, messy. Register's images of ecocities carry some of that messiness, and consequently do not hold much appeal for most planners. I am inclined to believe that a similar disaffection is held amongst the planning community, at least locally, for the images produced of the Halifax EcoCity Project. This suspicion was partly borne out by the Adelaide City Council's professional urban design staff encouragement of the Halifax site's selected developer to adopt straight, uncomplicated road layouts and minimise irregularities in their final proposal – reducing consideration of the potentially interactive arena of the street to preoccupation with having straight, high kerbs to assist with street cleaning.[3]

Successful examples of designed, rather than historically accreted, picturesque environments do exist, but are also typically regarded with suspicion by most architects and other design professionals. Broadbent catalogs some examples in his chapter on Neo-Empiricists (Broadbent 1990). The following examples have held particular appeal for me as rich, organic urban forms that might be appropriate to an ecopolitan urban environment.

Williams-Ellis

Portmeirion

Portmeirion, designed and developed by Clough Williams-Ellis between 1925 and 1978 is a fantasy village near Portmadoc in North Wales made up of a number of historical buildings rebuilt in whole or in part, combined with frankly sham facades and a slightly humorous approach to design which, Williams-Ellis recorded, was greatly enjoyed by modernist puritans of the British architectural establishment even as they proceeded to foist their abstract architecture and prefabricated systems on others (Broadbent 1990 p.214–217). The village operates as a kind of hotel and provides an up-market holiday destination. In the 1960s it was the set for the cult TV series 'The Prisoner' which exploited the surreal aesthetics of the village to great effect with its stagey but cosy familiarity. Williams-Ellis was a conservationist who helped the development of early planning controls and in the 1920s wrote a critique of the newly spreading suburbia called 'England and the Octopus', to which Lewis Mumford wrote the introduction.

One wonders how it is that investment in designing for delight in holiday environments seems to be acceptable, whilst it is generally ruled out in building for ordinary life. In holiday environments people rejoice in the absence of motor vehicles and those environments that demonstrate this, like Portmeirion, attract enormous interest and visitor numbers. As with Alexander's 'quality without a name' there seems to be proof positive of a public predilection for pedestrian places, but normal development practice eschews them. Likewise with the visual vibrancy and delight of such places, represented in Australia to some extent by vacation destinations like

[3] Personal communication with John Culshaw, Halifax site developer.

Noosa. One wonders if the propensity for the picturesque might not be a universal characteristic of ecocity advocates. In the grounds of Ted Trainer's house at Pig's Point near Sydney, can be found a fantasy of garden-making and fanciful incidental sculpture that seems to stand in contrast to his analysis of society and advice to 'abandon affluence'.

Gaudi

Catalan Gothic

That the colourful, irregular and sometimes willful aesthetic of the picturesque has popular appeal would seem undeniable, indeed, this appeal would seem to be part of what attracts criticism to it from the architectural establishment. It is closely related to the organic and to the Arts and Crafts movements in architectural design, and both are routinely criticised for their lack of modernist rationalism. Influenced by Ruskin, Wagner and the regionalist theories of Viollet-le-Duc, the Catalan, Antoni Gaudi came as close as anyone to deriving a synthesis from the antithesis, latent in the Arts and Crafts movement, between '. . .the desire to revive indigenous architecture and the compulsion to create totally new forms of expression.' (Frampton 1996 p.64) There is also little doubt that the popular aesthetic appeal of Gaudi's work is in what are clearly picturesque qualities of changefulness, visual richness, avoidance of monotony and a certain capriciousness in its execution.[4] He kept closely to the teachings of Viollet-le-Duc, who warned against the uncritical adoption of old models, and used the inspiration of the past to inform his own brand of creativity[5] (Zerbst 1991 p. 9).

Hundertwasser

The Straight Line Is Godless, a Tool of the Devil[6]

> . . .a city full of Hundertwassers would be a catastrophe. What I suggest is not Hundertwasser architecture, but a variety; in the sense of organic architecture
>
> (Hundertwasser in Verzijl 1998 p.9)

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[4] John Ruskin introduced the terminology of 'changefulness' as part of his analysis of Gothic architecture in which he saw a rationalism such that 'Whenever it finds occasion for change in its form or purpose, it submits to it without the slightest sense of loss either to its unity or majesty.' (quoted in Davey, 1995 p.19)

[5] A creativity which was not appreciated by his teachers at the Faculty of Architecture in the university where he began his studies in Barcelona in 1869 and where he received low grades for his exquisitely rendered but unconventional designs.

[6] Hundertwasser in Verzijl 1998 p.8.

Another, similarly exotic and individual aesthetic which has proven popular appeal is that of Hundertwasser. The Hundertwasser House in Vienna, constructed by the city council as social housing, has become a major tourist attraction (Hundertwasser 1996). This building comes closest in its visual actuality to the sketches of roofgarden covered cityscapes of Register and it is frequently referred to in the ecocity milieu as a positive example of what at least part of an ecocity might look like. Despite his international reputation and significant body of work, Hundertwasser is still regarded with suspicion by the architectural establishment around the world and he warrants no reference in Frampton's critical history of modern architecture.[7]

Alberts

European Organic

Whereas in Vienna a building designed to provide housing has become a tourists attraction because of the appeal of its architecture, in Amsterdam, a building designed to provide energy-efficient offices for banking became so popular because of its architecture that it became a venue to be hired out for wedding receptions! This building was designed by Ton Alberts working in the European organic tradition and employing a strongly participatory design process. It has become an icon of the green building movement and is often cited as an example of the kind of architectural approach that might be appropriate in the design of ecocities. Again, it employs irregular form and incorporates evocative natural elements of vegetation, water (some running down flowform sculptures in the handrails) and shifting patterns of sunlight to make a human building.

Lynch

The Image of the City

Kevin Lynch, whose perceptive analyses gave us a city typology now routinely used in one form or another in discussion of city form and sustainability, is also 'One of the first coherent analysers of the urban scene in Empirical terms. . .' (Broadbent 1990 p.225). Lynch's analysis of 'the image of the city' identified key components in its legibility, namely: Paths, Edges, Districts, Nodes and Landmarks. Lynch's propositions regarding these elements have been influential, including amongst new urbanism advocates, and have been important aspects of design guideline publications like 'Responsive Environments' (Bentley et al. 1985). His city typology informed

[7] One of the standard texts on architectural history written by one of the more open-minded and progressive architectural academics.

the workshop process used in the very successful Whyalla EcoCity Development UEA Urban Design Workshops (see Chapter 7).

According to Lynch, 'An analysis of the mental images that people hold of their life space and life time is the key to understanding the sense of place.' (Lynch 1981 p.28). In considering 'managing the sense of a region' Lynch offered a series of examples of how 'an agency' (which might, one supposes, be a bioregional agency) might develop the sense of place and time. He included: the ability of children to explore their territory, or of the elderly or the handicapped to traverse the region; the perceived safety of being alone at any hour in various areas; the physical definition of social territory, and the preferred nature of the transitions between the public domain and group territory: the degree to which an area should contain visual reminders of its past use and form, and even the degree to which most people should be able to describe the spatial form of the region. (Lynch 1981 p.28–29)

5.3 Appearances *Do* Count

Hideous Mountains

If beauty is in the eye of the beholder, it may be difficult to arrive at consensus on what beauty is. Huntley quotes Sir Francis Younghusband, musing on the beauty of Kashmir scenery 'It is only a century ago that mountains were looked upon as hideous.' (Huntley 1970 p.89) Notwithstanding the inherent cultural specificity of such a criterion (In his 'Wilderness-Based Checklist' Wells rates Manhattan on the ugly side of the scale when many people see it as beautiful and western culture now sees wilderness as beautiful but used to see it as a chaos to be removed and improved[8]) it is one that reminds us of one of the primary purposes of architecture and design in human settlement which is to make places that please the human spirit, sensibility and aesthetic sense. Disagreement about what exactly constitutes beauty does not diminish the value of pursuing it and diversity of expression and response is part of the dialogue of culture.

A House is Not a Machine

In trying to establish a relationship between organic metaphor and built form it is important to understand that it is more to do with a philosophic conceptualisation of the building function rather than its aesthetic. If architectural journalism is any measure, the idea of house-as-organism does not prevent it from being a willful, sculptural assemblage of steel and glass. In reviewing a house designed by German architect Thomas Spiegelhalter Frei claimed that the house was 'as close to being a

[8] Robert Hughes illustrated this well in his history of American art.

living organism as contemporary technology can provide' (Frei 1996 p.66) whereas a less architecturally inculcated observer might have understood the house quite well as 'a machine for living'.

This is why an argument about aesthetics must be enjoyed in respect of ecology and design. The Ecopolis proposition supports the idea that the appearance of difference from conventional fashion in form is an important part of demonstrating ecology in design. Ideas regarding the aesthetics of ecological design are not generally well expressed except perhaps in the negative. According to Malcolm Wells

> If we ever needed great designers it is now. The environmental architecture of America is almost without exception depressingly ugly. Many people on first sight rightly decide they want no part of it
>
> (Wells 1982 p.47)

More recent criticism comes from James Wines, whose New York City based architectural firm SITE is particularly known for its iconoclastic 1970s designs for Best company showrooms – which features include peeling walls, instant ruins, waterfalls under glass and trees marching through a building.

> My take on esthetics is that if it isn't interesting, nobody's going to keep the building around anyway. So what's the point of the sustainable movement?

Wines was interviewed about his forthcoming book about the environmental design movement to be called Architecture in the Age of Ecology, later published as 'Green Architecture'[9]. In an interview, Wines is reported to have claimed that

> The point of the book is to get the green movement off this finger-wagging, to get away from that reprimanding tone... I'm challenging those awful buildings done by most of the 'greenies'. It's bad, uninteresting design... While there's brilliant work being done today that qualifies as sustainable, most architects' choices of visual interpretation are still locked into time-warped, 20th century stylistic idioms, which tend to confuse rather than reinforce progressive images of earth-friendly architecture.

Both Wells and Wines are concerned to see public acceptance of environmental building, with a desire for aesthetic delight that provides what one might interpret as a call for an authentic expression for ecological development.

Nature Is Good for Us

Connection with the surrounding environment via an ecologically sensitive and responsive built environment can connect people with changes in light, with the seasons and the living and social environment generally, providing visual amenity and promoting well-being.

This idea that connection with nature is good for us or may be good for us, is also recorded in the work of ecologists, e.g. '...nature in the urban landscape

[9] The Wines quotes are from a publisher's promotional email circa 1999.

is still an underrated resource whose esthetic and educational values have yet to be understood.' (Gill and Bonnett 1973 p.x) thus '. . .the retention of natural landscapes within the city, together with their use for educational purposes, may enable many people who have lost their 'rural roots' to enjoy and feel in harmony with nature. . .' and reach some kind of understanding about how features and processes of the ecosystem provide constraints on population (Gill and Bonnett 1973 p.ix).

> Returning to traditional and regional design principles does not have to mean a lack of imagination, as is often maintained. Simple and well-integrated architecture generally possesses greater dignity than fashionable originality
>
> (Kennedy and Kennedy 1997 p.199)

The argument may also be seen this way. Nature abhors straight lines (nowadays we might say she does things in fractals instead). Nature also abhors exact repetition. Nothing is ever the same twice. Symmetry abounds in nature, but even in symmetry things are not identical. In the symmetry of a face, or a leaf, both sides are similar, but different; developed according to the same pattern, but with individual realisation.

If architecture reflected this natural order then it might begin to possess the same kind of depth of difference that is in nature. If simple rules and patterns can be realised with individuality the result will be organic and more likely to be aesthetically satisfying than perfect machine repetition. In many ways craft pieces have exhibited this characteristic and accompanying appeal to our senses since humans became makers of artifice. Hand-made items are never identical in the way that machine produced objects are.

Historically, even the best architects and designers have resorted to simple repetition when confronted with the task of creating a lot of housing or multiple office accommodation. Often, the authoritarian impulse begins to take over, as with Mies Van Der Rohe and his insistence that the blinds on the Seagram office tower could only be open, shut or precisely half-closed! Central authority prefers such certainty and it makes maintenance easier if everything is the same. But as soon as people are able they try to break the tyranny of such monocular vision.

In the Ecopolis proposition for participation in design no two dwellings are ever the same because each one is finally designed in association with its intended occupants. This proposition is based on the same fundamental position of respect for innate human-ness and the value of ordinary life.

5.4 Biophilia

> Life of any kind is infinitely more interesting than almost any conceivable variety of inanimate matter
>
> (Wilson 1984 p.84)

Divine Proportions

There are evocative patterns in nature which generate aesthetic and emotional responses in the human observer. The meaning of these responses is open to dispute and is almost certainly culturally dependent. One of the earliest examples of using mathematics to systematically generate ideal aesthetic proportions (and thus associated positive emotional responses) is that of the Golden Section in ancient Greece[10]. The association between nature's many beautiful patterns and forms, and godliness is at least as old. Another name for the Golden Section was the Divine Proportion.

The relationship of natural forms and proportions to beauty has been explored and explained in many ways since antiquity, see for instance, the architecture of Greek temples and the works by Pythagoras about the Divine Proportion (Huntley 1970) and later in a scientific manner by Thompson (1961). With the advent of biophilia as a testable hypothesis about human aesthetic and environmental preferences, the argument for beauty may be intertwined with the more overtly functional ideas of designing with nature. Nature can generate beautiful patterns with or without the agency of living processes (Ball 1999). Beautiful design can emerge in the living world without the benefit of human intervention or intentionality (Turner 2007). Our ideas about what is beautiful are bound by culture and experience ('the hideous mountains'). Humans have searched for evidence of some laws or patterns governing correspondence between the beauty of nature and human perception for millennia. When that search is extended to try and find some absolute correspondence then notions of divinity are rarely far behind.

Geometry might be regarded as a structured way of seeing the earth. Geometry, literally 'earth measuring', was once a way of comprehending the dimensions of the earth and linking those dimensions to the scale of the human being, and human constructions. Although it may now only be imperfectly understood, the tradition of sacred geometry has carried through cultures and centuries as a means of fixing the size and shape of structures of central importance such as cathedrals (Lund 1921). Competing theories exist regarding methods, means and meaning, but convincing analyses show complex, organic sacred structures being developed from fundamentally simple rule and compass geometry (Dudley 1995, 2000). Mathematically derived harmony and proportion have been preoccupations of the shapers of space since at least the time of Pythagoras, with even the geometric relationships inherent in particular rectangles being regarded as divine. (Huntley 1970). Le Corbusier attempted to relate the rectangular golden section to an architecture founded in industrialism and accordingly offered the world his modulor system of measurement in the early 20th century. Thus the relationship of aesthetics to one or another idea of human comfort, whether or not it be sublime, has been acknowledged and treated with guidelines, commentaries, codes or prescriptions for millennia. In recent years,

[10] A fascinating topic that the reader is encouraged to enjoy exploring.

the potential for scientifically codifying that relationship has been explored through the work of biophiliacs.

> The first publication to specifically explore, 'the need for nature' premise was E.O. Wilson's, 'Biophilia.'. He proposed that this human behavioural trait was in fact a hereditary response, a phenomenon now known as 'biophilia.'[11]

Wilson described 'the human bond with other species' and defined it as 'biophilia'. If we have 'the innate tendency to focus on life and lifelike processes' (Wilson 1984 p.1) then it may be inevitable that we view cities as, at the very least, simulacrums of life. We understand the world as a living place. The idea of biophilia has resulted in the development of a number of research programs in recent years which suggest that a scientifically verifiable relationship exists between humans and nature that is mediated by aesthetic experience and has physical and psychological impacts. This is of particular interest to designers of the built environment and opens the possibility of proving that urban environments need to be integrated with nature for reasons of psychological health as well as environmental fit.

> Over thousands of generations the mind evolved within a ripening culture, creating itself out of symbols and tools, and genetic advantage accrued from planned modifications of the environment. The unique operations of the brain are the result of natural selection operating through the filter of culture. They have suspended us between the two antipodal ideas of nature and machine, forest and city, the natural and artifactual, relentlessly seeking, in the words of the geographer Yi-Fu Tuan, an equilibrium not of this world
>
> (Wilson 1984 p.12)

The idea of ecological cities may be the most complete attempt to find that equilibrium in this world.

The natural environment shapes human physiology and consciousness and the natural environment is affected by human activity. Human activity applies an organising principle (mental world consciousness) to its actions, which shapes society and which shapes activity in the physical world that changes that environment. The altered environment is built to the extent that it changes from its natural state. The built environment, in turn, shapes human physiology and consciousness. There is an intimate relationship between the form-giver and the forms. From A Conversation with Janine Benyus:

> Biomimicry (from bios, meaning life, and mimesis, meaning to imitate) is a new science that studies nature's best ideas and then imitates these designs and processes to solve human problems. Studying a leaf to invent a better solar cell is an example. I think of it as 'innovation inspired by nature.' The core idea is that nature, imaginative by necessity, has already solved many of the problems we are grappling with. Animals, plants, and microbes are the consummate engineers. They have found what works, what is appropriate, and most important, what lasts here on Earth. This is the real news of biomimicry: After 3.8 billion years of research and development, failures are fossils, and what surrounds us is the secret to survival.

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[11] Elise Maynard in an unpublished honours research work-in-progress, University of South Australia 2001.

> Like the viceroy butterfly imitating the monarch, we humans are imitating the best and brightest organisms in our habitat. We are learning, for instance, how to harness energy like a leaf, grow food like a prairie, build ceramics like an abalone, self-medicate like a chimp, compute like a cell, and run a business like a hickory forest.
>
> The conscious emulation of life's genius is a survival strategy for the human race, a path to a sustainable future. The more our world looks and functions like the natural world, the more likely we are to endure on this home that is ours, but not ours alone. http://www.biomimicryguild.com/janineinterview.html (accessed 9 December 07)

D'Arcy Thompson was probably first to show with scientific rigour that there was an inherent relationship between natural processes and form. He demonstrated that the additive Fibonacci series (1,1,2,3,5,8, etc) was a natural consequence of growth and led to such characteristic natural features as branching and spirals. Much of the current work on patterns (e.g. Ball 1999) derives from Thompson's earlier work. In recent years the rediscovery of nature's engineering achievements have inspired researchers to develop techniques of 'biomimicry' (Benyus 1997). This has yet to impact greatly on architecture or urban design, although there are signs of things to come with proposals to make giant arches, bridges and walls from artificial bone (Sample 2000 p.7). One of the most ambitious attempts to employ the lessons of biomimicry is that of Project TERMES where they are 'exploring how termites can serve as models for adaptive construction in harsh environments (like Mars)'[12]. Project TERMES takes the insights of Turner as the basis for investigating the detailed architecture of the termite mounds that inspired his musings on the nature of the extended organism. 'These mounds have no obvious ventilation system and are different from the tall open chimney type mounds which are often cited as architectural inspiration for passive ventilated structures, and yet, they somehow exhibit the same levels of homeostatic regulation which you expect to find in living organisms.' Inspired by Turner's work and insights, as conscious organism we can not only invent (chimps can turn inanimate objects into tools too) and borrow (cuckoos directly 'borrow' the work of others), but also learn through processes of observation and investigation that are, almost by definition, unavailable to organisms without consciousness. Thus we learn from the world around us and, interestingly, a team of researchers[13] inspired by the author of 'The Extended Organism' are trying to learn from the termites of South Africa exactly how they build their remarkable mounds so that the knowledge can be applied to making human structures. Describing the termites as 'like aliens on our own planet' and making the observation that 'No other organism on the earth is known to engineer the environment to this level', the research team see the potential for building structures able to self-regulate internal conditions in harsh environments not only on Earth, but on Mars.

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[12] (http://www.esf.edu/EFB/turner/termite/construction.htm, accessed 29 Dec 07)

[13] 'Project TERMES (Termite Emulation of Regulatory Mound Environments by Simulation) is a truly adventurous and far reaching project. Using new, cutting-edge technologies we are copying the complex internal structure of these mounds, so that we can build our own homes in the same way.' (http://www.sandkings.co.uk/index.html, accessed 29 December 2007)

5.5 Cultural Filters

> You hear what you want to hear, and you see what you want to see
>
> (The Rock Man in 'The Point' by Harry Nilsson 1971)

The Doors of Perception

The natural world bombards us with stimuli and information. In order to make sense of sensory overload we have evolved brains that filter all that stimulation so that we only receive sufficient information to sensibly perceive and respond to the world. The filters provided by evolution leave us with sufficient knowledge of the electromagnetic flux of the universe to live in it and not be overwhelmed. These doors of perception can be opened more widely by means of trauma, mental training or the use of psychotropic drugs. When this happens, the shift from trickle to flood of information about the world can drown the senses and render the experience of life incoherent.

Since the advent of consciousness, we have continually supplemented the sensational nature of existence with our makings of society and culture. With this additional creation we have discovered a need for further controls. The natural organism needs unconscious filters to make life bearable and coherent; the social organism that evolves culture requires filters that are consciously constructed to maintain coherence. Much of this is done by creating and maintaining mental structures which regulate behaviour[14]. Those mental structures are reflected in built form – higher status takes the higher ground.

Aesthetics Is Information

For Hundertwasser the straight line is a tool of the devil and Wines insists that ecological design be interesting, whilst the hideous mountains make it clear that what constitutes good and bad aesthetics is a product of social conditioning, or is at least strongly conditioned by cultural context. In every case, aesthetic expression is a form of communication and conveys information. The reading of the information will vary according to time and place and not least, the reader. A few years ago, building designs that included a lot of vegetation were rare and regarded by the architectural fashion police as inferior to buildings with clean, uncluttered surfaces, but in recent years (since circa 2005) the world's most fashionable architects have been draping green skins across their creations, covering their mineral shells in living vegetation. Now that élite clients have let it be known that they want to be seen to be environmentally friendly, their professional designers have been anxious

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[14] Typically by reducing the number of available behavioural options, e.g. 'thou shalt not kill', 'obey the king'.

to ensure that their designs send appropriate messages, that they communicate the information that the client is 'green'.

This shift in aesthetic preference may be taking place for a number of reasons. As well as creating strong symbolic statements, green roofs and walls can provide clients with significant economic and functional benefits (see Section 8.5). As a fashion statement, it helps to precipitate the kind of systemic cultural change that is needed to create an ecological culture.

As we have seen in Chapter 2, the debate about aesthetics of ecological design has been a mostly tepid affair based on poorly articulated premises. The underlying precept has been that 'sustainability mustn't stop/get in the way of good design' and this has been characterised as a polar opposite to the view that 'it doesn't matter what it looks like as long as it works'. Leaving aside the question of whether failure to achieve sustainable outcomes can be called good design in any meaningful sense, there is a link between working and looking good. Our aesthetic sensibilities are tuned to biophilial perceptions that have been measured to some extent – proving, for instance, that we heal quicker in environments that offer views of vegetation and water.

Biophilia is a condition determined by evolution, embedded somehow in our genetic make-up. It would appear to determine certain deeper aesthetic preferences[15]. But the aesthetic preferences of our conscious selves are strongly determined by cultural frameworks to perception, operating with extensive filters that can have enormous effects – causing us to see same mountains as both beautiful and hideous. All if this reminds us that we need to be looking at the deeper cultural level if we are to create ecological cities that are beautiful rather than hideous, and that if the aesthetic judgment is to mean anything other than a measure of fashionability, it must relate to the expression of factors in real science and an evolving understanding of nature. In which case the fashionable architects have at least got it partly right.

In considering the aesthetics of an Ecopolis then, it would be better to jettison concern with style in the conventional sense (should we do neo-classical or modern) and to concentrate on the quality and type of information its various designed elements should present to its inhabitants and visitors.

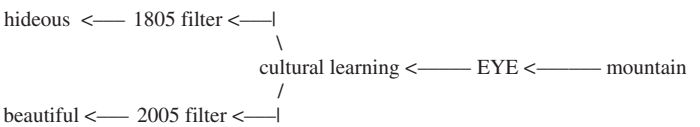

Figure 15: Cultural Filters

[15] Which may be a factor in the theories of Alexander which seem to be so aesthetically predicated.

Chapter 6
Finding Fractals: Identifying Elements of the Ecocity

An ecocity is an ecologically healthy city. No such city exists. There are bits and pieces of the ecocity scattered about in present-day cities and sprinkled through history, but the concept – and hopefully, the reality – is just beginning to germinate

(Register 1987 p.3)

As a response to the 1992 Earth Summit and Local Agenda 21 a number of cities now have environment plans of one kind or another (Quarrie 1992). None of them fully integrate biological and human built environments. None of them are ecocities, although they may possess some ecocity features. This chapter briefly describes some places which display ecological/sustainable characteristics and that have expressed ecocity pretensions. It includes some places that are not routinely presented in urban sustainability literature (the Los Angeles EcoVillage), it includes places that are not yet built but which were committed to construction in 2008 (Masdar and Dongtan), it includes some work in progress (Arcosanti) and it does not include some projects that are well documented case studies in other publications (BedZED). Many of the most thoroughly ecological places, in the terms favoured by this book, are in Europe.

6.1 Agenda 21, Environment Plans and Sustainability

Local Agenda 21

Principle 10 of the Rio Declaration on Environment and Development (Agenda 21) states that 'Environmental issues are best handled with the participation of all concerned citizens…' (UNCED 1992 p.11). As the whole purpose of the Rio Earth Summit was to make explicit the links between development and environmental impacts – as did its follow up, the 1996 City Summit in Istanbul, with its focus on urban environments – this principle has potentially enormous implications for planning and other decision making bodies. Principle 10 of Agenda 21, on which planning strategies at the local level (Local Agenda 21 or Local Environment Plans) are based, concludes:

P.F. Downton, *Ecopolis*, DOI 10.1007/978-1-4020-8496-6_7,

> States shall facilitate and encourage public participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided
>
> (UNCED 1992 p.11)

Many approaches to ecological development being adopted or promulgated by local governments and agencies through Local Agenda 21 and similar programs possess goals congruent with the ecocity idea, although these goals are rarely stated in terms that presuppose radical action or major change in the status quo.

Australia has lagged behind other OECD countries in adopting measures to ensure the most basic of environmental performance in buildings and infrastructure provision. There were no requirements for house insulation in the National Building Code until 2006, something that has been a feature of European, Canadian and American codes for decades. Although there is a minimum flow rate demanded of domestic water supply there is no upper limit. It is remarkable that there are no statutory requirements for water quality in Australia, only recommendations, and that according to some writers the e. coli levels tolerated have greatly exceeded those permissible in the old Soviet Union (Archer 1991).

In England, Local Agenda 21 has been manifest in 'Environment City' initiatives in which the general pattern was that rather than setting the agenda for other council policies and actions, which was the real intent of LA 21, local governments adopted environment programs as additional subsets within their existing frameworks. I am not aware of any instance where environmental initiatives have progressed to the point where they become the cohering force for local government policy, so there is little or no evidence of LA 21 or similar programs being used to integrate city functions in an ecological framework. The status quo departmental divisions remain unchanged.

Nevertheless, many sustainable city programs comply in essence with Local Agenda 21, even in the USA, where suspicion of anything to do with the United Nations limits enthusiasm for its overt adoption (Sustainable Communities Task Force 2000).[1]

UEA has actively contributed to the LA 21 process in Adelaide as a formal organisation and its members have done so in other cities but Doyle cautions that the 'key gospel' of Local Agenda 21 – sustainable development – tells us that, through increased efficiency and effectiveness in production, biophysical limits can be surpassed (Doyle 1998 p.774). Lovins et al. tell us that we can double wealth by halving resource use (Lovins, Lovins and von Weizäcker 1997). Doyle goes on to describe the kind of cultural imperialism which sustainable development presupposes and promotes in order to advance the cause of creating more and better consumers (Doyle 1998 p.782). In short, it is possible to see sustainable city and

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[1] Case studies listed by the President's Council on Sustainable Development Sustainable Communities task Force report include Brownsville, Texas; Chattanooga, Tennessee; Cleveland, Ohio; Denver, Colorado; New Bedford, Massachusetts; Northampton County/Cape Charles, Virginia; Pattonsburg, Missouri; Piney River, Virginia; Sarasota, Florida; Seattle, Washington.

LA 21 programs as self-deluding at best, cynical at worst, and ultimately of little or no use for achieving ecological functionality in major urban areas.[2]

Sustainability Indicators

Indicators are a way of measuring whether a city is moving towards a better ecological performance. They are measuring sticks – criteria against which the effectiveness of actions, processes, policies, etc, can be assessed, and are necessary components in the making of ecocities. The nature of what makes an effective indicator is debatable. The identification of appropriate sustainability indicators is a major area of endeavour internationally. They are rarely objectively measured with agreed units but are developed on the basis of shared perceptions – typically achieved via a community participation process. An example of the best kind of work being done on sustainability indicators is that by the World Conservation Union IUCN International Assessment Team published in its Tools and Training Series, especially 'An Approach to Assessing Progress Toward Sustainability' (IUCN International Assessment Team 1997).

In the USA, Jacksonville Community Council Inc. (JCCI) provided an example of some of the better work being done by local government. JCCI convened a diverse group of residents from all sectors of Jacksonville 'to define progress and to develop a model to measure, monitor, and improve the quality of life for both current and future generations'. The model consisted of nine parts: education, the economy, public safety, health, the natural environment, the social environment, government/politics, recreation/culture, and mobility. The indicators were linked to public participation and information processes. With seventy-five indicators tracked each year the JCCI report that this process had empowered citizens on 'the journey to sustainable development'.

Such projects have the potential to advance the ecocity idea because they affect social interaction and engage citizens in the management of the urban ecosystem. They are engaging for the community because they are about measuring the quality of life. Such programs intrinsically raise the issue of what constitutes citizenship and the role of the individual in the procurement, operation and disposal processes in the lifecycle of the built environment.

My exploration of indicators is discussed and presented in later chapters, particularly Chapter 11 'The Seven Steps' in which the indicators are woven into a matrix for an Ecopolis methodology.

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[2] Doyle's critique of official 'sustainability' draws attention to the inevitable tension in the idea that poor people can 'help themselves' to improve their lives and their environment when the rhetoric of self-help and individual freedom has been captured by capitalist globalism intent on minimising wages and ignoring economic externalities. Part of the promise (or packaging) of sustainable development is the chimera of democracy and it behoves us to remember that Hitler came to power through the ballot box, that there is nothing intrinsically 'free' about democratic systems without a concomitant culture of freedom (Walden 1999 p.72).

6.2 New Urbanism and Sustainable Houses

> We must get away from the idea that sustainability is confined to eco-houses or eco-villages in the heart of the countryside
>
> (Rudlin and Dodd 1998 p.2)

To find out what it might be like to live ecologically in the city we have to resort to examples of single dwellings for demonstrations of fully featured environmental building performance – an American and Australian example are discussed below. To get some idea of what urban ecological communities might be like it is necessary to look to Europe, where small and medium scale developments have been undertaken with some cognisance that support of community life was a central requirement of city living. A good example is the 'Biological Building Estate' at Tübingen in Germany where 111 units of high environmental performance are fitted on a 13,000 sq.m. site providing private, semi-private and public open spaces and gardens for the tenants (Kennedy and Kennedy 1997).

> There are, across the world, precious few examples of urban developments that have been rethought from ecological principles. In America there have been a number of Pedestrian Pocket developments but. . . the built examples tend to be pale reflection of the concept as initially conceived
>
> (Rudlin and Dodd 1998 p.1)

The Pedestrian Pocket developments are New Urbanist speculative developments that appear to pay lip service to the core issues identified in The Charter of the New Urbanism. These 'pale reflections' of ecocity ideas are of passing interest in terms of their design and aesthetics and but do provide some evidence for a movement against sprawl.

Integral Urban or Sustainable?

The idea of ecohouses is not new, and apart from some improvements in technology little has changed between the time of the Farallones Institute 'Integral Urban House' established in Berkeley in October 1974 and Michael Mobbs' 'Sustainable House' in Sydney, the development application for which was submitted 21 years later, in October 1995 (Mobbs 1998 p.10). Both are inner-city conversions of an existing dwelling. The Integral Urban House was a low budget exercise, the Sustainable House was not.

The Sydney house was ostensibly the result of one individual's determination to demonstrate sustainability, it achieved mainstream recognition and was launched by the New South Wales state Premier; the Berkeley house was an outcome of work by a non-profit organisation which had as its president (then and now) Sim van der Ryn,

then California state architect under the governorship of Jerry Brown[3] and still a widely respected and radical ecological architect (see Chapter 4). Members of the board of the Farallones Institute included environmentalist and Friends of the Earth representative Stephanie Mills, and Peter Calthorpe now lauded for his 'Pedestrian Pocket' and 'TOD'[4] new urbanist developments. In short, the Integral House was a starting point and catalyst for future achievements whilst the Sustainable House is, in many ways, an end point. Other differences are significant. The Berkeley property was very much about integrated, holistic design in which the house and its grounds were seen as an ecosystem and its occupants integral to that system (Farallones Institute p.16–17) whereas the Sydney house is more of a 'machine for living' filled with product demonstrations.

This distinction is important because it suggests that there had really been no advance in thinking about dwelling in over 20 years. It is about the distinction between houses as organisms or machines, and it reminds us that there has to be a social agenda in any discourse about ecological settlement even at the level of the individual dwelling.[5] My concern regarding the concept of ecological cities is that we do not lose sight of the social agenda and human occupation of the built environment as an absolutely integral part of any definition. There is a need to be wary, in effect, of what Koskiaho calls the 'third approach' in which 'technologisation of the whole ecologisation' of city planning is achieved, or, as Van der Ryn put it nearly 17 years after the opening of the Integral House "A true 'sustainable community' or 'ecological city' is much more than a dense, efficient land-use pattern." (Van der Ryn 1992a p.68). It is also much more difficult to achieve. In correspondence, Register mentioned that the next step on from the integral house needed to be the integral neighbourhood and the 'integral whole city', but local politics centred around perceived (but unstated) social justice issues stymied that evolution.[6] With the ecocity projects attempted by UEA et al., there has been a determination to start with the community base, but the conventional realms of city politics and commercial interests have done little to aid its realisation – Christie Walk represents just fraction of a fractal and has been achieved without government support.

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[3] Founder of the non-profit 'We The People', Brown has had a long and varied political career which included being Mayor of Oakland, California from 1999 to 2007. In 1999–2000 Brown and his office of mayor in the City of Oakland, promoted 'Oakland Ecopolis' – '. . .where the promise of a green future holds forth the hope of transforming the crumbling gray concrete of its streets and highways and the deteriorating brown blocks of its downtown into a verdant garden mixing steel towers and tree-filled parks. Oakland Ecopolis calls from the future. . .' (Yanarella et al. 1999).

[4] 'Transit Oriented Development'.

[5] Sydney's Sustainable House was undertaken with moral scruples however. Sharing widespread disquiet about Boral's forestry policies, Mobbs included a clause in the builder's contract which specified that 'no timber should be purchased from, or supplied by, Boral Pty Limited.' (Mobbs 1998 p.145).

[6] From Register to Ede (5 September 2000) forwarded to me.

6.3 Ecocities and Green Urbanism in the U.S.A.

Arcosanti

Situated about 100 kilometres north of Phoenix, Arcosanti is a small piece of one of Soleri's arcologies. Still under construction since its commencement in 1970, Arcosanti provides a tantalising taste of the richness of Soleri's vision of architecture and ecology in a compact city synthesis – or it is proof of the folly of his grandiose ideas. Which you see depends upon your point of view, and over the years, I have shared both viewpoints.

The original design of Arcosanti was for a 50 metre high elaborately articulated building covering 2.8 hectares and accommodating 1,500 people. Its role was to create a community-school in the form of a city in microcosm to investigate and experiment with arcological concepts, working, learning, living and playing all under one roof at a density of about 530 people per hectare or 215 per acre (compare with Christie Walk's designed density of 400 people per hectare or 160 per acre). As a prototype for the much larger arcologies (the intended population of the Novanoah I arcology is 400,000) the design can be said to represent an urban fractal for that city type. The current master plan would see a large structure rising over Arcosanti's existing, rudimentary manifestation to house 5,000 people.

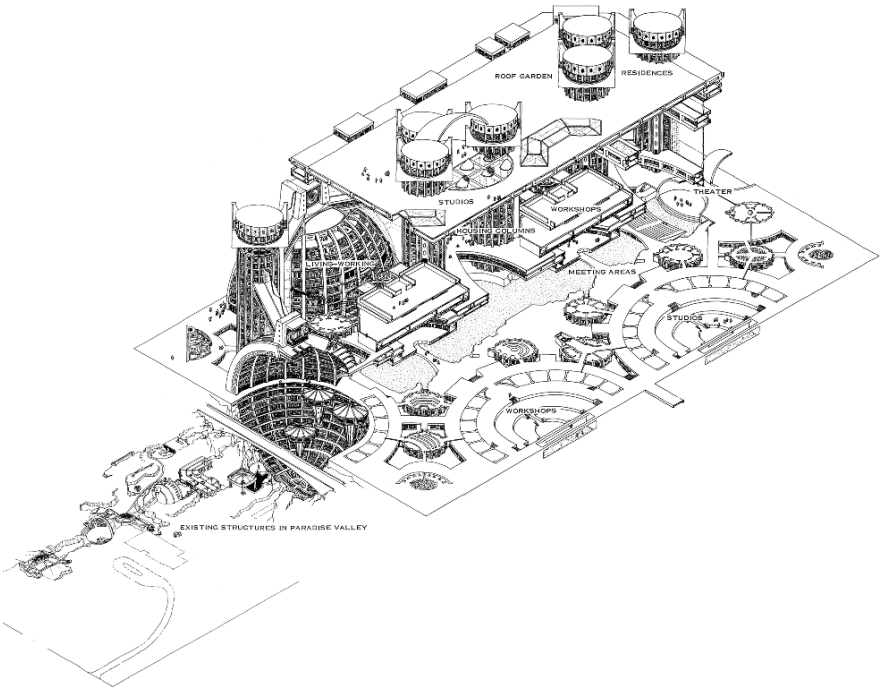

Figure 16: Arcosanti – the original proposition *(Soleri Archives)*

Fundamental to the concept is the intention to keep the built form within an area of no more than about 10 hectares (25 acres) as a custodial urban presence and human habitat in a preserved, natural landscape of some 1,643 hectares (4,060 acres). In this regard it is the antithesis of Wright's Broadacre City (and modern sprawl) and very similar to an ancient Italian hill town.

Arcosanti has suffered from a kind of arrested development with there never having been the funds or resources to create the full physical reality of the vision, although its power as a conceptual model and provocation has been extraordinary. As built to date, it offers only a partial urban fractal and works as a seeding device rather than a functional model: it does not clearly address the issues of infrastructure (it is a long drive from Phoenix and is only accessible by car and although plans exist there is little use of renewable energy), nor does it house a particularly dense population – currently less than 100.

The scale and ambition of Soleri's ideas no longer look so outrageous in an era that is seeing new islands and a half mile high skyscraper under construction in the UAE and the wholescale remodelling of parts of Beijing to accommodate the Olympic Games. It may well be that the arcology vision is too complex to be achieved through any sort of totalitarian process, and can only be put in place through active, human, passionate involvement with its making. That is what has been happening at Arcosanti and by being so much at the heart of its creation, that involvement has added a quality that has transformed the effect of Soleri's megastructural vision at the same time it has added to its transformative power. There appears to be gritty, human detail in Soleri's earliest representations of arcologies. If Arcosanti were to be somehow made to physically come into being by becoming a corporate project along the lines of modern mega-malls, it would fail. Without the messy lives of real people to impact on the details of the idea it *would* be totalitarian. The construction of Arcosanti thus far is the only evidence of what one might be like in the flesh. It is an important example for showing how arcologies might develop in detail and it is encouraging that it has been achieved to date with the patina of many fingerprints all over it, just like a real city.

Los Angeles EcoVillage

> There are as many possible cities as there are possible forms of human society, but Los Angeles emphatically suggests that there is no simple correlation between urban form and social form
>
> (Banham 1976, p. 237)

Los Angeles is the heart of the beast that is media America, capital city of the California Dreaming. In April 1992, when Lois Arkin was in Adelaide to speak at the EcoCity 2 conference[7] there were riots and fires burning in the street less than

[7] EcoCity 2 – The Second International Ecological City Conference, organised by Urban Ecology Australia Inc and the second in the series of conferences that started in Berkeley, California.

half a block from her home in downtown LA. Arkin is the unassuming guiding light and guardian angel of the Los Angeles Ecovillage. Although it began as a vision for building an inner-urban ecovillage on reclaimed land in the city, practical limitations on the development of that land prevented it from being built. Nevertheless, the idea proceeded to evolve as a pragmatic response to the failure of inner-urban LA to provide a healthy physical or community environment.

Although the LA Ecovillage is neither large nor physically impressive (there are few visible signs of its existence and the casual observer could be forgiven for missing it altogether) it is an important and influential project that demonstrates certain key aspects of ecocity theory in action.[8]

Healthy Beginnings

> Whatever man (sic) has done subsequently to the climate and environment of Southern California, it remains one of the ecological wonders of the habitable world. Given waters to pour on its light and otherwise desert soil, it can be made to produce a reasonable facsimile of Eden. . . . and it was this promise of an ecological miracle that was the area's first really saleable product – the 'land of perpetual spring'
>
> (Banham 1976, p.31)

It was to accommodate a health resort that buildings at the centre of the LA EcoVillage began their existence.

Building ecological communities takes time. Lois Arkin had been organising in Los Angeles and Southern California for over ten years before the LA Eco-Village began to look like a solid possibility – and then it was different in many ways from the original vision. Begun during the summer of 1983, the cooperative advocacy group Cooperative Resources and Service Project (CRSP) brought together a 20-person volunteer group to create a non-profit developer called the Los Angeles Municipal Housing Association. Comprised of activists in housing, urban ecology, economic and social change, the intention was to set up the conditions for ongoing creation of 'sustainable urban communities' (Arkin 1991 p.42–43). They had planned to develop an ecovillage five miles north-east of downtown Los Angeles on an 11 acre (4.6 hectare) landfill site that had been used for dumping street rubble from construction projects (Arkin 1996 p.189). At the time when those plans appeared to be developing well, in a statement of optimism reminiscent of the kind UEA was to issue during the 'Halifax' years, Arkin reported 'We are now well positioned to obtain the site and to enter into a partnership arrangement with the City of Los Angeles and the Department of Water and Power to develop Eco-Village.' (Arkin 1991 p.42). In 1996 Arkin was able to report that the Los Angeles Housing

[8] One of the organisations associated with the ecovillage initiative is the 'Eco-Home Network', a twenty five year old organization which 'sponsors a demonstration home and community resource center for ecological living in the city.' (Arkin 1996 p.189).

Department had approved 'a substantial low-interest loan to LA EcoVillage for the building acquisition' and that:

> This public partnership with LA EcoVillage puts the mega-city of Los Angeles squarely in the vanguard of the ecovillage movement!
>
> (Arkin 1996 p.30–31)

By the dawn of the new millennium, plans to try and obtain a site had been shelved and the EcoVillage group had shifted their attention to retrofitting and refurbishing existing buildings in their immediate community. They purchased an old courtyard building known as the 'White House' that had originally been one of the resort establishments when the area had enjoyed status and prosperity as a spa and health centre. In order to do this Arkin and the ecovillage group introduced a system of fund raising that offered loans on the basis of minimal interest rates – borrowers nominate their preferred rate and many choose to take loans out at little or no interest in order to assist the ecovillage project whilst maintaining their savings without the bank charges that eat away at small savings. The result is that many low-income people have been able to afford an investment in their local community which provides housing for those in similar demographic groups.[9] Inspired by this model for voluntarily setting interest rates, Hoyle introduced a similar scheme to Wirranendi as part of the borrowing regime for the Christie Walk project.

The strong sense of community that even a short term visitor experiences in the neighborhood of the LA Ecovillage (something I have experienced as a guest of Lois Arkin and the LA Ecovillage community on three occasions) has been developed through such experiences of collective self-help as well as by the establishment of what amounts to a local community centre in the 'White House'.

The Los Angeles experience is relevant to the work of UEA and its attempts to establish ecocity projects in South Australia and vice versa partly because of their bioregional similarity.

> The vegetation of the coastal region of Southern California, including that of the Los Angeles Basin, lies within a Mediterranean climate. This kind of climate occurs in only a few areas of the Earth, occupying approximately 1.7% of the Earth's surface area (Lenz and Dourley, 1981). Other areas with Mediterranean climates occur along the coast of central Chile, the Cape region of South Africa, south-western and south Australia, and, of course, in the Mediterranean region. Although they cover only a small area of the Earth, Mediterranean habitats are biologically diverse and support many rare species
>
> (Botkin and Beveridge 1997 p.7)

As of March 2008 the neighbourhood is fighting the Los Angeles Unified School District which is considering building a new school that that requires demolition of some local properties even though there are three new schools close by, all of which are reported to have empty seats. The LA EcoVillage is lobbying on the basis that

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[9] Arkin – personal communication.

'Neighborhoods should not have to choose between schools and housing' asking 'why condemn residences instead of parking lots?' (Lara Morrison 2008).[10]

It may be a very small place, but precisely because the LA EcoVillage is in the heart of one of the world's most extensive and ecologically dysfunctional urban sprawls it offers hope for the prospect of remaking the world's cities. As Gilman puts it 'A city could not be an eco-village, but a city *made up of eco-villages* could be a sustainable community.' (Gilman 1991 p.11). The LA EcoVillage is another partial fractal of Ecopolis, particularly pertinent in regard to its social relationships, ethnic diversity and emphasis on low income groups.

Village Homes

> The two-hundred-and-twenty fortunate families of the Village Homes development live in what most folks would call a park. Trees and gardens are everywhere, *redolent* with ripening edibles. All the homes are solar, with energy bills about half those of houses in conventional developments nearby. The small lots are augmented by the mutually owned community garden, expansive village green, swimming pool, and bike paths; these connect all the homes to one another and the nearby town of Davis, CA. Inhabitants pay monthly dues to a strong neighbourhood association that sets policy and sees to the maintenance. Crime is low and neighborliness is rampant. The place is quiet and it smells good. It's a nice place to live. Even teens like it
>
> (J. Baldwin in Rheingold, 1994, p.120)

Developed back in the mid-1970s, Village Homes in Davis, California is more suburban than urban, more New Urbanist than Ecopolitan, but it has been an unqualified success. In the mid-1990s Baldwin reported that 'This astonishingly attractive, environmentally wonderful community is so popular that homes change hands, unadvertised, for 20% more than others of similar class nearby. Visitors resist leaving. The developer made money. Yet after eighteen years of success, no new project like it has been attempted anywhere.' (J. Baldwin in Rheingold, 1994, p.120)

Michael Corbett wrote a lucid and well-illustrated book to explain the principles of the development and how it might be repeated. In 'A Better Place to Live: New Designs for Tomorrow's Communities' he acknowledges many parallels in his approach to that of Howard and his Garden Cities, and berates sprawl proposing:

> The pattern I think we should work toward is one of small, relatively moderate-density towns with enough distance between them to give lower density overall. Moderate density within the town would have the advantage of providing stimulating social contact and eliminating most of the need for automobiles. Low regional density would reduce air pollution, allow local agricultural production for each town's needs, permit easier waste management and recycling, and put the countryside within easy walking distance of every home. This is essential if we are going to live within the limits of renewable energy supplies, maintain a healthy environment and ensure sustainable food production
>
> (Corbett, p.32)

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[10] http://www.gopetition.com/petitions/la-eco-village (accessed 21 March 2008).

Corbett goes on to discuss appropriate population size for such townships, agreeing with Howard on a figure of about 30,000, and he analyses the density his pattern would generate. The photograph he includes adjacent to the above passage is of a terrace of houses in a small Cotswold village in England. My own early thoughts on what might constitute an appropriate or optimum balance between size and density for ecopolitan settlement range over similar territory often took me to the old town/village/hamlet/countryside pattern of the English West Country because it seemed that they might be somewhere near the optimum for much the same reasons that Corbett identifies above. For this reason, and to reinforce the proposition that the essential patterns of successful long-term human settlement are already proven by their existence, I made a preliminary analysis of West Country settlement patterns, comparing them with the sprawl of Adelaide's metropolitan area (see Appendix 3).

Village Homes is famous for not having been replicated, despite its success as a development even in financial terms. If replicability is a condition of ecological development, Village Homes succeeds, at least theoretically; if the fact of replication is a condition, then it is a failure. Corbett himself gave the following reasons for its non-replication:

> Most developers don't want to go through the headaches that they have to with local government officials who want preconceived, standard, accepted solutions,
> Lending institutions raise (unspecified) obstacles,
> Builders are discouraged when college-educated civil engineers, public works directors and planners find the concepts 'just too difficult for them to deal with'.
>
> (Zelov and Cousineau 1997 p.269)

The residential areas in the core site design for the Whyalla EcoCity Development were inspired by the Village Homes model. I prepared detailed dwelling designs and a sub-division design, all commissioned by the Whyalla City Council, but no development took place. The planner was totally supportive, the engineers Connell Wagner (my partners in the tender for the sub-division) found the concept difficult, but no developer showed an interest in the project.

Village Homes stands as an outstanding example of an approach to development that successfully has challenged conventional sprawl thinking and engendered community in measurable terms.

> The average person knows 42 people in their neighborhood, compared to 17 by those in outlying areas. Residents spend 3.5 hours a week with friends in the neighborhood, compared to a vicinity average of 0.9 hours/week. The average resident identifies 4.0 of their best friends living within the neighborhood, while the average is 0.4 for people living elsewhere in the vicinity.[11]

It also demonstrates the practical application of many ecological development precepts including orientation of blocks for solar passive housing; narrow, curving streets that evoke a village feel and help slow traffic; pedestrian and bike paths and common areas: infrastructure which integrates drainage into aesthetically attractive

[11] http://www.lgc.org/freepub/land_use/models/village_homes.html

constructed creeks, swales and ponds (which provided a cost saving alternative to conventional drainage for the developer) and an edible landscape. Its 225 houses, 20 apartments and community facilities (which include an office) share a richly landscaped productive site of which 40% is commonly owned open land. Almonds are harvested as a cash crop by the community.[12] Village Homes could be regarded as a partial – but well-resolved – fractal for that part of an Ecopolis which may need to be developed to a lower-than-urban density.

Ithaca EcoVillage

> Village residents have the opportunity to share common dinners several times per week in the two Common Houses, and volunteer about 2–3 hours per week on various work teams to keep things running smoothly: outdoor maintenance, finances, governance, future projects, and more. The evolving village culture includes plenty of neighborly support for families in need, various annual celebrations to mark the seasons, and plenty of ad hoc parties and music jams. We're finding that living more cooperatively requires a lot of learning and work, but is richly rewarding and well worth the effort. (Ecovillage at Ithaca website[13])

In New York State Joan Bokaer[14] and her cohorts set themselves an impressive task, 'The ultimate goal of Eco Village at Ithaca is nothing less that to redesign the human habitat.' (Walker 1997 p.142). With a projected population of 500 people (on the basis that anthropologists consider a village of such a size ideal for good communication) on 71 hectares of land two miles from downtown Ithaca, there are already a number of occupants in the co-housing based project. The developer is EcoVillage at Ithaca, a non-profit organisation with an associated educational arm, EVI/CRESP, a project of Cornell University's Center for Religion, Ethics and Social Policy.

Development has been based on staged construction of five clusters of co-housing neighbourhoods around a village green. The first EcoVillage Cohousing Cooperative formed in 1992, and completed the first neighborhood (aka FROG) in August 1997. About 60 adults, 30 children and sundry pets and produce animals 'have taken up residence in this lively community'. Thirty houses line a meandering pedestrian street. The houses feature a number of innovative energy-efficient features and green building technologies and won an 'Excellence in Innovative Housing' award from the National Association of Homebuilders in 1996.[15] Development continued with a second neighbourhood called SONG, and a third cohousing neighbourhood that will join FROG and SONG is currently in the planning stages.

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[12] http://www.villagehomesdavis.org/Design.php (accessed 21 March 2008).

[13] http://www.ecovillage.ithaca.ny.us/ (accessed 13 March 2008).

[14] Convener with Serigne Mbaye Diene of the Third International Ecocity and Ecovillage Conference held in Yoff, Senegal, January 1996.

[15] http://www.ecovillage.ithaca.ny.us/, accessed 19 April 2001.

Figure 17: Ithica Ecovillage – looking east down the first neighborhood's main street *(Jim Bosjolie)*

The overall management and financial structure of EcoVillage Ithaca appears to be similar to Christie Walk. Like Christie Walk it is a community primarily occupied by people who can afford to purchase property. Its future development is expected to encompass more accessible and affordable housing in addition to 'an education center, a charter school, village-scale wind power, organic orchards, a roadside farm stand, on-site biological wastewater treatment, graywater recycling, biomass energy crops, onsite biodiesel/vegetable-oil fuel production, carshare, shuttle van, a natural cemetery, and an expanding portfolio of educational programs.'

The work of people in the ecocity/ecovillage movement is often, if not always, done with an eye to the potential for promotion of the ideas embodied in their projects. This is certainly the case with UEA et al. and the projects it has been involved with. Volunteers who have worked on the EcoCity projects in South Australia would recognise the sentiments in the following passage.

> In EcoVillage at Ithaca we have tried from the very beginning to create an educational model – one that will inspire and teach the principles of a saner way to live on the planet. While far from perfect, we have begun to develop a community that, before it is even built,

> has attracted national and sometimes international attention. We are choosing to build something that is far more than a pretty and satisfying place to live. Instead our goal is to have a small part in influencing patterns of development in this country, and even around the world
>
> (Walker 1996 p.41)

The project provides an outstanding example of a non-European ecovillage. It has many attributes of an Ecopolis. It is more densely clustered than Village Homes but is not a fully urban project in the manner of Christie Walk or the LA EcoVillage. It is, however, conceptually connected with the larger picture of urban reconfiguration through its primary protagonist, Joan Bokaer, who has developed an economic strategy built around a 'Green Fund' for stimulating appropriate local investment to work towards transformation of the city of Ithaca itself. (Register 2006 p.216)

Heart of the City

> The ecocity features weren't together physically, so putting them together in the mind was a stretch. If we could literally put them together and meaningfully connect them in one place, a special place visited by many people – if these features collectively looked like an ecocity – we might finally be able to communicate something about the whole integral pattern of parts
>
> (Register 2006 p.329)

The Heart of the City project in the Strawberry Creek area of downtown Berkeley (see Plates) was conceived in 1997 by Richard Register and Ecocity Builders in an attempt to achieve a 'postcard breakthrough' so that "With a single glance at an image as small as a postcard, the observer would say 'Ah-ha! So this is what ecocities are all about!" ' (Register 2006 p.329). Register and his cohorts had, over the years, achieved a number of small, successful local interventions that included construction of a very visible solar greenhouse, a traffic calming 'slow street' and a pioneering and influential creek restoration project.

Building on this experience, the Heart of the City plan was to take the existing urban fabric and transform it with a number of distinctively ecocity projects built around the restored creek, including:

- a public plaza;
- a number of pedestrian streets;
- tall new housing 'with ecocity features' adjacent to the main transit station;
- multi-level footbridge links;
- extensive solar greenhouses;
- rooftop gardens, cafés and public areas with 'wonderful views'.

Intended as an intriguing, highly noticeable development, according to Register the project would have been profitable for local businesses and a destination for tourists 'curious about the future'. Once in place, it would have communicated the ecocity vision with startling clarity and introduced a new strand of transformative 'DNA' to the old tissue of the existing city. (Register 2006 p.329). A good deal of

work was done to try and bring the concept into realisation. Forty small business and nonprofit organisations joined a coalition to explore the idea and a charrette engaged half a dozen architects to explore design options. Ecocity Builders organised two small international conferences in support of the project and sought amendments to Berkeley's city plan to allow taller buildings, conditional upon the inclusion of ecocity features. To date, the project has not eventuated.

The idea of the Heart of the City project remains valid – and viable, if the groundswell of opinion in Berkeley were to shift sufficiently. If the project proceeded, says Register they would have an 'urban fractal', an 'integral piece of the city where all the pieces came together.' (Register 2006 p.329). The project fleshes out some of the detail of the larger idea of ecocity mapping and the idea of 'Shadow Planning' described in more detail in Section 10.7.

6.4 EcoUrbanism in Europe

New Ecological Settlement Projects in Europe

Kennedy and Kennedy's review of ecological settlements surveyed seven new developments and five urban renewal projects (Kennedy and Kennedy 1997 p.11–25). The retrofit projects are pertinent to remaking existing urban environments but only the new developments[16] are here set out in table to provide relevant comparative material for the case studies. The Halifax EcoCity Project and Christie Walk development are treated according to the same criteria used in this table form in Chapter 7.

Mixed Development in Nuremberg

The projects reviewed by Kennedy and Kennedy were developed by insurance companies, building societies and housing associations. Innovative urban ecological architecture has also been supported by some local governments in Europe. In Germany, for instance, the local government of Nuremberg decided that a site of just under half a hectare near the medieval city wall should be redeveloped as a catalyst for the revitalisation of the surrounding district (Dawson 1997 p.50). Designed by Joachim Eble 'one of Germany's leading ecologically conscious architects' (p.50) it consists of 61 flats, 32 office units, nine shops, café and kindergarten much of which is linked by a 15,000 square metre greenhouse, the 'Prisma' development was seen as an investment risk by the insurance company developer and some ecological features, such as rainwater flushed toilets, were deleted because of budget constraints. Nevertheless, the project retained fundamental features of ecological design including appropriate material use and a climate-responsive built form. It represents a

[16] Six of the seven case studies have been included in my tabulation.

good example of what can be achieved when local government is supportive and developers are prepared to accept long-term risk as part of their investment strategy.

EU Ecocity Projects

The European experience and methods of initiating ecocity projects are more government dependent than in the USA and Australia. Notwithstanding their respective claims to be democracies, this reflects their different political and economic environments. What the European approach lacks in spontaneity it potentially compensates for with its thoroughness and momentum and capacity to establish systemic changes in the old and complex system of urbanism and urbanisation that is Europe.

There are, for instance, seven projects set out under the overarching EcoCity project of the European Union's Fifth Framework Programme. The project berates the continued growth of sprawl around Europe's towns and cities and proposed redirecting development towards the making of existing urban centres into EcoCities, defined as:

> . . .compact, pedestrian-oriented, mixed-use quarters, which are integrated into a polycentric, public-transport-oriented urban system. Featuring attractively designed public spaces with integrated green areas and objects of cultural heritage, an ECOCITY is an attractive place to live and work. Such sustainable, resource-efficient and liveable settlements offer many benefits for the health, safety and well-being of their inhabitants. This in turn increases people's identification with 'their' ECOCITY
>
> (Gaffron et al. 2005)

Situated in the different climatic contexts of Scandinavia, Central Europe and the Mediterranean, the seven projects were in Bad Ischl in Austria (pop. 14,000), Barcelona in Spain (pop. 1,500,000), Györ in Hungary (pop. 130,000), Tampere in Finland (pop. 200,000), Trnava in Slovakia (pop. 70,000), Tübingen in Germany (pop. 85,000), and Umbertide in Italy (15,000). The projects were diverse, including brownfield and greenfield locations and addressed populations ranging from 1,350 to 13,400 people per site. Generally, the projects were less to do with initiating a planning process than with 'challenging accepted standards and providing fresh perspectives and inspiration for different solutions. In some cities, the ECOCITY ideas were directly integrated into the official municipal planning processes, while in others alternative plans were drawn up, which sparked new discussions and led to changes in the long run.' The report by Gaffron et al. concludes that 'Overall, the ECOCITY project challenged the approaches to urban planning and development in all the municipalities involved, even in those cases where the ECOCITY site concept might not be implemented to its full extent.' (Gaffron et al. 2005 p.88). 24 indicators were defined for evaluating the developed plans of the case areas, the

criteria for which included urban structure, transport, energy flows, material flows and socio-economic issues.[17]

The goals of individual projects included:

- high ration of solar-oriented buildings;
- new, higher density sub-centres;
- improved building performances (higher levels of insulation, etc.);
- maintenance or strengthening of local community;
- mixed-use building development;
- introduction or extension of light rail systems;
- revitalisation of streams;
- support for car-free lifestyles;
- planning for green corridors;
- community involvement.

The European planners make observations that can be seen as echoes of the words of ecocity advocates from the beginning of the movement:

> Dense and compact housing structures are an important tool in creating an ECOCITY, as they reduce land consumption, lead to shorter walking distances, facilitate good public transport provision, are a precondition for economically feasible district heating systems, promote social interaction and reduce the cost of infrastructure provision.
>
> Another core issue of sustainable urban development is to create settlement structures which are suitable for a mix of different uses. This means bringing living and working together again and planning for a great variety of functions, including the cultural and economic infrastructure, in order to avoid the disadvantages of a segregated city.
>
> With regard to green areas within the ECOCITIES, it was possible to achieve good results even in densely built settlements. In addition to areas with natural vegetation, the creation of areas of water, the planting of trees along streets, as well as the greening of roofs, terraces and façades were used as tools to bring nature back into the town.
>
> The ECOCITY planners recommend striving for public spaces with a high amenity value (e.g. supported by water features) and great variety (e.g. in size, use and spatial sequences). Community involvement during the planning phase and ex post evaluations are important issues to ensure public acceptance and attractive solutions. (Gaffron et al. 2005 pp.93–94)

The general objectives of the EcoCity programme reflect the same preoccupations and overall strategies as the Heart of the City project and other variants on the ecocity theme from around the world. It is notable that the report's references include Kropotkin, Register and Alexander, as well as Howard, Jacobs and Mumford. And once again, the protagonists set out to use each demonstration project as a means of leveraging larger scale changes.

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[17] http://www.ymparisto.fi/print.asp?contentid=106938&lan=fi&clan=en (accessed 20 March 2008).

Table 6: New Ecological Settlement Projects in Europe

Architects, Developer, Number of dwellings, Site Area, Ecological Aspects	**Biological Building Estate – Auf dem Schafbrühl, Tübingen, Germany**	**Ecological Village – Anningerblick, Guntramsdorf, Austria**	**Multi-family Housing Estate – Stallenmatt, Oberwil, Switzerland**	**Residential Area – Ecolonia, Aalphen aan den Rijn, Netherlands**	**Town Extension – Torsted Vest, Horsens, Denmark**	**Puchenau II Garden City, Linz, Austria**
Architects, Planners	Joachim Eble, Buckhard M Sambeth, Wolfgang Häfele	Helmut Deubner, Atelier für naturnahes Bauen	Peter Steiger Urban planner: HR Meier-Knobel	BEAR architects, Alberts and van Huut, JP Moehrlein, et al. Urban design: Atelier Lucien Kroll	Torben Gade	Roland Rainer
Developer	Karlsruher Lebensversicherung AG (Life insurance company)	S-Wohnbau GmbH and S-Bausparkasse (Building society)	Ciba Geigy Ltd pension fund	Bouwfonds Woningbouw housing association	Municipality of Horsens and a citizen's action group	Neue Heimat, Gemeinnützige Wohnungs-und Siedlungsgesellschaft Oberösterreich
Dwelling Number	111 units	140 units	64 units	101 units	900 units	750 units
Site Area	13,000 sq.m.	Not given	12,410 sq.m.	Not given	55 hectares	Not given
Healthy Building	Use of recyclable materials open to diffusion, natural paints, timber joist floors, cork linoleum flooring, etc	Basic efforts to use healthy and resource-saving materials by consideration of production and life cycle	Careful choice of materials for non-toxic internal environment, double layer brick construction, mineral insulation, natural paints	Yes, supposedly, according to the Dutch environmental protection program and overall minimum ecological requirements	Use of recycled and recyclable materials	Some use of biological building materials, most houses have brick walls, insulation with coconut fibre and mineral wool

Table 6: (continued)

Architects, Developer, Number of dwellings, Site Area, Ecological Aspects	**Biological Building Estate – Auf dem Schafbrühl, Tübingen, Germany**	**Ecological Village – Anningerblick, Guntramsdorf, Austria**	**Multi-family Housing Estate – Stallenmatt, Oberwil, Switzerland**	**Residential Area – Ecolonia, Aalphen aan den Rijn, Netherlands**	**Town Extension – Torsted Vest, Horsens, Denmark**	**Puchenau II Garden City, Linz, Austria**
Energy	Passive solar energy systems, optimisation of floor plans according to illumination, ventilation and functional requirements of apartments	Use of passive and some active solar energy systems	Use of passive solar energy systems, zoning of floor plans to conserve energy, low primary energy building materials	Use of passive and active solar systems and (unspecified) energy saving strategies	Local district combined heat and power	Use of passive solar systems, some solar collectors for warm-water supply and heating
Heating	Skirting-board heating, connected to district heating network	Low temperature connected to district heating	Low temperature gas central heating, reduced energy for heating (one-third normal)	See above	See above	Central heating of various types
Electrical System and utility lines	Independent sockets, power cable laid in star-shaped pattern	No information	No information	No information	No information	Resource conserving design of infrastructure in common service trenches

Table 6: (continued)

Architects, Developer, Number of dwellings, Site Area, Ecological Aspects	**Biological Building Estate – Auf dem Schafbrühl, Tübingen, Germany**	**Ecological Village – Anningerblick, Guntramsdorf, Austria**	**Multi-family Housing Estate – Stallenmatt, Oberwil, Switzerland**	**Residential Area – Ecolonia, Aalphen aan den Rijn, Netherlands**	**Town Extension – Torsted Vest, Horsens, Denmark**	**Puchenau II Garden City, Linz, Austria**
Water	Rain water collection in streams and ponds, water used in gardens, landscaping and play areas	Collection of rain water and use for gardens, toilets and washing machines	Biotype with pond for rainwater, partly grass-covered roofs to store rainwater, pervious footpaths	Large pond for rain water collection and as landscape feature	Use of rainwater for toilets	Two small streams integrated into landscape design, rain water asbsorption
Open Spaces	Private, semi-private and public open spaces, gardens for tenants	Private, screened gardens	Vegetation-covered facades in climate and energy strategy	See above	Residents planted 12,000 trees, gardens provided for residents (presumably community gardens)	Intense vegetation in private and public areas, private green spaces in atrium-style houses, direct access to Danube, retention of river bank for recreation
Traffic	Car free, car parking on periphery – mostly covered	Car parking on periphery, car-free inner open spaces, accessibility by footpath	Reduced traffic on residential roads, underground garages	Reduced traffic on residential roads	Residential streets with 30kph limit, most car parking spaces off the estate	Traffic-free with access only for delivery, waste disposal and emergency vehicles, network of pedestrian and cycle paths, two commuter rail stops

Table 6: (continued)

Architects, Developer, Number of dwellings, Site Area, Ecological Aspects	Biological Building Estate – Auf dem Schafbrühl, Tübingen, Germany	Ecological Village – Anningerblick, Guntramsdorf, Austria	Multi-family Housing Estate – Stallenmatt, Oberwil, Switzerland	Residential Area – Ecolonia, Aalphen aan den Rijn, Netherlands	Town Extension – Torsted Vest, Horsens, Denmark	Puchenau II Garden City, Linz, Austria
Waste Disposal	Garbage sorted according to type, communal composting	Separation according to type, composting	Separation according to type, composting	Separation according to different types	Some separation, composting	Separation according to type, some clustered collection points, some local composting
Social Concept	High quality of social living, neighbourly contact encouraged by communal open spaces	Communal centre and cafè planned	Two communal rooms	Fostering a sense of neighbourhood and identification with the living environment through urban spaces	Apartments for single-parent families and socially deprived small families	Tenant and owner dwellings built to public housing guidelines, layout of dwelling agreed to by future users, child-friendly, large natural play areas, private and public spaces
Floor Plans	Apartments built on open-plan system around central living room	Lay-out oriented for passive solar	Orientation for passive solar, zoned floor plans, encapsulated ares with conservatory, balcony or verandah secondary structure	Flexible	Flexible floor plans	Several options for lay-out of dwellings

Table 6: (continued)

Architects, Developer, Number of dwellings, Site Area, Ecological Aspects	**Biological Building Estate – Auf dem Schafbrühl, Tübingen, Germany**	**Ecological Village – Anningerblick, Guntramsdorf, Austria**	**Multi-family Housing Estate – Stallenmatt, Oberwil, Switzerland**	**Residential Area – Ecolonia, Aalphen aan den Rijn, Netherlands**	**Town Extension – Torsted Vest, Horsens, Denmark**	**Puchenau II Garden City, Linz, Austria**
Design	Follows traditional building of nearby hamlet	Pitched solar-oriented roofs with traditional tiles, rendered facades, conservatories of plain wood frames	Basic elements arranged symmetrically, each block with clearly defined central area with secondary structure of trellis and balconies	According to the Dutch environmental protection program and overall minimum ecological requirements including passive solar, reduced water consumption, recyclable and durable materials, sound proofing, healthy materials	See above	Primarily high density and lowrise with 1–3 storey buildings on solar oriented slope, varied architecture in general unified urban structure

Table 6: (continued)

Architects, Developer, Number of dwellings, Site Area, Ecological Aspects	**Biological Building Estate – Auf dem Schafbrühl, Tübingen, Germany**	**Ecological Village – Anningerblick, Guntramsdorf, Austria**	**Multi-family Housing Estate – Stallenmatt, Oberwil, Switzerland**	**Residential Area – Ecolonia, Aalphen aan den Rijn, Netherlands**	**Town Extension – Torsted Vest, Horsens, Denmark**	**Puchenau II Garden City, Linz, Austria**
Commentary	Despite high site occupancy of buildings, project offers exceptional qualities to residents and human scale. Architects combine healthy materials and construction techniques with extremely flexible space planning. Ecological design explicitly appreciated by residents.	Demonstrates importance of committed architect through to completion phase – persistence needed to get building permits and to persuade contractors to adopt new measures. Client scepticism about building costs with some fierce discussion, later costs turned out lower than anticipated	Much compromise, because if client concern with cost, on original design which included clay construction, thermal walls, photovoltaics, solar collectors, composting and biological waste treatment. Decision-making simplified by each partner – developer, contractor and architect – each represented by one individual	Regarded from the outset as research and demonstration project for the Netherlands. Wide range of technology and house designs tested. Emphasis on diversity of issue rather than holistic approach which was regarded as not yet feasible	Emphasis on planning and development processes with involvement of residents as an essential feature. Builders lost interest when restrictive financial constraints affected implementation. Problems compounded by recession in building industry	Demonstrates how a combination of user-friendly principles for high-density and low-rise buildings, good access by different means of transport and use of passive solar correlates with many elements of ecological urban design. Shows a broad social spectrum of housing at reasonable cost and high architectural quality. Holistic approach

All of the above is derived from Kennedy and Kennedy 1997

6.5 Bits and Pieces in 'Less Developed' Countries

> Those of us who work in cities know how difficult it is to change cities
>
> (Ultramari 2000)[18]

Sustaining the South

In relation to sustainability, the developing world is invariably concerned with poverty. Stren, White and Whitney make the point that resource distribution between developed and developing countries is a key issue in the potential for sustainable urban development, referring to remarks made by Stephen Lewis, former Canadian ambassador to the United Nations

> To achieve sustainable development in the South, not only will Western countries have to convince developing countries not to raid their own natural environments the way the Northern countries already have done, but they will also have to be prepared to transfer resources generously to prevent this from happening. Lewis concluded rather gloomily that, while there is 'massive international recognition' of the environmental problems of developing countries, the West is 'simply not prepared to come to grips with resource transfer.' This, said Lewis, is about morality as much as it is about what is necessary or even possible
>
> (Stren in Stren et al. 1992 p.6)

Colonialism, Compact Cities and the Case of Calcutta

Urban systems have evolved from local dependency on regional resources into an international network in which not all cities benefit equally. Cities which industrialised first benefited most from the global reach established by colonial expansion. Stren et al. point out that the colonial system assured the prosperity of these cities and allowed them to dictate terms of trade for access to cheap raw materials and that in this way '. . .they made the whole world potentially part of their hinterland.' This has provided the basis for the wealth these cities enjoy but dependence on a distended, colonised hinterland makes them very dependent on the status quo. 'If they were reduced to their old regional hinterlands, under present operating conditions, they may find it impossible to sustain their present size and level of prosperity.' (Stren et al. in Stren 1992 p.45–46)

There is no accepted general theory, but the compact city idea is strongly linked in current literature to the sustainable city (Welbank 1996). If the compact city is about intensive land use, centralised activity and higher densities, then even a huge developing country metropolis like Calcutta has compact city characteristics. If it is about most people moving around without cars, Calcutta complies. If quality of life is a key criterion, then the city fails. The compact city model is hard to

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[18] Clovis Ultramari of Unilivre, Curitiba, during the summary session of Ecocity IV.

apply to any spreading metropolis, although in cities like London one can identify a polynucleated structure that possesses some compact city characteristics.

Colonial Cousins

Calcutta is a low-rise city. Buildings rarely rise much above 4 storeys and there are few high-rise blocks in the Central Business District. Although it covers approximately the same physical area as Calcutta, Adelaide could hardly be more different. For most of its metropolitan spread Adelaide rarely rises above one storey. Australians expect complete personal privacy as a basic right, in Calcutta it is a luxury, if it is desired at all. In Calcutta there is real community and vibrancy in daily life, in Adelaide the notion of community is more abstract and remote, and dependent on mechanical or electronic interfaces rather than face-to-face contact. Yet links between Calcutta and Adelaide are not entirely tenuous. Both were founded as intentional colonial interventions for exploiting the resources of their hinterlands. Both successfully extended the reach of the English Empire[19].

Compact cities are about concentrating their populations in style, comfort and efficient grace, but the problem with cities in developing countries is that of urban migration. Calcutta exemplifies this problem. Chaudhuri argues that it has absorbed the biggest mass migration in human history 'with incredibly meagre resources, little attention, and less sympathy'. (Chaudhuri 1990b Introduction).

It is encouraging to identify those aspects of compactness and sustainability that show at least a glimmer of what might be possible in developing countries if sufficient resources and planning were to be mobilised. Calcutta may demonstrate how difficult that can be, Curitiba shows something of how that might be done.

City governments in wealthy Western democracies would be unlikely to adopt any policy that did not give high priority to the prevention of poverty and disease, but they would be equally unlikely to press their citizens into work as volunteer garbage collectors or sewage plant workers as part of that policy. In Curitiba and Calcutta that is almost exactly what the city governments have done.

Green Calcutta?

Urban agriculture is a valuable contribution to urban sustainability, particularly in developing countries, for although 'Agriculture and urbanization are commonly viewed as conflicting activities... A closer look reveals... that there are considerable land and water areas in the urbanized sphere that are available for agricultural use.' (Smit and Nasr 1992 p.147). Smit and Nasr say that sustainable cities require an economic process to close the loop of resource use, especially in regard to urban

[19] See Appendix 4 for a discussion of the attitudes to the price of comfort in Adelaide and Calcutta.

agriculture and water resources (Smit and Nasr 1992 pp.141 and 147). Calcutta demonstrates some of the potential for achieving this in an economically deprived environment, for according to US scientist Harriet Hill 'The sewage fed fisheries of East Calcutta. . . which have been receiving urban wastewater for over 100 years. . .' are an example of ecosystem adaptations that have treated human wastewater for millennia (Hill 1997)[20].

Santosh Ghosh, as the former Chief Architect for Calcutta and West Bengal, has an intimate knowledge of the city and its planning systems. Undeterred by the scale and scope of Calcutta's problems, he has proposed a green vision for Calcutta in which '. . .scattered green space within the compactly built up area, will act as an oasis and also a continuous wedge of green widening at the edge of the city into the green belt and then into a rural landscape, establishing a coherent relationship between urban and rural areas.' He paints an image focussed on the compact urban area and acknowledges that such a plan is intrinsically regional, but notes also that the making of such an ecologically integrated metropolis '. . .depends on citizens' awareness and a movement to preserve and protect together with the Government's programme for greenery and wetland projects.' (Ghosh 1992 p.18)[21]

This call for citizen awareness is echoed by ecocity advocates around the world, including in Adelaide through advocacy organisations like Urban Ecology Australia. Curitiba created a 'Free University for the Environment' which offers 'practical short courses at no cost for homemakers, building superintendents, shopkeepers and others to teach the environmental implications of the daily routines of even the most commonplace jobs.' (Rabinovitch and Leitman 1996 p.30)

No Room for Eco-burgers

> In the 1980s, a middle-class revolution has silently seized Calcutta. There is a new trend towards sporadic beautification, preservation of old monuments, and a certain streamlining, sophistication and even luxury in middle-class homes. With this goes a new concern for the environment
>
> (Bandyopadhyay 1990 p.78)

Turning Calcutta into an ecological metropolis may be a challenging task, but if a city of its population and extent is able to sustain key ecological functions despite the pressures of population growth and development, it may not be perverse to contend that for compact cities the challenge is correspondingly less, and proportionally more achievable. A similar argument can be advanced for Curitiba, where population and developmental imperatives have also been subsumed within a

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[20] According to Aditi Sarkar these ecosystem adaptations have evolved to produce an environment in which the thirty-odd villages east of the city take its solid waste, liquid sewage and polluted air and produce clean air, fresh water, and fresh fish and vegetables. In addition, income and employment is generated in the rural sector (Sarkar 1990).

[21] Ghosh was the organiser of the Conference on Architecture of Cities that adopted 'The Charter of Calcutta' in its final session in 1990.

coherent overall planning framework that accepts the pragmatic realities of its place and time, yet directs both social and economic development towards ecologically sustainable outcomes.

The conditions in less developed countries are generally much worse than in the developed world and the challenge for shifting their cities towards ecological viability is great. At the same time, there are people like Ghosh, who know only too well the scope of Calcutta's ecological challenges, yet sees no room for half measures, telling me, for instance, that "Pseudo-environmental approaches are like adding twice the lettuce to a Big Mac and calling it an 'eco-burger'." (Polo 1999 p.15).

6.6 Around the World in Many Ways

Although there may be very few fully fledged ecocities, ecotowns, or ecovillages in the world, there are an increasing number of projects headed in that direction and a number of municipalities and other levels of government that have begun, or are encouraging, ecocity-like activity. A number of publications contain case studies of these projects but the experiences of advocates and pioneers of urban ecology and ecocities in Russia, China, India, Japan and Africa get little circulation in 'western' media. There is not sufficient space to include comprehensive case studies from all those countries in this book but the reader is encouraged to explore libraries and the world wide web for more information. An example of an initiative that does not appear to have ultimately been successful is included here because it demonstrates how even when strong initiatives are taken at the local government level, the local government is itself often in the thrall of higher levels of government that can create abrupt shifts in direction, funding and capabilities.

This tends to strengthen the argument in favour of independent community based initiatives and against reliance on any level of government for driving innovation; although all levels of government have the potential to support community innovation. In Europe, Alberto Magnaghi's work and the Charter for New Municipium appears to offer the brightest prospect of local government being able to drive change.

Midrand, South Africa

At the other end of the scale from Calcutta and Curitiba, but still positioned firmly in the middle of the enormous social and economic pressures of developing country urbanisation and the forces of globalisation is Midrand. Ecocity credentials were claimed by this small city in South Africa which at the turn of the millennium was Africa's fastest growing 'economic investment town'. Its very high annual growth rate had given it 'a brief window of opportunity to adopt sustainable development from the start. . .' (Dawson 2000).[22]

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[22] Alan Dawson, presentation at Ecocity IV conference, Curitiba, April 2000.

Midrand adopted an ecocity program to address developmental pressures of poverty and population growth (from 20,000 to 200,000 people within 18 months). The program include community food gardens, eco-friendly construction using local resources, cycling and walking as preferred transport, greening of workplaces, and emphasis on advanced and environmentally responsible technologies as the basis of economic development. In Midrand, like Curitiba, they were trying to address fundamental issues of healthy human settlement.

Alan Dawson, a former newspaper editor and Mayor of the town and trustee of the Midrand Eco City Trust, described the Midrand initiative as a means of dealing positively with poverty and rapid urbanisation.

Midrand's initiatives included: establishing co-operatives based on food production with bartering systems and development of an eco-bank to provide low to no interest rates for the poor; reduction of water demand growth to zero within 5 years (potentially saving the town US$10 million even as the population grew at 10% per annum); containing sprawl and planning for a compact city form; appointment of an urban farmer to promote and drive agriculture through the area (a training centre for Permaculture was already operating in Midrand), and planning for municipal waste recycling.

In addition, the city had entered into a covenant with developers for establishing green office buildings and in 2000 was constructing an urban eco-village of 30 'natural brick' homes on 2,500 sq m as a model for sustainable housing integrated with organic agriculture and small business. And they were addressing the ever-present problem of transport by collaborating with South Africa's equivalent to the CSIRO to 'introduce a suite of travel demand management strategies' that included electric car, bicycle, park and ride and high-occupancy vehicle programs.[23]

There is a strong link from the developing country environment to that of developed countries and the evolving body of knowledge that is urban ecology. The Midrand Eco City Trust was a body independent of the Midrand Metropolitan Council structure funded primarily by the Royal Danish Government which has a venerable and sophisticated urban ecology program.

As of April 2001, the likelihood of Midrand continuing its initiative was fading fast. Writing about the prospect of Midrand continuing to host the forthcoming Ecocity 5 conference, Annie Sugrue,[24] one of the organising committee, posted the news that at the time of the presentations at Curitiba, Midrand was 'a fully fledged municipal structure, in charge of its own tax base and allocation of funds.' Since then, however, large changes have taken place in the municipal structure so that Midrand is now a 'part of a huge structure called the Johannesburg Unicity'. The relatively small city of 250,000 is now one of eleven districts of the new Metropolitan city council of some 4 million people. 'There is no longer a political structure for Midrand alone. All political decisions for the entire Midrand are taken by a huge council of over 200 councillors.' The city lost key councillors from the previous

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[23] Alan Dawson, presentation at Ecocity IV conference, Curitiba, April 2000.

[24] Anne Sugrue posting on ecocity5@lists.gaia.org 2 March 2001.

Midrand administration, including Alan Dawson, Enoch Dlamini and Fienie Van Rensberg.[25] 'This means that effectively after July this year, this organization will have no money!! The Danes have more or less agreed to fund us until the end of the project period for which they are funding, which is the end of November.' (Sugrue 2001) .

Midrand appears to have fallen victim to the forces of centralisation and gigantism that are inimical to ecological development and the maintenance of community-oriented programs.

6.7 South America – 'Ecocity' Curitiba[26]

> Coming down the stairs. . . were two striking olive-skinned women in lively conversation. . . one with a T-shirt that said 'Welcome to Curitiba, the Ecological City'
>
> (Register 1999)[27]

Figure 18: Curitiba approached from the East, showing the smog and traffic typical of any substantial urban settlement, North or South

Curitiba[28] is the primary example of a major city in a developing country that displays some characteristics of ecocity function. Curitiba has received international acclaim as a prototypical ecocity but there are a number of aspects of ecocity design, development and maintenance that conflict with its self-described status as an ecocity.

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[25] All delegates to the Ecocity IV conference.

[26] In relation to the 'Seven Steps' proposed in the latter part of this book, Curitiba can be understood to be performing very well in terms of 'Shedding', moderately well in terms of 'Proximating' and poorly in terms of 'Architecting'.

[27] Personal communication.

[28] Curitiba, in Brazil, has probably defined the meaning of the word 'ecocity' for many modern planners. Its unusual development trajectory has been attributed to its mayor of 25 years, Jaime Lerner, who remains a tireless advocate of the ecocity idea – and whose showmanship makes him a terrific conference presenter.

> The problem of what exactly a sustainable city is, is also complicated by the word's market value. Every city administration, every developer, wants to be 'sustainable'. One typical effect of this is 'extensional' sustainability. One additional feature makes a house 'sustainable', ten of these houses make a housing project 'sustainable', and two or three of these projects make a 'sustainable city' – at least for the media. Even without such effects, the concept remains vague. The most concrete aspects of policy are emission norms, water norms – whatever is easily measured. The only other concrete indication in sustainable-planning literature is the repeated use of the same examples, the city of Curitiba in Brazil probably most of all
>
> (Treanor, 1997)

In developing countries, ecological development is a means of providing infrastructure, improving the basic conditions of life and redressing economic injustice. Because it has tried to do these things, Curitiba lays claim to the ecocity tag, with social and environmental education programs spearheaded by 'Unilivre', an open university for the environment.

Curitiba is routinely presented as a model for sustainable urban development even though it is in a developing country environment. It may not be an ecological city but since 1971 progressive city administrations have adopted a development plan that embraces ecocity characteristics '... based on a preference for public transportation over the private automobile, working with the environment rather than against it, appropriate rather than high-technology solutions, and innovation with citizen participation in place of master planning.' (Rabinovith and Leitman 1996 p.27).

Curitiba has successfully pedestrianised many inner-city streets, it has a trend-setting public transport system that makes buses almost as effective as trams, and it has controlled sanitation and drainage problems by creating magnificent parks. At the same time it has instituted recycling programs where the urban poor can trade garbage for food.

Paraná: The Region

Representing the Planning Secretariat of the State of Paraná at the Ecocity IV conference, Antoninho Caron quipped that 'No traveler reached the New World with any maps from the Old World'. This attitude towards planning suggests a cultural disposition towards decision-making that is congruent with participatory planning processes and may tell us more about the underlying ethos of Brazilian planning than any amount of academic analysis. Caron's remarks were of particular interest because they came from a person at the heart of regional planning processes. He also said that 'We have a creative destruction phase...old things must die...' and that Paraná is trying to extend the principle of working 'through human beings for human beings' to the whole state through working with citizens. If this is true it is, again, an attitude congruent with ecocity principles.

Caron spoke of the inappropriate processes of colonial development and how it was necessary to stimulate the development of smaller cities with the involvement of all cities. A number of initiatives are being put in place by the state of Paraná, including extending recycling programs of other cities in addition to Curitiba, developing ecotourism, and adopting environmental auditing. There are five aspects of sustainability that the region of Paraná is beginning to use in a model for developing sustainability in its constituent communities: 1. Social, 2. Economic, 3. Ecology, 4. Spatial, 5. Cultural. According to Caron, 'the region' is not a finished product in nature; the city is the architectural response to the region, it is a collective work of art, and a constant participative work that 'potentialises local initiatives' (Caron 2001).[29]

Nevertheless, it would seem that ecology is still not treated as an overarching conceptual framework for integrating the other issues but, as was noted with LA 21 programs in other cities, is treated as a sub-set of other concerns, as a component rather than as a cohering structure. Despite any failings in absolute terms, Curitiba is relatively successful. Peter Davey suggests

> That government action can have a radical effect for good, even in unpromising circumstances is shown by Curitiba, the capital of Paraná in Brazil an that country's fastest growing city. Under mayor Jaime Lerner, an architect, a land use and transport plan was adopted which promotes dense development while allowing 52 m2 of open space per person, one of the highest levels of any city in the world. The key is a public transport system. . .
>
> (Davey 1997a p.5)

Curitiba is also justly famous for its adoption of an above-ground transit system using articulated buses that cost much less than an equivalent subway system. Inasmuch as it has been successful, Curitiba planners and government might well echo the views of transport planner Laura de Macedo who, speaking about the experiences of the city of São Paulo, said 'There are no easy answers, and most of the experience had to be based on co-responsibility, demonstrating that public participation is key to policy making in a strong democratic system.' (de Macedo 2000).

One of the biggest challenges facing Curitiba is the rising tide of car ownership, pollution, and population growth pushing the city limits. Planning for continued reduction in car use in Curitiba is getting more difficult. As it is in other in Latin American cities like Mexico City and São Paulo, because as newer cars are running cleaner, city governments are being convinced that they can ease up on traffic restrictions, making it even harder for new measures to be introduced in other cities (De Macedo 2000). Curitiba has provided an important iconic example of a city reinventing itself in a green guise, but its status as an 'ecocity', already tenuous, is being further eroded as the pressures from global consumerism increase.

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[29] Antoninho Caron, Planning Secretariat of State of Paraná, presenting at the EcoCity IV conference in Curitiba, Brazil, 6 April 2000.

6.8 England's Rural Urbanism

In the search for the 'bits and pieces of the ecocity scattered about in present-day cities and sprinkled through history' it is instructive to look at those parts of western civilisation that have demonstrated some social and environmental resilience.

Urban civilisation depends on complex relationships of resource exchange and management between the urban centres and their regions. In sustaining civilisation over centuries in the same landscape, the natural has become artificial and the remaking of the landscape has resulted in the creation of a living fabric that is susceptible to degradation from poor management, or as it might also be characterised, a collapse of the belief system necessary to sustain that system. Alexander cites the example of southern England '. . .which is a structure about three hundred miles by about one hundred miles that was built up over an eight hundred year period into one of the most complex structures ever made by man (sic). It is now rapidly being wrecked, because of lack of understanding of its existence and structure as a living fabric.' (Alexander 1997 p.215). The density of population and intensity of development of that region is remarkable[30] and provides an example of at least a partial model for the urban-regional/city-country pattern that is inherent in the Ecopolis prospect.[31]

Poundbury

Prince Charles is undertaking an experiment on part of this living fabric of Southern England with an extension to the country town of Dorchester on his estate lands at Poundbury, designed by Leon Krier.

A number of texts deal with shaping streets, squares and the other outdoor rooms of the city. Rob Krier's work has been of particular significance (Krier 1979). Krier's basic premise was that we had lost the traditional understanding of urban space (Krier 1979 p.15). Krier's brother Leon employed the principles that he and his brother had developed together in the planning of 'Poundbury'.

In the early stages of its construction supporters and detractors of Prince Charles viewed his Poundbury experiment with concern, finding the architectural approach unconvincing and public communication minimal or otherwise inadequate (De Bertodano 1994 p.15). By the end of the 1990s the view appeared to had shifted, so that regardless of opinions about the style of the buildings, there was a growing appreciation of the quality of its streets and public spaces (Worsley 1998 p.24). This appreciation had reportedly extended to the Department of the Environment, Transport and Regions which published a handbook called 'Places, Streets

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[30] See Appendix 3 for a brief comparative analysis of the relative development densities of rural England and metropolitan Adelaide.

[31] And undoubtedly influenced my thinking as I spent my formative years as a organism in the weave of that living fabric.

and Movement' supporting the primacy of people over vehicles and variety over monotony (1998 p.24).

Poundbury is categorised as a Type V 'New Urbanism' Development by Barton and Kleiner in their review of 'innovative eco-neighbourhood projects' (Barton 2000). They identify its importance for 'confounding assumptions of house purchaser conservatism, and pointing the way to much more efficient and effective use of greenfield sites.' (Barton 2000 p.78). Despite Krier's attention to walkability and mixed-use they say it fails to stand up to 'the exacting standards of sustainability' and criticise it as 'far from ideal for bike and bus efficiency' (p.78).

It attracted local criticism too 'If the intention was to produce poetry in the Dorset dialect, the result so far is doggerel in theatrical Mummerset.' (Walker 1997 p.70). With what he claims is too little attention given to the use of native materials, Walker, Chairman of Dorchester Civic Society's Conservation Group, says the value of the development as an exercise in 'forging a new model environment' is substantially reduced. He asks 'Where in this 'celebration of the locality' is the cob, the clunch, the flint and the thatch? One suspects these materials were put in the too-difficult file as compared with the ease of utilising insulation blocks and cement render.' A puritanical attitude to materials and carping about pastiche runs through Walker's critique of Poundbury.

His complaints about its urban design seem less sure, with some apparent contradictions. Walker recognises that 'The intention was to reduce the impact of the all-pervading culture of the car…' but seems not to allow for the physical limitations of space-packing when he then immediately complains that '… anyone coming to Poundbury to cultivate his (sic) garden will discover more designated

Figure 19: Poundbury - Still struggling with the car

parking space than vegetable patches.' He then goes on to say that the Dutchy's own brochure '. . .reveals the relative spaciousness of the housing plots on the neighbouring council estate compared with the hugger-mugger density of the new buildings.' (p.70). This critic is not an advocate for higher density development, even when it is equivalent to the historic regional urbanism he so admires. Study of the plans and photographs of Poundbury reveal that it is both inventive and pragmatic in its accommodation of the car. My own efforts at designing medium to high density development (and familiarity with the traditional urban form of south west England) lead to a sympathetic acceptance of the need to reconcile 'car courts' with urban space and acknowledge that they often have to be one and the same to achieve a workable solution (see, e.g., the parking areas of Christie Walk, Chapter 7). Poundbury has been developed in an environment in which planning regulations and building codes do little to encourage traditional built form and, in the circumstances, achieves surprisingly much of the picturesque quality that is sought in Krier's work. An editorial postscript notes an expectation that Poundbury will offer a richer social mix than most suburbs. A similar design approach can be found in the work I did in association with Dave Pickles for redeveloping a part of Beverley in Yorkshire in 1975 that shows many parallels with the much later Poundbury scheme, with the main difference being that it was for redeveloping a brown field rather than a green field site (see below).

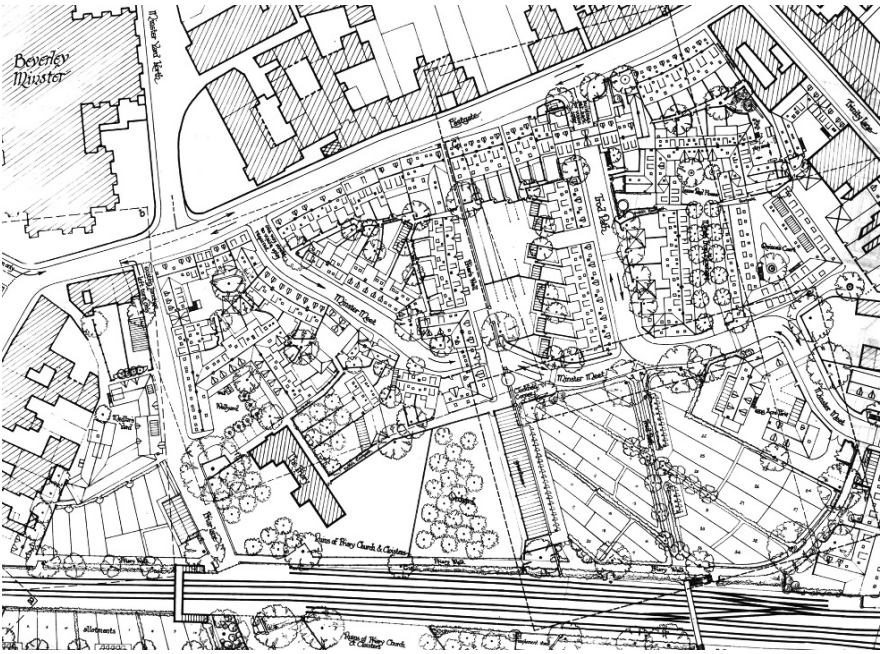

Figure 20: The site plan of the Downton and Pickles proposal for redeveloping a 'quarter' of the Minster town of Beverley in Yorkshire

Beverley and the Later Ecocity Projects

It is of interest to compare Krier's much later plans for Poundbury with those David Pickles and I did for our final year design project completed at the Welsh School of Architecture in April 1975, later exhibited locally and published in part (Downton and Pickles 1977). It was a proposal for an industrial site, ripe for redevelopment, in a critical central position in an historic town (Beverley, Yorkshire). Krier's planning was on the basis of an explicit theory whereas the Pickles-Downton project was entirely empirical. Both are effectively about the reinstatement of a pattern derived from the old urban fabric and both are concerned with what Krier clearly identifies as a 'quarter' (Krier 1989). There is a fairly strong congruence of conceptual forms in the designs including urban blocks, winding streets, visual axes but without rigid linear avenues; there is even some similarity in graphic technique in that both eschew a mechanistic aesthetic in their style of presentation. The architectural forms are likewise traditional or semi-traditional and there is a hierarchical underpinning to the layout, in one case to a central square and in the other to a Minster.

This congruence of approach does not arise from any known relationship of ideas or practice between the authors of the two schemes and it may be taken as another example of the capacity to recognise intrinsic patterns in human settlement that

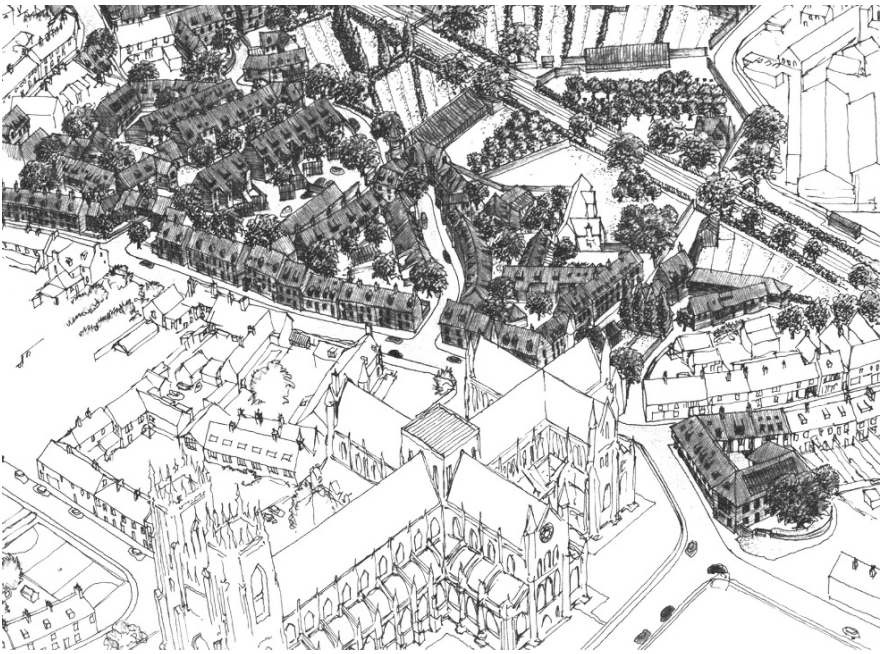

Figure 21: Perspective rendering of the Downton and Pickles proposal for redeveloping a 'quarter' of the Minster town of Beverley in Yorkshire

provides coherence to vernacular design and gives rise to what Alexander calls 'the timeless way'.

Much of the thinking behind the Australian Ecopolis projects was presaged in the Beverley scheme. The proposal was for small scale, accretive development that engaged local craftspeople and contractors to better serve the local economy and engage local interest. A large developer was eschewed on the basis that, among other things, they would adopt a master plan approach that would not support an adaptive, organic development process. A 'Conservation Trust' was proposed to be the developer working alongside and in support of the council but autonomous and able to function 'as a self-regulating organism'. Development of the site was proposed over a period of about 20 years with stages *not* planned in advance lest that become 'a strait-jacket on the organic realisation of that development.' (Downton and Pickles 1977 p.3). Each stage was intended to assist the financial viability of the next. The Halifax EcoCity Project putative 'School of Urban Ecology' was also there in embryo with a 'school of craftspeople' growing on the site, and 'A job architect would become one of the first residents, living and working on the site with her or his work-place open to all so that public participation stands a chance of becoming a reality rather than merely a phrase.' (Downton and Pickles 1977 p.4) The report reinforces this by insisting that 'There should be no imposed solution at any point. A very real involvement of builder, architect and residents must be the generative force for the entire development.' (Downton and Pickles 1977 p.4) In the plans 'to indicate the general layout of a development in keeping with the above principles' could be found concern for ancient boundary lines, historic street and building patterns, land-use predating then-current urban development, traffic calming, productive landscape, community gardens, and integration of new structures with old.

Over a quarter of a century after the Beverley schemes was conceived by the authors, one (Downton) was to be found in Australia trying to realise projects based on similar principles of what might be called regenerative urbanism and the other (Pickles), as Chief Architect of Newark and Sherwood District Council in England, was applying similar principles as part of a strategy for upgrading the environmental performance of the existing urban fabric of Newark in order to reduce health problems caused by cold and damp dwellings (Pickles 1992).[32]

Cornish Domes – The Eden Project

> The British landscape is semi-natural at best, having been influenced by human activities since the Mesolithic (circa 10,000–4,500 BC)
>
> (Wheater 1999 p.xii)

By 1981 over 10% of land in England was urban. (Wheater 1999). The landscape is artificial. Whilst Charles has looked to the past for inspiration in his addition to

[32] Pickles' work earned him an OBE in 1996.

the living fabric of England's landscape, there has been at least one recent experiment in building environments that contain synergies generated by the application of high technology and non-traditional ideas to ecology and place. Bucky's domes and Biosphere 2 have clearly provided inspiration for the designers and developers of the massive, and massively successful, 'Eden Project', supported by the UK government 'Millennium Commission'. Situated in Cornwall, south-west England, the Eden Project provides a series of contained ecosystems under a complex of geodesic domes (the largest of which contains 1.5 hectares) set in a worked out China Clay quarry (Davey 2000 p.76). In this constructed ecology of the English 'living fabric' buildings house ecology, demonstrating an integration between the natural and the artificial, mediated by the architecture of the built environment.

> As I watched the first visitor walk open-mouthed into our great green cathedral, and as small groups became hundreds and then thousands followed on behind, I thought to myself, the truly special thing about Eden is not what you see, although that is awesome enough; it is the spirit that brought so many 'ordinary' people together, to add up to so much more than the sum of their parts. That was the real reason for hope. If we could do this, what could happen if even more were harnessed together?
>
> (Smit 2001 p.13)

The Eden Project is the largest conservatory ever built and superficially something of a megastructure, but the making of it is a rich and complex human story, told with eloquence and no little passion by Tim Smit in 'Eden'. It is both a history of a project and a parable about constructing great works and achieving 'the impossible' from a starting point of relative chaos and constrained resources. It is a fractal of process and inspirational planning with extraordinary relevance to the urban ecology mission; if the Eden Project can be built, so can Ecopolis.

Outside In

If Lovelock's fears about extreme climate change are borne out, then the Eden Project may turn out to be an unwitting precursor of the kind of architecture demanded by the conditions of Gaia's revenge. The new built forms of her angry future would need to contain our habitable environments more than ever before, it would be architecture and city-making turned outside-in.

6.9 An Ecocity in the Middle East

Fostering New Ideas

Dubai has become a byword for profligate development. In land area and economy, Dubai is the second largest of the seven states that make up the United Arab Emirates and according to a Gulf News Report published in June 2006 contained about

30,000 of the world's 125,000 construction cranes.[33] The extraordinary extent of investment in the UAE is producing some of the most interesting and challenging building projects on the planet, including what promises to be by far the world's tallest building (Burj Dubai) and new, extremely expensive, off-shore suburbs in the form of elaborately shaped artificial islands. In amidst the oil-wealth of weird and wonderful projects there is one in UAE's largest state of Abu Dhabi that stands out as being genuinely innovative, with some real potential for pointing the way to how development is likely to proceed into a post-petroleum future. The project is called Masdar, reported to be a 'model ecopolis'[34] (see Plates).

Masdar (meaning 'source' in Arabic) is a planned city that will contain a university and research activities which are intended to reinforce its role as 'a global cooperative platform for open engagement in the search for solutions to some of mankind's most pressing issues: energy security, climate change and truly sustainable human development.'[35] WWF and Bioregional worked with Mubadala Developments and Foster + Partners 'to conceptualise and detail the incredibly ambitious sustainability strategies of the Masdar eco-city development.'[36]

Electricity in the finished city will be generated by photvoltaic panels and wind turbines and water will be supplied from a solar-powered desalination plant. Abu Dhabi has also announced plans to build the world's first 500 MW hydrogen plant (which will split natural gas to release hydrogen and capture carbon dioxide that will be inject into old oil wells, pressurising them to force out otherwise unrecoverable oil reserves). Landscaping will be irrigated with city grey water. The compact city principle has been applied, with an overall height limit of 5 storeys, narrow streets shaded by solar canopies, no place further than 200 metres from public transport and a very distinct city edge modelled on traditional walled cities. The city's multi-level transport systems are of special interest 'with light rail on one level moving people in and out of the city while pedestrians rule at ground level and personal rapid transit flits back and forth above.'[37] It is unclear whether a particular system has been selected, but the personal rapid transit (PRT) appears similar to one that was being developed by Anderson with Raytheon in the early 1990s, reported at the time as a kind of 'personal train' system using linear induction motors and elevated one metre wide tracks to shuttle around automated on-demand computer controlled cars (somewhere between the size of a Smart car and a Mini) to take passengers non-stop to their destinations.[38] A variant of the 'podcar' system called ULTra (Urban Light Transport) using conventional motor vehicle technologies and larger cars has been under development by Advanced Transport Systems Ltd, a company

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33 http://archive.gulfnews.com/articles/06/06/18/10047703.html (accessed 11 March 2008).

34 http://www.treehugger.com/files/2008/01/ecocities_every.php (accessed 11 March 2008).

35 http://www.masdaruae.com/ (accessed 11 March 2008).

36 http://www.bioregional.com/oneplanetliving/uae (accessed 11 March 2008).

37 http://www.treehugger.com/files/2008/01/ecocities_every.php (accessed 11 March 2008).

38 Nadis, Steven 1994 'High Hopes for Faster Transit' in *New Scientist* **1915**, 5 March pp.28–32.

based in Bristol, England with a pilot project at London's Heathrow Airport due to commence operation in Spring 2009.[39]

The podcar image is futuristic but it also calls up memories of B grade sci-fi movies. There is a video promotion of the Masdar city project accessible on YouTube in which the tone of the whole presentation has the curious air of Harry Potter colliding with a totalitarian sci-fi utopia. The slick and slightly empty computer-generated imagery is off-putting to many and people who are not familiar or comfortable with the world's of commerce and design that generate such imagery do not warm to this style of presentation. Allusions to the design of the city looking like a microchip do not help. The verbal content of the presentation fits descriptions of ecopolitan environments but, as one of my interns put it, 'It sounds good but feels wrong'[40]. Beneath the superficial images and smooth voice-overs there are some deeper issues that invite exploration concerning the nature of communication and the values projected by this kind of representation, and whether they betray an élitist mindset that is, in fact, inimical to the ecopolitan vision.

If the need for ecological repair is most pressing where the damage is greatest, then attempting to build the world's first carbon-neutral, zero-waste, car-free city in the state with the highest per capita ecological footprint in the world represents an entirely appropriate response. Construction was scheduled to begin in early 2008 and it will be interesting to see whether the WWF's monitoring will eventually verify Masdar's 'eco-performance' once built.

6.10 Ecocities in China

> Home to polluted rivers, smog-filled cities and factories belching out Earth-warming carbon emissions, China often grabs headlines for its notorious environmental problems. But what is less known is that the country is also at the forefront of bold experiments to build ecological cities that could show the way forward in sustainable urban living for the rest of the world
>
> (Quek 2008)

Deep Waters

Given the problems that a rising sea level brings, and considering that the most conservative projections of climate change indicate at least a metre of sea level rise within a generation, with an almost zero likelihood that it will stop rising at that point, it would be extraordinary if a prototypical ecocity development were to take place in a location vulnerable to rising waters, yet that is exactly what appears to

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[39] Advanced Transport Systems Ltd. 2007 *ULTra Summary* December, Advanced Transport Systems Limited, Bristol.

[40] Jen St Jack.

be happening with the Dongtan project just off the coast of Shanghai in China (see Plate 9).

A world-first model of its kind, Dongtan is an impressive project that addresses most of the key issues in creating sustainable urban environments. Its designers, Arup, reckon that its ecological footprint will be just 2.3 hectares per person, when a conventional city uses 5.8 hectares.[41] Like Masdar in Abu Dhabi, Dongtan is being created from the ground up on a 'green field' site. In this case, rather than being in the desert, it is China's third largest island, Chongming, and is adjacent to a major RAMSAR wetlands and bird sanctuary. A reporter for a design journal observed 'It's a little disturbing that in Dongtan's case, a bird haven is being encroached upon.'[42] However, the project's protagonists claim the wetlands will end up being better protected as the presence of the new city will aid in their conservation and management.

The whole area of land designated for the new city is on the low wetlands eastern end of the island and is so close to sea level that even a small rise in the waters threatens inundation. Al Gore illustrates the inconvenient truth of what would happen if sea level rose as a consequence of Greenland's ice sheets melting (Gore 2006 p.205) but a simple web-based computer mapping tool shows that most of the coastline around and to the north of Shanghai goes under the waves if the sea level rises by even a metre; Dongtan would be flooded by a 3 metre sea level rise unless there are substantial sea defences in place.

The obvious question has to be 'why construct a new human settlement in a location that will almost certainly require massive resource investment in the future, just to survive?'. The answer is surprising. According to Peter Head, the Arup director responsible for the project, the ecological footprint calculation has included the flood defences which consist of an outer wall and inner secondary cells. These walls enclose the wetland buffer zones and parks. The outer walls can be raised in the future as needed and although the energy and materials for that have not been included in the footprint, Head believes that for a city of half a million people the additional expenditure would not be very significant. As anticipated sea level rises take place the expectation is that the accretion of silt which forms the main wetland (outside the wall) will increase in height and extent to add further protection to the city (Head 2008).[43]

The decision to make the 'world's first ecocity' in such a location may seem curious, if not perverse, but perhaps there is method in the madness. After all, the experience of building Dongtan will give the Chinese a boost in expertise to rival the Dutch at holding back the sea. With Shanghai and nearly every major city in the

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[41] Slide presentation of the Dongtan Eco-City, Shanghai by Roger Wood, accessed via the Arup website (www.arup.com) 28 January 2008.

[42] 'Model Ecopolis Called Masdar' reported by April Streeter, 21 January 2008 in Design & Architecture, accessed on http://www.treehugger.com/files/2008/01/ecocities_every.php.

[43] Email communication 31 January.

planet vulnerable to the same sea level rise, they may achieve market leadership for one of our future world's most essential products.

The Rising Tide

According to a report in The Straits Times, Singapore and China have also been planning to break ground for a flagship eco-city venture in July 2008. The proposed city will be 'Built from scratch and spread over 30 sq km in Tianjin municipality's eastern corner.' Its mixture of transport systems are planned to include mass rapid transit, light rail, electric and gas powered buses and cycleways, with roads designed to minimise commuting distances and a long term target for 90% or more of the eventual 300,000 inhabitants to walk, cycle or use public transport. The project aims to achieve high levels of air and water quality, and promote recycling, low energy use and construction of green buildings. In addition to these typical 'sustainability' goals the Tianjin ecocity will pioneer an 'emphasis on social harmony' with Singapore's People's Association, 'which oversees grassroots and community organisations in Singapore' involved in developing an appropriate social fabric so that residents are educated and engaged in the workings of the city.[44] This emphasis on constructing an effective cultural base for the putative ecocity indicates an understanding of just where the fundamental foundations of a city must lie – in its citizens.

The rising tide of interest in ecocities in China is not something that has come out of the blue, it is the culmination of a quite extensive history of research and substantial investigation of development options (See 4.2 Wang and the Chinese Urban Ecologists).

[44] Quek, Tracy 2008 'Qatar to Invest in China Eco-city with Singapore' in *The Strait Times* Singapore, February p.22.

Chapter 7
Building Fractals: Ecopolis Projects in Australia

You are certainly on the cutting edge of some of the most critical issues of our times. . . Unless we begin to make significant changes soon in the way we organize ourselves as a civilisation, we face an ecological catastrophe on a global scale unprecedented in the history of mankind. The concerns of the Urban Ecology movement are an integral part of this larger set of issues. We must begin the restructuring at the most basic level, in our homes and in the towns and cities where we all live.

(Al Gore 14 April 1992)[1]

7.1 Ecocity Organisation

Grainy Intensity

> The ecocity organization is a rather everyday type of association of people working together, chipping in dues, running fund raisers, doing mailings, hosting events, promoting what they feel improves life, and so on, but it has an extraordinary mission: it's an organization designed specifically for exploring the theory of the ecocity as well as for experimenting, learning, teaching, and building ecocities. I know of very few organizations that are explicitly just that: Ecocity Builders, Urban Ecology Australia, Urban Ecology China, Ecocity Cleveland, and the Cosanti Foundation.
>
> (Register 2006 p.275–276)

This chapter includes a history of the non-profit organisation Urban Ecology Australia (UEA), and briefly describes three case studies of ecocity demonstration projects in South Australia, one of which remains unbuilt, one of which has been very partially realised and one that has been fully developed and occupied. The projects are the Halifax EcoCity Project, a high-density, inner-city mixed-use development in Adelaide, the Whyalla EcoCity Development in Whyalla, and Christie Walk in central Adelaide. In each case I consciously attempted to apply the nascent theory of Ecopolis and in the process I found myself in the role of advocate, client, architect, developer, builder, educator, researcher, theorist and resident! My life partner Chérie Hoyle was essential to these projects happening, to the formation of Urban Ecology Australia, and to the organisation and success of the EcoCity

[1] Addressed to the author as Convener of EcoCity 2, from 'Albert Gore, Jr., United States Senator'.

P.F. Downton, *Ecopolis*, DOI 10.1007/978-1-4020-8496-6_8,

2 conference which attracted the attention of Al Gore in April 1992. The entire experience of creating UEA and getting these projects to happen was intense and all-consuming for us for over 16 years, and could not have happened without a great deal of support from many people. We were working at 'the grainy level of community-inspired action' (Berry and Nelson 2007). The projects are described in some detail here to try and provide some insight into the process of trying to initiate ecocity developments from a community base.

Figure 22: The Urban Ecology Australia Inc logo is based on a design by Richard Register circa 1979 for the US Urban Ecology representing cities in balance with nature

7.2 Urban Ecology Australia

> Of all the world's cities, few are so liberally blessed with records of environmental change as is Adelaide. . .one of the world's best study sites for the urban ecologist.
>
> (Flannery in Daniels 2005 p.17)

A Brief History of the Organisation

Born in Adelaide, South Australia, Urban Ecology Australia Inc (UEA) was incorporated as a community non-profit educational association in December 1991. It grew to become a national organisation with formal recognition from the federal government as Australia's peak urban environmental community organisation. Urban Ecology Australia has the following objects and purposes:

a. To educate, inform and facilitate the exchange of information about the evolution of ecologically integrated human settlement through conferences, lectures, published papers, newsletters, participation in expositions and fairs, maintaining a library, and through other appropriate means;

b. To sponsor, undertake and encourage research to be carried out in relation to the evolution of ecologically integrated human settlement.
c. To provide an independent, community-based focus for co-ordinating and advocating action to transform existing human settlements in the direction of ecological integration, health, and social vitality and equity;
d. To participate in building new ecologically integrated, healthy, socially vital and equitable new human settlements.
e. To do all such other things as are conducive or incidental to the attainment of any or all of the above.

Before there could be interest in *urban* environmental issues, there needed to be a shift in perception within and outside the environment movement. The goal of UEA has been to inject eco-city ideas into the mainstream and interest lay people in ecological development[2]. To do that, mainstream media had to be involved and both the critique of present day cities and positive images and ideas for future cities needed to gain popular currency.

The history of Urban Ecology Australia can be traced back to the national Greenhouse '88 conference which, in Adelaide, led to the convening of people with an interest in urban environmentalism, including Deborah White, a co-author of an early Australian text on what would now be called sustainable cities (White, et al. 1978). The conference organisers accepted the inclusion of built environment sessions which later inspired the formation of the 'Greenhouse Association of South Australia' (GASA). My presentation was developed into the Ecopolis concept presented in Adelaide at the 'Ecopolitics IV' conference in 1989. The 'Greenhouse '88' proceedings (Dendy 1989) led to my attendance at the First International Ecological City Conference, April 1990, in Berkeley (Canfield 1990) which initiated links between Richard Register and Australian urban ecologists, vital to the development of ecocity activism in SA[3,4].

After returning to Adelaide from 'Ecocity 1', I was invited to mount an exhibition on Ecopolis at Old Parliament House and prepared ten panels illustrating the problems and promise of urban development and its environmental impacts (see 10.3 Exhibitionism: Ecopolis Now!). Launched by John Schumman, the exhibition

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[2] Incorporated in South Australia, its name expressed an intent to lay claim to a national role.

[3] Later in 1990, I spoke at the 'Architecture of Cities' conference in Calcutta organised by a former colleague from Yarmouk University in Jordan, Professor Santosh Ghosh. The conference adopted 'The Charter of Calcutta' which has since underpinned UEA philosophy.

[4] Register and the organisers claimed that Urban Ecology's 1990 First International Ecocity Conference would be 'the first major event to bring together the innovators and experts from around the world to consider reshaping towns and cities for health and vitality deep into the future…' (The Urban Ecologist 1989 p.14). The subsequent series of international ecocity conferences have been supplemented by national conferences with a similar style, content and ambience, notably the First Los Angeles Ecological Cities Conference in 1991 and the Australian Catalyst conferences in 1995 and 1997.

was well attended and helped familiarise South Australians with ecocity ideas, not least amongst politicians.

Changing the Climate of Opinion

In 1991 GASA held a second national conference, 'Greenhouse '91', at which Register was keynote speaker, with the theme 'Changing the Climate of Opinion' and in December 1991, Urban Ecology Australia Inc (UEA) was formally incorporated, having grown from many of the people and interests that had initially come together through GASA. UEA ran the Second International EcoCity Conference (EcoCity 2) in April of 1992, attracting over 400 delegates from 21 countries. As the formal follow-up to the First International Ecological City conference it helped set the pattern for the series of Ecocity conferences that have taken place since[5]. It did much to introduce the idea of ecological cities to Australia.

The aims of UEA were about moving beyond rhetoric to create practical propositions for ecocity solutions. In support of this goal, UEA announced the Halifax EcoCity Project at EcoCity 2 with an illustration of the project on the conference poster to give the proposal maximum currency. Before reaching this stage, the HEP had undergone a considerable period of gestation and community input (see below).

UEA's evolving theoretical base said that ecocity development should not simply be dependent on economic forces and that there had to be a culture that wanted such development. A precondition for this was the availability of relevant ideas in the socio-cultural milieu. If ecocity and ecological development words and ideas were not being employed in the media, there could never be enough general interest to sustain even modest proposals for ecocity projects. Between 1988 and 1992 UEA focussed on changing perceptions in order to set up one of the essential preconditions for acceptance of, and eventual support for, ecological cities.

Challenging Negativity

UEA set out to change perceptions in an up-beat way. Inspired partly by a workshop at 'Greenhouse '88' on combating despair in the face of global crises and the vigorous championing of the positive view from Flinders University philosophy lecturer, Malcolm Slade, it was decided that the best antidote to negativity was presentation of practical alternatives which demonstrated the route from 'here and now' to 'there and then'.

In public meetings and conferences across Australia and overseas, UEA speakers repeatedly found that the main source of negativity was not coming from the

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[5] Ecocity 3 was in Yoff, Senegal 1996; Ecocity 4 in Curitiba, Brazil 2000; Ecocity 5 in Shenzhen, China 2002; Ecocity 6 in Bangalore, India 2005; Ecocity 7 – The Ecocity International Summit, in San Francisco, U.S.A. 2008.

average suburbanite but people who had battled the system for years and dispiritedly believed that they knew exactly what could not be done.

The task of challenging negativity has not been limited to talks and conferences (which have been overwhelmingly positive), but also in running the organisation itself, particularly in the management of the Centre for Urban Ecology (CUE) which has been totally dependent on volunteerism[6]. UEA's policy of not tolerating sexism, racism, or pessimism, occasionally led to tensions. But just as a steady drip-drip-drip of negative criticism can undermine individual or collective confidence, so sustained effort to see the positive aspects of a situation can build confidence. Positive energy is self-reinforcing and over several intense years, UEA volunteers have generally reported their experiences with the organisation as empowering and liberating.

UEA has only been able to exist at all because of its volunteers. The human capital of energy, enthusiasm and commitment provided by volunteerism provided it with the capacity for promoting ecocity projects. Since opening the Centre for Urban Ecology in May 1993, UEA has been open to the public and has hosted many researchers and work experience students from schools and the tertiary education sector. UEA has had a website since 1994[7] and has hosted interns from many countries including Malaysia, Germany, Denmark, Canada, France and the USA. They assisted in the day-to-day running of the CUE and also undertook research projects on behalf of the UEA and, often, educational institutions in their home country. Ecopolis Architects have continued the intern tradition. Setting up a Centre for Urban Ecology led to provision of an information and referral service. A substantial reference library was established[8] and UEA routinely received requests for policy advice from elected representatives at all levels of government.

Being non-authoritarian does not mean being a soft touch, and neither does it mean a lack of structure and purpose. For a deeper look into the theory of non-authoritarian organisation, anarchist theorists remain relevant, especially Kropotkin and Bookchin. The connection between these organisational issues and effective eco-city theory is through community participation processes and theories of citizenship (Bookchin 1991, 1995). That citizenship involves active participation and advocacy in the community. On the basis that ecological cities can only begin to exist when there is a citizenship that wants its cities to be 'ecological', UEA has promoted ecocity ideas at the immediate, local level as well as regionally and nationally. Its advocacy has included the promotion of environmental technology and commitment to environmental education but this has always been a part of the overall goal of promoting ecological cities.

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[6] Not least from Chérie, whose central role as co-ordinator was an unpaid position.

[7] Initially, thanks to the generosity of Michael Harbison, an early champion of the idea of a fully wired city. Harbison is a former circus fire-eater, sword swallower, ringmaster and tent manager with Ashton Circus who was the entrepreneurial founder and manager in the mid-1990s of the Ngapartji multi-media centre. Since 2003 he has been Lord Mayor of Adelaide.

[8] Thanks to UEA Life Member #1 David Munn.

Its commitment to demonstrating practical outcomes has been evidenced through involvement in consultancies for private and public sector clients where the goal is ecological responsibility in urban development. UEA's advocacy of major inner-city, ecological development has been on the basis that the primary means by which developmental and environmental pressures can be reconciled with the restoration of nature is through the massive resource management capacity inherent in the built environment.

Promoting Demonstration Projects

UEA quickly evolved into a genuinely national organisation in the early 1990s and had branches in Victoria and the ACT. It achieved formal recognition from the federal government and contributed to national, state and local governmental panels as well as the life of local communities. But whatever else it has been engaged with, during its history as a formal institution it has maintained the goal of initiating major inner-city redevelopment projects as a key strategy for achieving change. This strategy derives from my proposition that the making of Ecopolis depends on catalytic changes in the urban fabric – a fabric understood to be woven from the threads of social and built form. At the socio-political level, as a cultural intervention, if 'a key building can help to switch a city' (Davey 2000a p.47) then so can key developments. Placing the community at the heart of the development process is a necessary, radical program for determining the type and ownership of any such city 'switching'.

The future of sustainable development has to involve practical partnerships between the industrial, commercial, governmental and community sectors. This was the theme of the 'Partnerships for Change' conference convened in Manchester in 1993 where the 'Sustainable Urban Communities' workshop noted that 'The history of the city is a history of partnership, of people coming together to create the conditions for social, economic and environmental security' and that 'The city, in partnership with agriculture in rural areas, has been both a vehicle and catalyst for change.'[9] UEA has always seen ecocity projects as vehicles and catalysts for change, with the community as leading partners in the process.

Three Fractals

> 'I'd guess about the smallest project that could qualify would have to be about one to two blocks in area such as the Integral Neighborhood we (Urban Ecology, USA) proposed around 1977 for West Berkeley (two blocks) and the downtown Heart of the City project

[9] Workshop 3 – Sustainable urban communities (Chair, Jaime Valenzuela; Animator, Paul Downton; Rapporteur, Orapin Sopchokchai; Conference International Advisory Group Member, Michael Ndubiwa), in *Partnerships in Practice* Department of the Environment, London 1994 p.63.

> we (Ecocity Builders) are still working on in downtown Berkeley (one block but in an area so dense lots can happen in just one block). Whole districts of many blocks could also constitute urban fractals. The Halifax project would have been one of those.'
>
> (Register 2008[10])

Since 1990 UEA, in association with Ecopolis Pty Ltd, UEA has been advocating and proposing ecocity developments as catalysts for change – the 'cultural/urban fractals' introduced in Chapter 1. In the three Ecopolis projects described here, the evolving 'Ecopolis Development Principles' have been used, with varying degrees of application and success, as the basis for their design, development and management. They represent, in effect, tests of imaginative scenario planning – adventures in ecocity making – and they range from unbuilt experimentation with ideas (The Halifax EcoCity Project) to active development of community and physical structures at the municipal scale (Whyalla EcoCity Development) and the neighbourhood (Christie Walk). The projects are all in South Australia. Two are in Adelaide, one of the last places on the planet to be colonised, with interesting characteristics as a potential model for ecocity making. As Susan Heller Anderson, a metropolitan staffer of the New York Times, wrote in 1987:

> Picture San Francisco without the hills, or Cambridge, Mass., without the river, or Savannah without the azaleas. That's Adelaide, which too has enlightened restoration of its 19th-century architecture, good food and spectacular scenery. But there is more: just one step from the outback, Adelaide embodies Australia's fragile balance between civilization and isolation.
>
> (Anderson 1987)

The first project to be publicly announced was the Halifax EcoCity Project in 1992. This was a proposal for a high-density, inner-city mixed-use development on a 2.2 hectare site in Adelaide. It subsequently received enormous community support and gained international acknowledgment as an influential model for advanced, integrated, inner-urban ecological development but conventional developers and the local city council failed to engage with the community in carrying the vision through to reality. It now exists in a semi-legendary state without corporeal reality.

The Whyalla EcoCity Development was proposed in 1996. It not only received community backing but was initiated and supported by the city council. Community developers were erecting innovative, environmentally-friendly buildings within 18 months of the project first emerging as an idea. It continued to proceed, fitfully, on 15 hectares designated as the EcoCity Core Site, in Whyalla. A change of council led to reduced support for the project, and recently, private sector corporate interests have fully and finally undermined the original vision.

Christie Walk was originally proposed as a component of the Whitmore Square EcoCity Project which was a conceptual fractal that contained a series of yet-to-be-determined projects within the south-west quarter of the City of Adelaide. It was pursued as an entirely community-based enterprise embracing democratic processes

[10] Personal communication.

and ethical investment as well as non-profit structures and uncompromising ecological criteria. Site works commenced in early 2000, the first resident moved in during April 2001, and the last residents moved into the third and final stage of the project at the beginning of 2007.

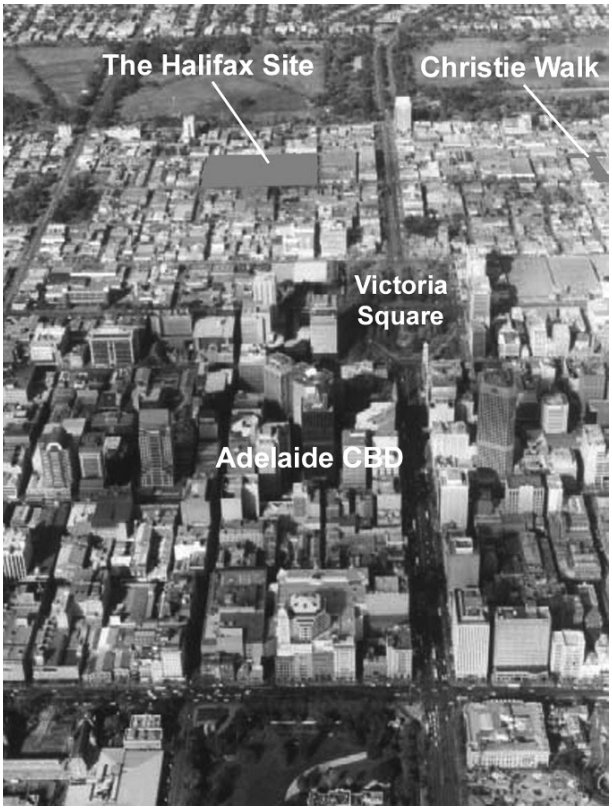

Figure 23: The City of Adelaide showing the location of two of the case study sites

7.3 Fractal 1: The Halifax EcoCity Project

> The Halifax EcoCity Project does exist. Its realism has grown out of the detailed planning for this specific project which is well advanced for a specific site awaiting urban renewal in the inner city area of the South Australian state capital of Adelaide.
>
> (Prelgauskas 1994 p.5)

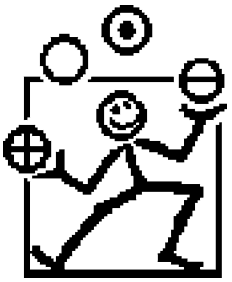

Figure 24: The Halifax EcoCity Project logo[11]

Beginnings

The Halifax EcoCity Project (HEP) and UEA evolved during the late 1980s and early 90s. The HEP did not so much grow out of the 1992 Second International EcoCity Conference (Orszanski 1993 p.3) as develop from activities that the eventual HEP protagonists were already involved in, namely, seeking ways to build a working example of the Ecopolis idea. The Project proposed a 'piece of ecocity' for 800 people including community facilities, cafés, shops, offices, an Ecology Centre and market place. The car-free, mixed-use development of 3–5 storeys would have been of a similar density to traditional European cities. It was conceived as a means of catalysing redevelopment in the City of Adelaide and as a device for promulgating the ideas of ecological development.

Placing the Project

Co-protagonists UEA and Ecopolis identified the 2.4 hectare, polluted, ex-industrial wasteland site of an old City Council works depot in South Australia's capital city as an ideal site for demonstrating ecological development processes. The HEP protagonists believed that the site could have been the location for a world leading precedent on how to take an inner-urban site all the way through from the processes of remediation to occupation as a totally healthy human built environment. The site was heavily contaminated due to a range of past activities, in particular the presence of an asphalt plant and coal tar storage and distillation[12]. Ecological development is about healing and restoring such damaged environments. Public pressure, mobilised

[11] Inspired by an idea from Roman Orszanski, the Halifax EcoCity Project logo (shown here in its original bit-mapped format) represents humanity learning to juggle the elements in an attempt to place human settlement (represented by the square) in a position of dynamic balance with the biosphere.

[12] The main contaminants were coal tars with elevated Polycyclic Aromatic Hydrocarbons (PAHs) and lead levels with hotspots of arsenic, mercury, and petroleum hydrocarbons.

by the EcoCity supporters, was instrumental in the Adelaide City Council's decision to clean the site to residential standards.

The goal of the Project was not just to create an environmentally-friendly development but to address numerous issues related to development processes and the impact of the city on its hinterland. These included:

- exploring community-driven development and social equity in development
- challenging status quo power relationships and questioning assumptions about the purpose and cost structures of the development industry
- exploring various forms of tenure and community management structures
- linking urban and rural development and advocating holistic urban planning.

It became an experiment in community development sustained by a nucleus of activists. It moved unevenly from concept to partial realisation by consolidating political momentum at the community level. The Project was always described as a 'piece of eco-city' (this was to lead to the concept of the urban fractal) to reinforce its connection to the existing city but also it complies with 'urban village' definitions[13], incorporating principles of social equity, community enterprise and ecological responsibility. It has similarities with other eco-city models but is notable for its emphasis on the connectivity of city and region – it attempted to address rural degradation by proposing that the restoration of rural land was an integral part of the overall urban development program. The intention was to create a testable model that linked the sustainability of a city's economy and resource base to its bioregional context.

Projected Features

The Project would have featured green technology with climate-responsive architecture, non-toxic construction, solar hot water, solar electricity production and on-site biological treatment of sewage. Initial concepts included massive 400 mm thick walls providing thermal mass (cool in summer, warm in winter) and exceptional sound insulation. Privacy was maintained despite windows facing into courtyards and public spaces to allow passive surveillance of children and the immediate environment. The site was compact, within 10 minutes walk of the CBD. There was to have been no through-traffic for increased safety – and no poisonous fumes. A significant amount of open space was to have been retained at ground level, complemented by rooftop gardens and balconies. All these features reappeared later in the Christie Walk project.

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[13] Aldous, Tony (Ed.), Economics of Urban Villages – A report by the Economics Working Party of the Urban Villages Forum, Urban Villages Forum, London 1995. This Report appears to confirm the general nature of our independent, Australian-based observations about the problems and prospects of the urban village/eco-city, community-based development model.

Apart from researching and designing the environmentally-friendly physical structures, the project required research, design and construction of the 'invisible' financial and management structures to ensure that its economic and social foundations were equitable and democratic. Without this, in the Ecopolis theory the project could not have been truly ecological. In a 1994 grant application prepared in support of the Project, Adrian Shackely noted that, amongst other things:

> Putting in place the legal and financial structures for such a project involves ground breaking innovations. There is no comparable project anywhere in Australia although many of the elements are present in various places. If it is successful, it will provide significant breakthroughs in many areas including legal arrangements, financing, provision of community facilities and environmental enhancement and sustainability.

Funding was planned to come from a number of relevant, ethical, and appropriate sources, the bulk coming from the contracted pre-sale of properties – this pattern of funding was actually adopted for the later Christie Walk development. The Project was sustained by the input of skills donated by hundreds of people over a total period of seven years.

Initiating the Project

> Respect for the first people of Tandanya is crucial to making Adelaide an eco-city. Development of the project was only continued after consulting with the Kaurna Heritage Committee to make sure that the project was suitable for the land.
>
> (Munn 1995 p.62)

To distinguish the development process from the direct interests of the project initiators, UEA created a management team that included representatives of community and environment groups, educational and tenants' associations, trade unions, and business[14]. First convened in October 1992, the team was intended to survive just long enough to set up more permanent structures for realising the ecocity vision. It led to the putative formation of a land trust, and the actual creation of a Residents and Users Group and the company EcoCity Developments Pty Ltd. Regular information meetings and workshops were held for interested members of the public and potential residents. In May 1993 sponsorship was obtained for opening shopfront/office premises in Halifax Street, adjacent to the depot site, as a base for the operation of UEA and its advocacy of the HEP. The operation of a Centre for Urban Ecology (CUE) became an important part of the ecocity advocacy process. It meant that information was available in a non-confrontational way every day, all

[14] Organisations involved in the development of the project or who supported the proposal include: The SA Gas Company; Building Trade Unions – the Building Trades Federation and Construction, Forestry, Mining and Energy Union; The Conservation Council of SA; the Australian Conservation Foundation; the Kaurna Heritage Committee (representatives of the indigenous people of the Tandanya Bioregion); and Aurora Heritage Action.

week, and anyone interested enough to walk in the Centre could find someone to talk to about the HEP. Many volunteers were needed to have people continually available for this much community interaction and it is a measure of the Project's success that it attracted and sustained a large and dedicated volunteer group over many years. In the absence of any paid work, it was the quality of the volunteer experience that helped to maintain interest and commitment. For over 3 years, for instance, there were daily vegetarian lunches prepared and shared by every volunteer in the Centre.[15]

A Working Model

> . . .the life of a community project flourishes in the details. And the Halifax EcoCity Project is stuffed not only with more than 200 subscribing individuals, but features that sing a new ecologically rich way of life: rooftop gardens, bridges between buildings, locally popular verandahs, balconies, decks, terraces that become levels of fertile land hovering in the air
>
> (Register in the Ecocity Prize citation 1994)

Although the Halifax EcoCity Project has not been built it still has currency as a working conceptual model for urban ecological development. Early in the life of the project Emilis Prelgauskas[16] wrote of its grounding in the real places and processes and observed that 'The detail planning of that project incorporates ideas from 'urban ecologists' from around the globe; and has involved the work, involvement and commitment of many people in the local community; focussed together through Urban Ecology Australia Inc.' (Prelgauskas 1994 p.5).

The HEP was always intended to be subversive. Its success as an urban ecological intervention would not have been limited to assessment of the quality of its architecture, or by how much sewage it recycled, but by how much it created a population base in the City of Adelaide capable of redirecting the concerns of the municipality towards ecological responsibility and social justice. Despite being the capital city of the state of South Australia, Adelaide is a remarkably contained political environment capable of being changed by a small number of active citizens. Because it is not only the capital city of the state but almost its only city, its influence on the development of the state and region is exceptional. The 'Halifax opportunity' was political as well as didactic.

A number of (non-party) political goals were integral to the setting up of the Halifax EcoCity Project. 'The immediate goal. . .(*was*) to reopen a public sphere in flat opposition to statism, one that allows for maximum democracy in the literal sense of the term, and to create in embryonic form the institutions that can

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[15] The human ecology of the CUE and the Project has created a wealth of experience for hundreds of people and there are rich human stories to tell about the lives and times of the CUE volunteers which I have had to resist the temptation of including in this book.

[16] Prelgauskas was one of the founding board members of UEA and worked closely with Chérie and I in the early days of both UEA and the HEP.

give power to a people generally.' (Bookchin 1995 p.231). UEA's primary goal was to establish a major development project configured on principles of direct democracy, with the expectation that this would affect the local politics of the neighbourhood by providing an example of a community-based, democratically-run ecological built environment, and later, to affect the politics of the city and the region. Following Bookchin again 'If this perspective can be initially achieved only by morally empowered assemblies on a limited scale, at least it will be a form of popular power that can, in time, expand locally and grow over wide regions.' (Bookchin 1995)

There was a certain amount of gall in the proposition that a community organisation was capable of undertaking a major urban development with no track record and no conventional financial resources. It was always understood by those at the core of the project (and many others who understood the depth and breadth of the intended agenda) that failure to build the HEP would not mean the project had failed provided it had been influential in the wider community. There was a strong sense of mission regarding the project's potential to raise popular consciousness of what was possible in urban development and community-based politics. Configured as a small piece of ecocity it shared the agenda of confederal municipalism inasmuch 'That its future is unforeseeable does not alter the fact that its development depends upon the growing consciousness of the people, not upon the growing power of the state. . .' (Bookchin 1995 p.231)

A Cultural Adventure

Achieving a shift of consciousness; affecting the culture of the city and the region; influencing urban development objectives and ideas; affecting popular and planning cultures; all these were hoped for and intended outcomes regardless of whether the project was ever constructed. The goal was focussed but its realisation was subject to evolution according to circumstances. The situation remains such that '. . .how that consciousness, concretized in highly democratic institutions, will develop may be an open issue. . .' (Bookchin 1995 p.231)

The Ecopolis concept as represented by the Halifax EcoCity Project was constructed on the basis of intuitive design informed by academic research. The HEP was conceived on the basis of extant knowledge, testing the Ecopolis proposition that the concepts, principles and techniques already exist that are required to create human settlement that fits within the ecological systems of the biosphere. It was intended as a vehicle for the continued evolution of ideas rather than as a hermetically contained, end-point prescription for urban development. There was a spirit of excitement about the idea of trying to build the Halifax EcoCity Project that was not solely to do with bricks and mortar – for many people involved with the Project the thought was that '. . .it (would) surely be a political adventure.' (Bookchin 1995 p.231).

Figure 25: UEA's 'Make EcoCities Not War' banner in a crowd on Adelaide's Festival Plaza, demonstrating for peace

Regional and Economic Context

Adelaide is on a coastal plain known by its original people as Tandanya (Place of the Red Kangaroos). Criss-crossed by seasonal watercourses, the land occupied by the metropolis used to support a rich ecosystem but now a few degraded hectares of original vegetation remain amidst the hundred thousand hectare suburban sprawl. The climate is Mediterranean/arid irregularly subject to 'cool changes' (when the daytime temperature can drop 20°C within an hour). Temperatures rarely reach freezing. Average rainfall for the city centre site is approximately 500 mm per year.

South Australia was founded in the same year as Texas (1836). It has a mixed history as both 'paradise of dissent' (being first state to give women the vote and have an aboriginal governor) and as the intended site for a new aristocracy. Its social structure has been increasingly democratised but evidence of the original patriarchal class structure remains in institutions like the 'Adelaide Club'. The bell-tower of the Roman Catholic cathedral, adjacent to the central Victoria Square, was only completed in 1996, and the square mile defined by Colonel Light's military grid is, in modern terms, under-developed. Apart from the fairly common car crashes, violence is rarely visible in the streets, but vague undercurrents of unease swirl beneath the social landscape.[17]

The civic rose bushes and plane trees deny it, but this is a frontier town, on the edge of desert, facing the Southern Ocean and struggling with an economy based on exploitation of a landscape that is still largely a mystery to the immigrants who have tried to tame it for wheat, steel or coal. Cultural contradictions abound and from the bowels of one of the world's biggest copper mines in this non-nuclear state comes uranium to feed the global nuclear industry. Car manufacturing, wheat farming and sheep keep the financial wheels turning whilst the thin, ancient topsoil is readily lost to erosion and literally blows away in the wind. Large urban developments have only proceeded with logistical and financial support from State and/or Federal

[17] Salman Rushdie once claimed that the city was like the setting for a Stephen King novel!

Figure 26: The Tandanya Bioregion drawn for the program of EcoCity 2 – The Second International Ecocity Conference, convened by UEA. That the relationship between the city and its region is fundamental to the ecological viability of urban civilisation is the first proposition of the Ecopolis theory

government – a feature of the development landscape for so long that it is now structural. A 'big is beautiful' mind-set is entrenched at most levels of government and the community is perceived as a disruptive influence in the orderly playground of party politics.[18]

Process

> This plan and its process to date is poetry in community building, and the voice to read the poem is the public decision making process
>
> (Register in the Ecocity Prize citation 1994)

To take account of people's real needs and to try and ensure that any added value in the development would be returned to the community, from its inception the Halifax EcoCity Project was designed to proceed on the basis of community participation.

Despite minimal exposure in mainstream media and with no advertising budget, within 2 years the Project had received over 600 registrations of interest from potential residents. The community of the Project began forming as people keen to live in an ecocity began to meet at Potential Residents' Meetings, at events held by UEA and by dropping into the Centre for Urban Ecology shop front. That early participation translated into an ongoing commitment from some individuals who could be found several years later involved in the Christie Walk project.

The Barefoot Architecture Program

> The barefoot architecture program. Get involved , they say; what for, I say. Hey, I know what I want. It's easy. What did you say the available floor area is? That can't be right. No one can live in that postage stamp floor area. How much was it again for extra floor space? Boy, the first offer will do just fine thanks
>
> (Prelgauskas 1994 p.21)

The HEP was breaking ground in Australia, taking concerns about the quality and purpose of the built environment into broader public arenas, rather than keeping it within the portals of the professions. This was evidenced by the 'Barefoot

[18] In contrast to the ecocity development model and to the extent that, on the admission of key advocates for the contentious 'Multi-Function Polis' in the then State government, the community was deliberately excluded from the entire development process for what was intended to be the biggest urban development since the failed Monarto new town project of the 1970s. (Personal communication with John Mayfield from the Premier's Office (John Bannon) 1989).

Architecture Program', described in Chapter 10 and which strongly influenced the detailed realisation of the design for the project's build form.

The Built Form

> Paul Downton has covered all sustainability issues with a real feel for creating a 'sense of place'.
>
> (Barton 2000 p.277)

Here is how I described the architectural intent of the Halifax EcoCity Project in 1994:

> Walls of 400 mm thick rammed earth run in great parallel lines across the site of what was once a toxic scar in the middle of a young colonial city.
>
> Spanned by reinforced concrete floors these earthquake resilient walls extend the technology of earth architecture. Roof gardens alternate with steel and copper roofs and more than a thousand solar collectors make hot water or export electricity to the grid. Buildings range in height from two storeys to five, with passive-cooling belvederes carrying water tanks, stairs and lifts.
>
> Eschewing traditionalist pastiche the architecture generates the patterns of future tradition. A simple grid (of 7.6 m) determines the 'warp and weft' of the primary urban form – a massive, resilient structure of earth walls – earth resting on itself, eventually to return to itself. Working within this framework like an old, existing town, the architectural fabric is woven in and around it all. Spontaneity, eclecticism and idiosyncrasies of real people combine in making buildings open to change – not dead objects in space, but evolving architecture in a living place.
>
> Too often, 'eco' projects are objects you look at from the outside but this project will surround the visitor, immersing them in an experience of tactile and scented reality, creating ambience as well as image.
>
> The planning grid is square, apartment blocks enclose square courtyards and the square, with the occasional intervention of a circle, is used as a thematic device throughout. Repetition is avoided. No courtyard is enclosed by the same profiles and every elevation is unique, being designed with input from the households whose home the buildings are (Downton 1994 and 1996).

Analytical Diagrams of the Halifax EcoCity Project Design

The following diagrams illustrate the layered complexity of design inherent in the HEP. The layered analysis technique was inspired by McHarg's 'design with nature' methodology (see Chapter 4).

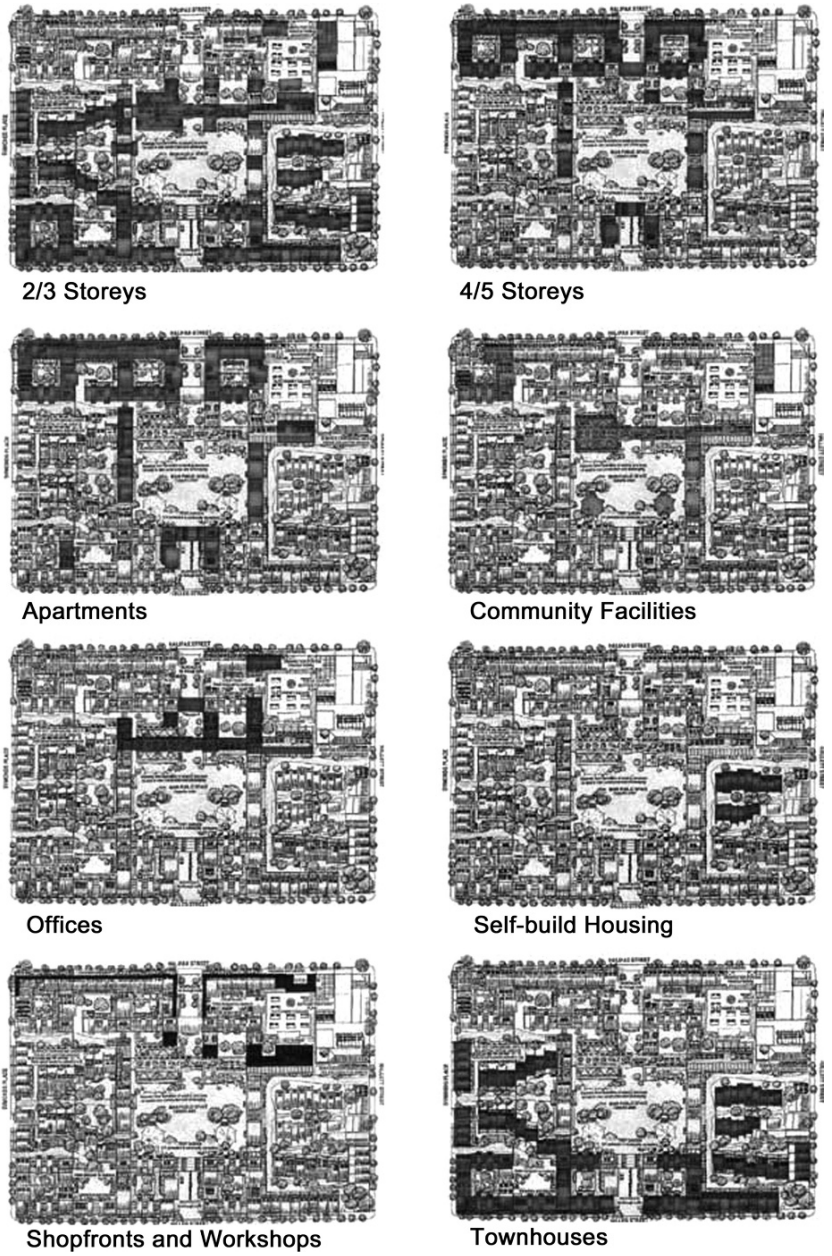


Figure 27: Building Types and Configurations

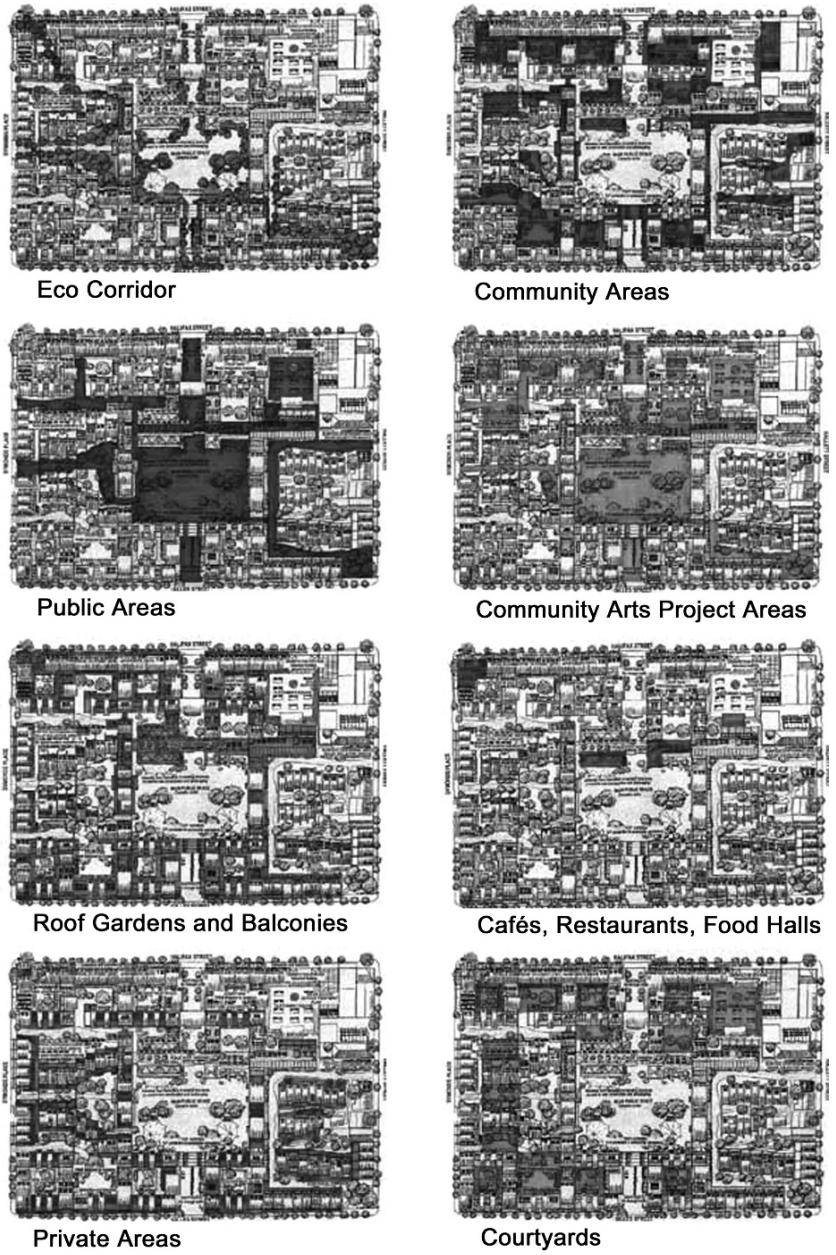


Figure 28: External Space Types

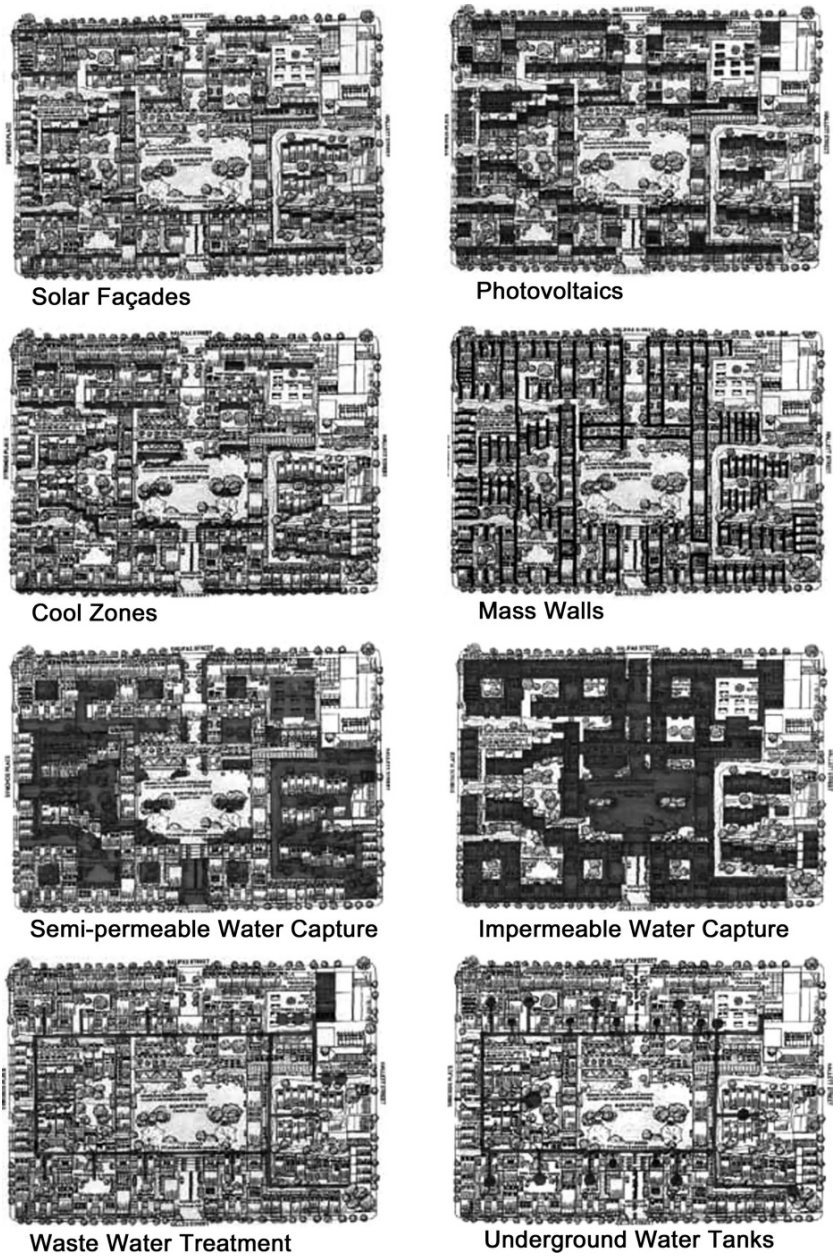


Figure 29: Climate and Energy, Water and Services

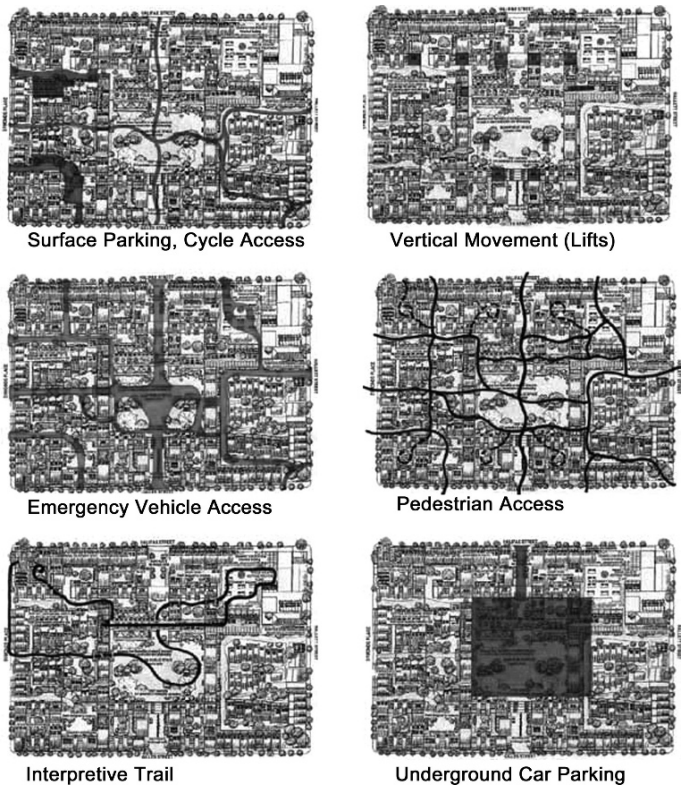


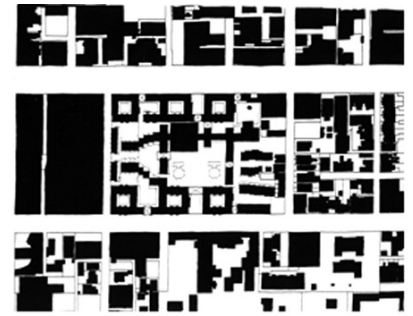
Figure 30: Movement

History 1992–1998

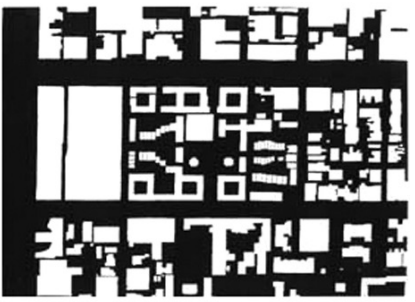
A letter of intent, setting out the basic proposition and including an initial sketch plan for the Halifax Depot Site, was composed by Ecopolis Pty Ltd as protagonists for the project with the support of Urban Ecology Australia Inc., and sent to Adelaide City Council (ACC) to register an interest in the site. It was accompanied by supporting documentation including a set of the Ecological Development Guidelines[19] and was distributed to potential interested parties and likely or desirable participants in the development, such as trade unions, tenants' associations, educational associations, industry, environmental and community groups.

A Management Team evolved from the informal people network generated by and around the directors of Ecopolis and the members of UEA. The creation of the Management Team served to distinguish the development process from the direct interest of the project initiators. The Team was formed by inviting people as individuals and/or as representatives of key organisations to join it and was first

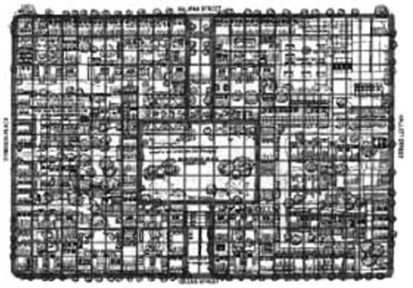
[19] An early version of the Ecopolis Development Principles – see Chapter 11.



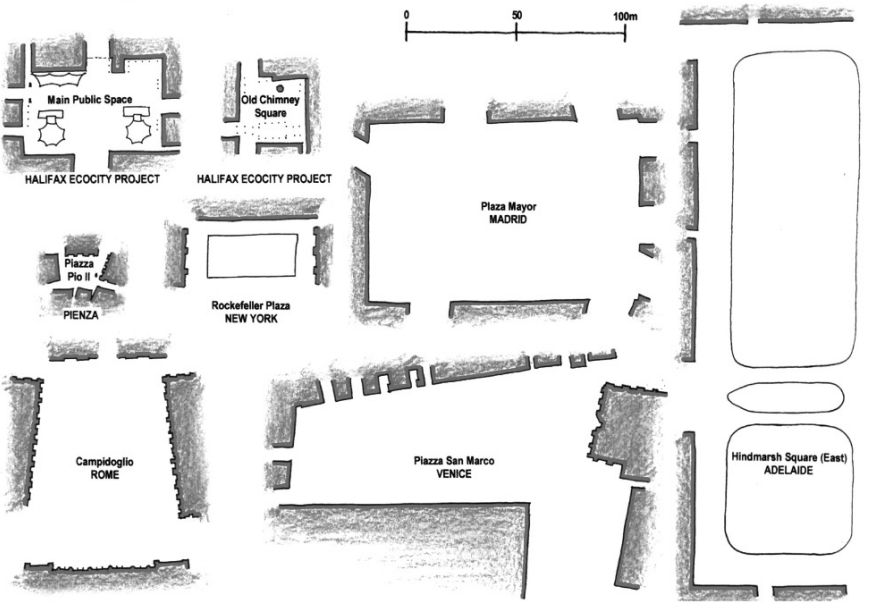
Urban Pattern – Figure



Urban Pattern – Ground



Planning Grid



Public Squares

Figure 31: Urban Patterns

formally convened in October 1992. The Team had the responsibility of setting up the formal structures for proceeding with the project. Three working groups were set up to research and advise on this process. After serving its original creative purpose the Team passed ongoing administrative responsibilities to a smaller group mostly drawn from the original members.

The responsibility for the project was then transferred to three core structures:

The Halifax EcoCity Land Trust: The Land Trust working group advised the Management Team to set up a Land Trust or Land Bank to own the land, control the finances and set out the caveats and parameters for ecological development on the site.

EcoCity Developments Pty Ltd: The Ecological Development Board working group advised the Management Team to form a primary development body – EcoCity Developments Pty Ltd – to take the place of a conventional developer. Seven years later this company obtained a builder's license and became the construction company for Christie Walk.

Residents and Users Group: The Community Board working group advised the creation of a Residents and Users Association to represent tenants, owners and users of the site. This was known as the Residents and Users Group. It dealt with conflict resolution and community demands and helped facilitate the on-going participatory design, maintenance and management processes.

Wirranendi Inc.

In late 1995 it was decided that an incorporated cooperative was the best structure for the development of the Halifax EcoCity Project. The name chosen was Wirranendi Inc. – which means 'becoming transformed into bushland', and is a word derived from the Kaurna, the Aboriginal people of the Adelaide plains. Its first General Meeting was held on 3 February, 1996. Wirranendi was later to become the development entity for the Christie Walk project.

Registrations, Meetings and Workshops

Interest and participation was sought from a wide range of people and organisations who were asked to consider taking up roles as residents, investors or supporters in whatever way was appropriate to their personal goals or institutional missions. This was done with a Registration of Interest form. No legal commitment was taken or implied from this registration but it provided the project with valuable expressions of support and an important database[20] to help with detailed development of the project design and preparation of business plans.

UEA organised regular public meetings to introduce the project and advertise its existence and purpose to the wider community. These meetings had a local focus but

[20] The database was kept confidential with access controlled by the Coordinator of the CUE.

also took place in other cities as part of the process of building support and interest across Australia.

Building on the feedback from Registrations of Interest and Potential Residents Meetings, a series of Barefoot Architecture Program consultations and Design Workshops involved participants in the 'hands-on' design development of various aspects of the project. Those aspects ranged from the macro level of regional infrastructure, history and ecology to community art and design; from local planning and administration to overall site planning considerations; and from detail design issues and materials procurement to site construction organisation and procedures.

Option to Purchase

The original Letter of Intent was not formally accepted by ACC because they advised that a process was being initiated leading to requests for expressions of interest. This did not happen. UEA continued to push for community-based ecological development on the Halifax site and succeeded in convincing the Council that there was sufficient credibility in the proposed ecocity project and its protagonists that on 7 February 1994 the ACC voted 13–3 to offer UEA a 12 month option to purchase the site (Munn 1995 p.62)[21]. Two weeks later in response to a recision motion put up by Councillor Jim Crawford, the Council voted 11 to 3 to reaffirm the original decision.

Negotiations were undertaken on the price of the site and the option in April 1994. These were then halted as the ACC admitted liability for the clean-up of the site. A mutual decision was reached that the Contract and Heads of Agreement would no longer be negotiated until ACC evaluated the contamination on the site and agreed to a clean-up plan.

Roelof's Report

One of the pivotal meetings in the history of the HEP was reported by an American researcher who happened to be in Adelaide at the time as part of a study tour.

> On February 7, 1994, the Halifax Project was the main agenda item at an Adelaide City Council meeting. The gallery was filled (including this author (Roelofs)) and many enthusiasts were sitting or standing in the aisles. There had been extensive community discussion of the project for years, the councillors already had strong opinions about it, and several of them passionately defended it. Some liked the idea of initiating environmentally sustainable development; others hoped that this would bring people back to city living. . . .
>
> The opponents of the project believed that any developer should have a chance to bid on the property, and the City Planner supported this protocol. Some questioned the financial competence of the group, to which the supporters countered that commercial developers are not held to such high standards. . ..Finally, the majority of the council agreed that the

[21] David Munn, first Life Member of UEA, was the 'keeper of the chronicles' for the first year or so of the HEP.

> proposal was different from an ordinary commercial development, and that it deserved special treatment. They voted eleven to three to grant the Halifax Project an option to purchase the site. . .[22]
>
> The Halifax Project is underway and has attracted worldwide interest
>
> (Roelofs 1996 pp.34–38)

Non-events and the 1994 EcoCity Forum

Meetings promised by ACC to discuss the state of the site were not forthcoming. After waiting several weeks for a response, UEA wrote to the new Chief Executive Officer of ACC, Ilan Hershman, expressing several deep concerns regarding the Council's dealing with the site and with UEA. ACC agreed to remediation studies, the cost of which were included in the 1995/96 budget. Studies on the site contamination were completed in April 1996. The Council budgeted for a sum of nearly $4 million for site clean-up and accepted the recommendation that: 'Investigations of remediation methods . . . be completed using the current approach of arriving at a totally clean site'. UEA was in communication with the ACC to select the best method, which was to include bioremediation.

To celebrate progress to date and to keep the community informed with the Project's development, UEA convened a major public meeting, the Halifax EcoCity Forum, in December 1994. The day before the Forum, UEA received a letter from Ilan Hershman, signed by Ian Pascoe, responding to the events of October and UEA's letter of 17 October.

ACC's Urban Services Committee voted unanimously to pursue a total clean up of the EcoCity site as recommended by consulting engineers AGC Woodward-Clyde and the Council's Halifax site manager, Eugene Kalibatis. The clean up cost was estimated as likely to reach $3.6 million but would leave Council with no ongoing liabilities.[23]

Hobsons Choice

Delays with getting on to the main site prompted the Wirranendi Management Team to purchase a small piece of land in Hobsons Place, near Halifax St, on which to build five townhouses. The project was to prototype two of the main building types of the Halifax Project and trial co-op ownership and management structures (see The Bourne Court Pilot Project in 7.5 Fractal 3 for further information). Later in the same year South Australia adopted 'community title' as a replacement for 'strata' land tenure.[24]

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[22] Roelofs appears to be reporting the figures from the later, recision motion vote.

[23] The cost of cleaning up the site was eventually to reach in excess of $6 million.

[24] As of November 1996 a new bill was gazetted in the SA parliament to bring in 'Community Title'. Community Title broadly follows the form of similar tenure legislation in New South Wales

Figure 32: 'Wirranendi – the Halifax EcoCity Project' was accepted by the UN as an example of Best Practice for exhibition at Habitat II – The City Summit held in June 1996 in Istanbul, Turkey. Pictured are the UEA Youth contingent for Habitat 2 – Sharon Ede, Sam Knottenbelt (van Rood), Rhiannon Downton-Hoyle

Halifax Report – October 1996

The ACC commissioned Ecopolis Pty Ltd, who worked in association with UEA, to prepare a report, 'The Halifax EcoCity Project and Site Remediation Strategy' which was submitted in February 1997. In this report Adelaide City Council was formally presented with a model for a participatory 'steering committee' proposal which would have set up an EcoCity Trust to oversee and steer the overall process of development. The report identified opportunities for public-private-community sector cooperation based on successful 'urban village' programs in the UK, but no one in the council ever seemed to understand the concept (Ecopolis Pty Ltd 1997b).

Preferred Developer – December 1997

ACC decided to put the development of the Halifax Site out to tender with a closing date for early in 1998. They voted UEA as the preferred developer of the Halifax site and this was reflected in the tender documents.

> The Adelaide City Council gave instructions for the development of the former dumpsite that reflected just about everything Urban Ecology said should be done, including ecological responsibility and people-oriented planning and design. All seemed fine
>
> (Arnold 1999 p.29)

ACC shortlisted developers for the Halifax Site and then chose four tenderers, including its preferred developer UEA, whose proposals for developing the Halifax

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to provide a basis for managing complex mixed-use developments. The HEP proposal was used as an illustration for the merits of Community Title in a discussion paper circulated during the development of the Bill.

Site were presented to council in May 1998, but it transpired that UEA did not have full control over its consortium 'partners' (see below). The other tenderers were Built Environs, Connor Consulting, and Pentroth. The vote on the choice of developer for the Halifax Site took place on Monday 15 June 1998.

The Halifax Site Tender

> The site is one of the largest and most prominent redevelopment sites to come onto the market for many years and provides an opportunity for the chosen developer to create an innivative (sic) world class environmentally sustainable development consistent with the attached Development Brief. [25]

The ACC's brief for the development of the Halifax site addressed all the aspects of creating an ecological development as advocated by the UEA. UEA totally supported the ACC's final tender process because it was open and transparent. The anger reported by many people about the outcomes of that process were not simply to do with the HEP not proceeding as envisaged, but with the fact that the council reneged on its own brief and processes and, in so doing, acted in an undemocratic manner.

Dancing with the Wolves

A number of meetings took place in the offices of Barry Phillis and Associates to put together the people and processes necessary to establish the HEP proposal as a development proposition from an industry-NGO group with the capability of undertaking the development. UEA was not required to submit a registration of interest as it was included in the final tender selection process in any case. Nevertheless, the UEA Board felt it necessary to submit a formal document out of concern for being seen to pursue due process. At that time, the understanding was that Alpine Constructions would act on behalf of the interests of all parties in what would be later formally constituted as a consortium. The Registration of Interest submitted by the nascent 'consortium' was primarily put together by Robert Papilion of Alpine Constructions and myself. Papillion was responsible for the final production. I contributed the text that described, point-by-point, how the proposed development would address each dot point in the Council's demanding brief. This was not the formal 'tender document'.

The Urban Ecology 'consortium' eventually consisted of: UEA (ACC preferred developer and community participation and education), Ecopolis Pty Ltd (architect),

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[25] From the Introduction in the call for 'Registrations of Interest to purchase and develop the former Halifax Street Depot' released by First Pacific Davies acting on behalf of the Corporation of the City of Adelaide.

Barry Phillis & Associates (project managers), Hansen Yuncken & Alpine Constructions (developers). UEA attempted to formalise a contractual agreement with the developers prior to the tender's submission, but this never transpired. In retrospect, it is clear that UEA relied too much on trust in Alpine's apparent enthusiasm for the Project and Papilion's track record of support.

The tender document that was finally prepared was done as a submission from 'Alpine Constructions and Hansen Yuncken as the Halifax Ecocity Group'[26] At no time had UEA been consulted regarding the formation of this group. The tender submission was by this group 'in association with Barry Phillis and Associates, UEA, Ecopolis, SA Housing Trust and the Master Builders Association'. Although the final tender document was titled 'Halifax EcoCity Project' it was the least representative of the two documents. Hansen Yuncken and Alpine prepared and submitted the final tender document, without it being sighted by UEA. The tender document omitted material prepared for the tender document by UEA Inc and Ecopolis Pty Ltd relating to community processes, information, UEA's international outreach and reputation, and design.[27] The first presentation to the City of Adelaide was done by Hansen Yuncken and Alpine Constructions without them informing UEA that it had taken place. At the insistence of Hoyle and Downton, the second presentation to ACC did involve UEA (and also Ecopolis Pty Ltd), but UEA's role was presented by Alpine and Hansen Yuncken as that of a consultant to their development entity.

What had been conceived and developed in terms of organic, community based processes was disposed of by Hansen Yuncken and Alpine Constructions, as a desperate development bid, whilst the ACC's professed concern for the bottom line saw a shift away from the dominance of a community zone of influence to that of a corporate zone of influence. Then Lord Mayor ceased being supportive, and became critical of UEA for trying to operate outside conventional development parameters – thus undermining attempts to change the dominant paradigm at a crucial time.

Developers Selected

> At the debriefing by Council staff after the Tender process and after Council had decided they would go with Pentroth, the Council staff said that the only thing the tender had fallen down on was the dollar component, and that not all the information which we had put into our Registration of Interest Document to Council with Alpine Construction had finally turned up in the tender document. The staff said that there was faith that what UEA proposed was intended to be in the Tender Document itself! Pentroth had been told that they had a

[26] Letter signed by J Bowyer of Hansen Yuncken and R Papilion of Alpine Constructions addressed to the Corporation of the City of Adelaide, dated 19 May 1998 and attached to the tender submission.

[27] For instance, as part of the material submitted by UEA, but not included in, the abortive tender document prepared by Hansen Yuncken, examples of the HEP being used in academic and consultancy environments as a case study or benchmarking tool for sustainable urban development were identified.

> number of things that they had to develop before they could go ahead! Says it all really! If ours only fell down on dollars, it was obvious that they only cared about dollars**.** (Hoyle in 'The Community Voice')

Pentroth, a medium sized Adelaide development company, won the Council's vote to be selected as developer for the Halifax site. UEA learned of this first via a local journalist, with the ironic twist that when I rang Pentroth to congratulate them on behalf of UEA, they were slightly nonplussed as they had not yet been informed by Council! UEA went public with their support for Pentroth on the basis of their apparent commitment to the council's brief.

Decision Status

Following the acceptance of the proposal, the council, and consequently the developer, veered further and further from their initial path and eventually completely abandoned the initial development principles set out in the brief. Pentroth's original proposal had been illustrated by a sketch of a slightly incoherent, but promising design which was to change completely once the council reneged on the original brief and tender process, and the administration, under CEO Jude Munro, directed the developers to take a completely different tack from that previously expressed in public.

As the council administration steered the project further and further away from its original concept, and after UEA and Ecopolis formally withdrew from any involvement with the project, Culshaw told me that the council planners had insisted on such things as new roads that had to be straight and of conventional construction to enable the council to adopt them and run their street sweepers along the kerbs. He would love to have been more adventurous, he claimed, but was constrained by the dictates of the urban designers in council.[28]

UEA issued an interim report to Pentroth on 24 July 1998 which was generally supportive of the developer's efforts but was critical of the council's apparent attempts to redirect the thrust of the project. In September 1998, Council resolved that Pentroth's tender, together with the further commitments in the Progress Report, now adequately addressed the requirements of the Brief and endorsed the preparation of a Heads of Agreement. This Council Resolution allowed a process to begin that went behind closed doors and excluded community input on a pretext of commercial confidentiality.

> Between October 1998 and February 1999 the Corporation undertook a series of workshops with Pentroth, specialist consultants, legal advisers and the industry to derive a redevelopment of the site which was consistent with Council's endorsed concept.[29]

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[28] Personal communication.

[29] From Consultation and Information meetings on Halifax Developer's Concept Plans.

In doing this there was no community consultation and the 'Process Objectives' of the original Development Brief were effectively ignored.[30] After that, the Development Brief appears to have been shelved, because it is not possible to find any relationship between most of what the Brief has to say and what was being offered by this Council-directed private development.

Key Objectives Abandoned

UEA undertook a point-by-point analysis of the original development brief to try and identify where the ACC-Pentroth proposal fitted.[31] The conclusion was that it did not address key objectives, some of which are listed here because they show how close the original process got to delivering an ecocity project, in particular *(Quoted passages are from the Council's brief as released by First Pacific Davies with my emphases)*:

PROCESS OBJECTIVES 'To undertake the project using a broadly based consultation process which is clearly perceived as integral to the project.'

COMMUNITY OBJECTIVES 'To create and maintain effective forums and opportunities for the community to take responsibility for itself by *participation in decision making and management* of the community.'

ENVIRONMENTAL OBJECTIVES 'To ensure that the development promotes the efficient use of energy by the use of appropriate materials, designs and orientation to respond appropriately to the climate.' and '*Creating community spirit*'.

MOVEMENT OBJECTIVES 'To ensure that access to and through the site is user friendly, *not dominated by cars*, and that the negative effects of vehicles are minimised.' and '*To ensure that movement is directed to the site rather than through the site.*'

URBAN DESIGN OBJECTIVES 'To create an Adelaide model of dense urban development with a diversity of design outcomes within design guidelines based on performance criteria and *where lively pedestrian activity can take place*.'

PUBLIC RELATIONS OBJECTIVE 'To maintain *an information strategy to ensure the community is informed about the project* using state of the art communication media.'

The drawings of the 'Pentroth-ACC' proposal that were finally released seemed to genuinely shock those who had held out any hope that the development of the Halifax site might bear some vestige of similarity to that promised by the council's own brief, and the vision of the Halifax EcoCity Project which had started the process. After nearly 8 years of massive collective effort there was a sense of loss in the community which has remained to this day.

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[30] PROCESS OBJECTIVES 'To undertake the project using a broadly based consultation process which is clearly perceived as integral to the project.' From the Adelaide City Council's brief to potential tenders.

[31] Too long a document to include in this book.

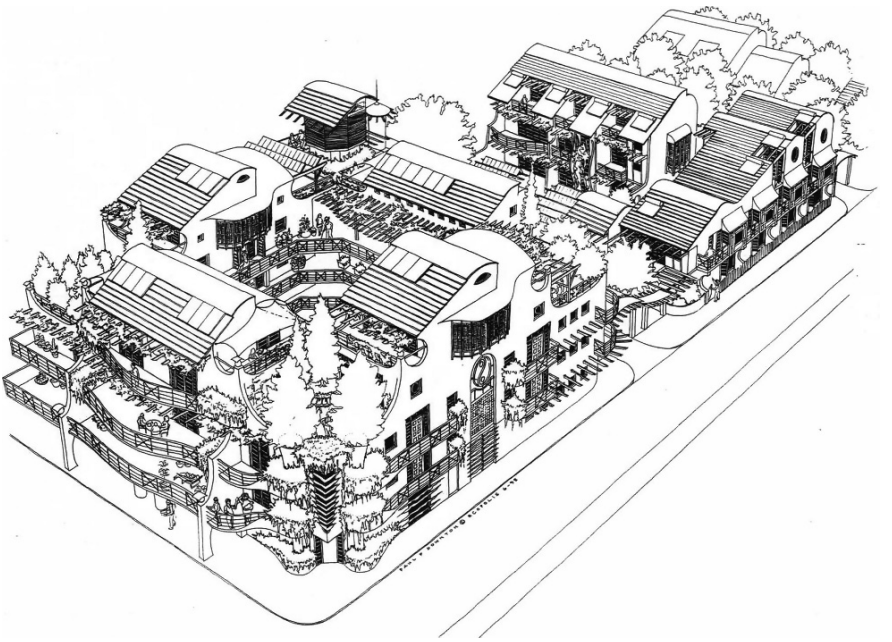

Figure 33: Robert Papilion of Alpine Construction was belatedly convinced that another substantial image would provide the evidence for design strategy that had been omitted from the Hansen-Yuncken-Alpine tender document. I prepared this perspective in a last-minute bid to provide that evidence. Ironically it represents the most fully developed design for that part of the site that had irginally been identified by UEA for beginning the ecocity adventure in Adelaide back in 1991. It shows a first stage of development – a 'bite-size chunk'. It is interesting to compare it with the earliest drawing, done in 1992, that set the tone for the entire ecocity project. It is also of interest to compare it with the Christie Walk project both in its scope and style

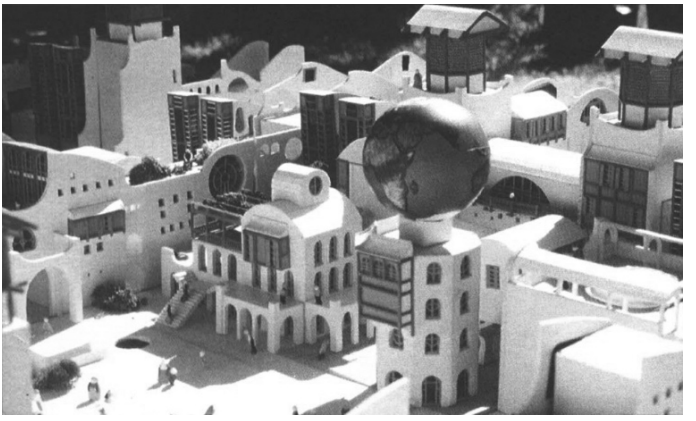

Figure 34: Detail of HEP 1:100 scale model

> . . . there was in Urban Ecology's proposal a sense of the whole community fitting together in a design open to nature's energy flows of wind and sunshine, working with the site, the natural resources and the givens of existing urban infrastructure and the needs of people. The skillful integration of public spaces, sun angles, areas of shade, mixes of uses, relationship of buildings, circulation of people, freedom from automobile intrusion into the pedestrian community. . . all this was brilliant. The complete lack of consciousness of such things as shown in the drawings for the Halifax Site I have before me now is, again, genuinely tragic. (Register, in his letter to the then-Lord Mayor Jane Lomax-Smith August 25, 1999)

7.4 Fractal 2: The Whyalla EcoCity Development

> The Ecocity project represents Whyalla's best hope for a prosperous future in that is promotes knowledge and information based industry, tourism and sunrise green manufacturing activities, the development of which has become a social imperative as well as a something of fundamental importance to the future of humanity. (Stewart Payne, City Planner, Whyalla City Council)

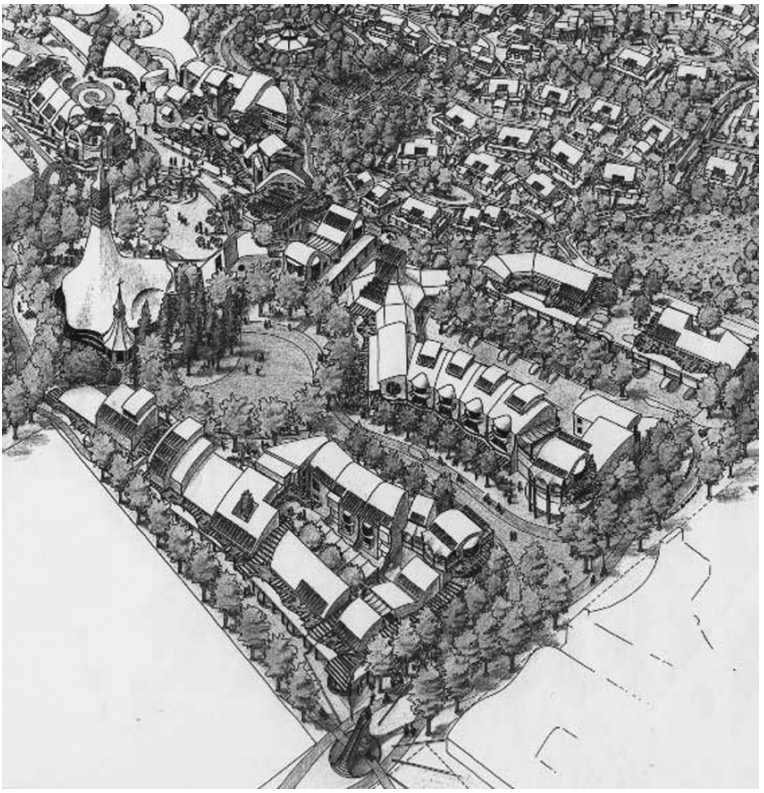

Figure 35: Whyalla EcoCity Development perspective

The Whyalla project was the first attempt to apply Ecopolis ideas to a major development with the benefit of experience gained in the Halifax EcoCity Project. Despite a promising beginning and substantial support from key sectors of the community, after a decade of effort the project was still-born and virtually none of the original project goals were realised.

Beginnings

My relationship with the city and community of Whyalla began with a visit Chérie and I paid to Whyalla to give a talk to a local environment group in 1988 and again in 1989 when researching the potential for setting up a 'Trans-Institutional Centre for the Environment and Sustainable Development' (CESD)[32]. The proposal featured Whyalla and its South Australian Institute of Technology campus as having the potential to take a key role in the development of a CESD. My research unearthed proposals for establishing a school of arid lands studies (Fox 1986) and detailed proposals for making Whyalla an environmental 'model city' (Laing and Rice 1989). All of which contributed to my perception of Whyalla as a place in which substantial commitments to environmental activities were possible. Chérie was working as manager of Trees For Life at that time. This amplified our collective awareness of Whyalla and the environmental interests of its community, and contributed to a fair amount of background knowledge of the city some years prior to any formal involvement in the Whyalla EcoCity Development consultancy.

Regional and Economic Context

Whyalla is a small city of 25,000 people situated 400 km from Adelaide near the head of the Gulf of St Vincent on the agricultural/rangelands boundary. The climate is broadly similar to that of San Diego with generally bearable heat in summer, excellent spring and autumn weather, and very tolerable winters. There are 301 days cloud-free every year. In the USA it would be regarded as a 'sunbelt' city, but its reputation in South Australia is coloured by its industrial history and so it is seen more as a 'rustbelt' town. The Outback is very close, with the spectacular scenery of the Flinders Ranges and near-desert within an hour's drive. The sea frontage is sheltered and excellent for wind-driven craft, although fairly busy with tankers and freight vessels. It has good port facilities and rail connections and generally well developed infrastructure.

Whyalla was founded as a mining and steel town 100 years ago (its centenary was at the same time as Australia's centenary of nationhood, in 2001). As is the case all

[32] Prepared as a submission to 'The Inquiry by the Senate Standing Committee on Industry, Science and Technology regarding the contribution that Australian industry, science and technology can make to reducing the impact of the Greenhouse Effect'.

over the world, the steel industry is restructuring and smaller and fewer plants do the same job done previously by larger works. Whyalla has had a population decline from a peak of around 32,000 as the steel works, owned by BHP until very recently, have adjusted their operations. There are still many people in the city with industrial skills in all aspects of metal working and manufacture generally. Whyalla is searching for industries to fill the economic niche(s) being created by these changes, and to find ways to maintain economic vitality despite the underlying trends of the town's biggest employer. Whyalla also has the major regional campus of South Australia's largest university – the University of South Australia.

In addition, the city claimed to have developed what the then-Mayor, Keith Wilson, called a 'can do' culture[33]. It may be a result of its industrial 'backs against the wall' history, or its multi-cultural make-up but Whyalla has a feisty underlying social dynamic[34]. The city is in a region identified by both state and federal government as a focus for economic regeneration and support but the complex politics of the city have stymied most attempts to pursue innovative development options.

Whyalla has made some effort to commit to ecologically responsible development and has put in place as number of initiatives with substance such as a wetlands/stormwater management system, extensive bikeways, and financial incentives for people to put solar hot water systems in their homes. The city's Economic Development Authority was ostensibly offering assistance in getting companies established in support of the ecocity development program.

The Land Grant

At the commencement of the consultancy title to the land resided with the State Government and was leased to the City Council as a Reserve. Negotiations to transfer ownership of the Core Site to the Council took place with The State Government, through the Minister for Environment and Natural Resources the Honourable David Wotton MP[35]. Change in land ownership came under the provisions of Native Title legislation. There were no difficulties experienced by any parties in regard to Native Title provisions and there was active involvement of the local Aboriginal Barngala community in the project development process, with representation on the Project Management Team and participation in the site 'blessing' ceremony.

To be able to develop what was to become the 'EcoCity Core Site' Whyalla City Council had sought for, and obtained, a land grant from the State Government. In his submission for this grant, the City Planner identified the following potential benefits:

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[33] Personal communication, 31 January 1997.

[34] According to personal communication with Phil Tyler of the Whyalla Economic Development Board, Whyalla has the most number of different ethnicities of any Australian city, despite its small size.

[35] Chérie Hoyle and I author attended meetings with the Minister to assist in the process as 'honest brokers' for the environmental and community goals of the Whyalla Council's land bid.

Developers have security of tenure
Enables innovative land tenure systems to be used such as community title
Reduces development cost for community developers who are not able to raise finance readily
Funds from land sales can be used for ecological site infrastructure development
Will provide impetus for the Eco City Development and enable building projects to start quickly
Will demonstrate the Government's commitment to the use of renewable energies and ecologically sustainable development as a whole;
Will contribute to regional development;
Is the right thing to do for Whyalla, the state and the planet!

He went on to observe that:

> The location of the site in the geographical heart of Whyalla close to other retail, recreational and community facilities, makes it ideal for the type of integrated community/residential development intended. The fact that the land close to the centre of Whyalla is vacant, presents a rare opportunity to create a functional relevant city centre. There is no large commercial interest or developer involved in the site, nor is it likely that a large scale developer could undertake a project of this kind and the project is being carried out by a number of small scale, mostly local developers who would not normally have the opportunity to take part in property or building development of this scope and magnitude.

Eventually, the 'small scale, mostly local developers' turned out to be a chimera, except for three community organisations.

The Consultancy

The brief that eventuated from the City Council of Whyalla was remarkable in that it formally set out to establish something called an 'Eco City Project'.

> The various planks of Council's strategy give a clear picture of Council's commitment to the principles of Environmentally Sustainable Development (ESD). . .
>
> The various strategies will make Whyalla an Australian if not world leader in an integrated and strategic approach to solving the many problems associated with our very energy and resource hungry modern cities. They will prove that urban development in the arid zone can be more self sufficient in its energy and resource needs. (from the Council's brief)

In order to further these aims, Whyalla Council advertised for consultants to produce an overall concept plan for a 'core site' redevelopment in the city, situated on a 15 hectare cleared, but otherwise undeveloped, site in the approximate geographical centre of the city. Their brief ranged widely, including a requirement for the creation of general design guidelines and extensive public consultation with an underlying, implicit expectation that the core development proposals would be linked to the economic rejuvenation of the city and its long-term goals for achieving leadership in ecological development. Outcomes and activities were to include:

- a number of public workshops
- the preparation of a document encompassing key design elements and guiding principles to ensure the long term environmental viability of the project

- presentation of proposals in a graphical format, with '. . .easily legible detailed plans of key components and elements of the development in graphical form (conventional plans, models, computer generated models) to enable communication of the proposal to the broadest possible audience.'

The brief maintained that the ecocity concept might be applied to Whyalla as a whole 'as Council's goal is to create a more ecologically sustainable city'. It recognised a rare opportunity for 'the creation of a greenfields example of a piece of working city.' The project was 'to utilise all aspects of appropriate and sustainable technologies *including urban design principles*, building construction techniques, design factors and materials, conventional energy conservation and alternative energy generation, sustainable water use and reuse of effluent.' (my emphasis). There was an explicit intent that the development would 'act as a catalyst for the new ecological development expected for the region.' Looking into the 'longer now', the brief called for plans and written supporting material to 'provide clear solutions and policy that can easily be carried into the future of the city.'

Whyalla engaged Ecopolis Pty Ltd in association with UEA Inc (with the support of the University of SA) to undertake the Whyalla Eco City Development. This can be interpreted as a commitment to innovation and progress and demonstrated a preparedness to work with young, 'leading edge' organisations that more conservative administrations might ignore. In preparing their brief, officers and elected members of the Council had consulted extensively, both formally and informally, with the Ecopolis Pty Ltd and UEA Inc. Chérie and I had worked informally to educate the then-mayor and liaise with the city planner to help them conceive a project brief that might create a genuine paradigm shift for urban development. For the selection of consultants the project was publicly advertised for competitive tender.

The group that made up the Ecopolis-UEA consultancy included a high percentage of young, relatively inexperienced people who learned on the job and brought a high level of energy and commitment to the entire project[36]. Much of the work they did was as volunteers. Without that voluntary work component and youthful energy, the ambitious aims of the consultants could never have been countenanced, much less achieved.

Process and Community

The Whyalla Eco City Development project set out to re-invigorate the city, not only in environmental terms, but economically and culturally. A clear expectation on the part of the City Council and many concerned and interested citizens was that a focus on, and commitment to, ecological development might lead to new industrial and economic activity linked to the city's re-invention as a 'solar city'.

Whyalla City Council had already undertaken environmental initiatives. The selection of the core site in the geographical centre of the city reflected the shift of the city's

[36] In particular: Digby Hall, Glenn Versteegen and Sophia van Ruth.

residential area towards that central location. The Ecopolis-UEA proposal was that the site become the location for an ecological architecture and urban design exercise incorporating technologies ranging from mud-bricks to 'poured earth' and using both basic and advanced solar technologies. There was seen to be a basis for industrial and economic renewal in the adoption and exhibition of these technologies in a program which set out to provide a model for arid lands human settlement. The exciting thing for the urban ecology consultants was that this whole program was predicated on the basis of partnership between local government, industry and the non-government sector with community participation at the core of the development process.

The program of community participation in the first stage of the Whyalla Eco City Development program extended over more than 6 months. It included the setting up of an 'Arid Lands Centre for Urban Ecology' (ALCUE) in Whyalla. Modelled on the successful Centre for Urban Ecology which evolved from the creation of the Halifax EcoCity Project, the Centre provided a 'shop-front' for the Whyalla Eco City Development, making information about the project readily available to the community and providing a place for people to put their views, concerns and ideas directly into the development process. ALCUE was the formal responsibility of Urban Ecology Australia Inc., and local members of Urban Ecology and other volunteers were responsible for the day-to-day running of the Centre. Ecopolis-UEA made it a condition of taking on the consultancy that the Council provided premises for such a Centre.

The consultancy team for EcoCity Whyalla included a number of individuals and organisations that undertook specialised tasks including the production of an ecological analysis of the Whyalla region and preparation of a preliminary bioregional map. The consultancy program began in August 1996. Work was expected to begin on site sometime in early 1997. The first beginnings of development effectively began with ground breaking for the remarkable 'Terbum' (Wealth Vase) ceremony in April 1997.

Public Meetings

The first public meeting was held to launch the consultancy on 23 August 1996 in the Middleback Theatre, close to the core site. It was attended by about two dozen people, including media and council representatives with most people over 40, one young person and one baby, and a reasonably even gender ratio. People were asked to consider: 'What are the good things about Whyalla? What could be better about Whyalla? And 'Where are the opportunities for improvement?' They were then asked about their perceptions of any obstacles and barriers and how they saw Whyalla in the year 2021. Participants were asked to post in any further responses and the consultants collected a number of contact names and addresses. A series of public workshops followed.

Whyalla Why Not?

The primary tool used to elicit a response from the community and to send out a message of difference about both the consultancy and the consultants, was that of

scenario setting by means of a short story in a booklet titled 'Whyalla, Why Not?', two thousand copies of which were made freely available to the citizens of Whyalla thanks to the sponsorship of the SA Gas Company. In addition to the 'Whyalla Why Not?' publication (Downton 1996a) a series of booklets was produced in association with the workshops, each dealing with a different aspect of the EcoCity Program. This 'Mini Library' provided accessible information for anyone with an interest in EcoCity Whyalla. There were seven titles in the series: 1. 'Urban Design Principles for Arid Regions'; 2. 'Ecology and Bioregions'; 3. 'Energy, Architecture and Design'; 4. 'Earth Construction Technologies'; 5. 'Core Site Design – Principles in Practice'; 6. 'Integration and Overview'; 7. 'Guidelines for the Future' (Downton 1996b).

The 'Whyalla Why Not?' booklet presented a short story set 25 years to the day from when the first public meeting was convened as part of the community participation program. In addition to the story there was a section which illustrated some of the ideas that are part of making cities more ecologically and socially responsible. The third part of the publication outlined the brief given by the City of Whyalla setting out the main tasks required of the consultants.

The story is about a journalist covering the 25th birthday celebrations for 'Whyalla – The Solar City' and it offers a view of what might have happened to Whyalla by then. 'Whyalla, Why Not?' was written in the future history, utopian tradition of Morris' 'News From Nowhere' and Callenbach's 'Ecotopia' (see Chapter 4) as a way to describe what Brand would call an 'imaginative scenario' of a possible future in which a program for change is implicitly set up but the reader's imagination is left with room to play. One way in which this document was used to engage the community was to run a competition in December 1996 in the local schools to continue the story. The results of this competition were, on the whole, encouraging, with many of the students envisaging quite radical futures for their city ranging from Luddite to technofix imagery and ideas but always with a strong environmental theme.

Workshops

A major part of the EcoCity program was a series of workshops held every few weeks, each on a different topic. Their purpose was to inform and educate and to gain input from the community into the design process. They included:

'Ecology and Bioregions' – Participants were introduced to the concept of bioregions, given a Bioregional Quiz, and asked to draw Whyalla's boundary on a large map of the region. They also did some cultural mapping, drawing a boundary around the area they considered their neighbourhood on a map of Whyalla.

'Energy, Architecture and Design' and *'Ecology and Architecture'* – Participants were introduced to the significance of energy issues in ecological architecture, such as climate responsive design, low embodied energy and local energy generation from renewable sources. Groups were formed to explore how to design a low-energy building incorporating these ideas. Earth-based construction technologies

were introduced and discussed. Particular interest was shown in how existing houses in Whyalla could be adapted for better environmental performance.

'Children, Community and Neighbourhood' – Adults were asked to recall memories of their own childhood experiences and compare them with what they thought kids wanted today. The younger participants were asked to write and draw about their favourite play spaces, and what they wanted from their urban environment. Participants were introduced to design concepts that helped create safe play spaces and reinforce a sense of community. Both age groups were asked to put forward their ideas as to what should be on the core site with respect to young people. The importance of the input from young people was emphasised by this workshop, reflecting experiences from similar community planning processes worldwide.

A *'Children's Workshop'* – Whyalla's young citizens participated in the Council of All Beings, with each child making a mask to represent a local bird, plant or animal. Through this 'Council' the children voiced concerns for their character's environment, asking adult humans to take care of non-human habitat. Children then formed groups to express their ideas of ecological cities in play dough, play bricks and through drama. This workshop addressed deeper levels of cultural change (Ecopolis Proposition 3), the need to integrate knowledge (Proposition 2), an understanding of broader context and integration with the biosphere (Proposition 1), and it began the process of engaging the community with the urban ecosystem through an ecocity project.

The Urban Design Workshop

The results of the Urban Design Workshops were of particular interest and are described in Chapter 10. A 'crash course' in urban design, led to a charette-like design exercise that involved discussing ideas and options under the guidance of myself and three UEA facilitators[37].

Kevin Lynch's three 'normative types' of city plan: the 'celestial' or 'Classical', 'Mechanical' and 'Organic' (Lynch 1981) were used to introduce concepts of urban form to the workshop participants and formed the basis of the workshopping program with three groups – one for each normative type.

In just an hour and a half ordinary citizens became urban designers – with surprising success.

The workshops were hugely enjoyable and participants showed a clear preference for the 'organic' city type – many of their observations and ideas were later incorporated into the core site design.

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[37] 'Classical' Facilitator: Angela Hazebroek, 'Mechanical' Facilitator: Sophia van Ruth, 'Organic' Facilitator: Digby Hall.

Community Energy

There were a number of initiatives over the period of the consultancy intended to engage public interest in the EcoCity Development. EcoCity Whyalla was represented in the Whyalla Christmas Pageant, with the Anglican Church community generously providing stall space in the Ada Ryan Gardens. High school and primary school visits were undertaken on a number of occasions by the consultants to present the EcoCity Whyalla concept to staff and students. EcoCity Whyalla was promoted via UEA stalls at both the Festival of the Sun and the Sunday Mail Home Show in Adelaide.

In January 1997 the Arid Lands Centre for Urban Ecology relocated to 24–26 Patterson Street and was open six days a week.[38] In March 1997 the Governor of South Australia, Sir Eric Neal, visited ALCUE and the EcoCity site during a tour of Whyalla. By April 1997 the spiritual energies of the community had found memorable expression in an outdoor Inter-faith Ceremony held to bless the EcoCity Core Site, involving the Anglican, Uniting and Catholic churches and initiated by the Buddhists and the first 'Terbum' (Wealth Vase) ceremony[39] held in Australia. Over 200 people celebrated a future ecocity envisaged as a place of social justice, creativity and environmental responsibility. The event was not part of the council's brief – it was community spirit released by the vision of Whyalla as an ecocity.

Media Coverage

Maintaining the continued interest and enthusiasm of the media has long been an important part of enabling effective community outreach by poorly resourced, non-profit organisations, and in Whyalla UEA made an effort to ensure good relations with the print and electronic media. There was coverage of the project in The Australian, Sunday Mail, Permaculture International Journal, SA Catholic News, Channel 2, Channel 7, GDS Channel 4, and many other publications, radio stations and other forms of media. The local Whyalla News gave good coverage to the EcoCity Whyalla program, helping to both get the word out about Community Workshops and the Arid Lands Centre for Urban Ecology, and providing a venue for the consultants to feed back information to the wider community.

The Project Team and Community Liaison

A Project Team was set up through the auspices of the City Council. Its membership included individuals representing:

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[38] Thanks to the dedication of ALCUE coordinator Jo-Anne Waters and other local volunteers.

[39] Consecrating land for the construction of a new Buddhist Centre on the EcoCity core site.

Ecopolis Pty Ltd
Urban Ecology Australia Inc
Whyalla City Council (staff and elected members)
Whyalla Chamber of Commerce
Australian Central Credit Union
The Anglican Community
The Buddhist Community
Buttlingarra Aboriginal Corporation
Whyalla Senior Citizens Welfare Association
Whyalla Hospital
Landcare Australia
Excel Enterprises
Whyallina Aboriginal Heritage Committee
SA Country Arts Trust
University of South Australia
The National Trust
Whyalla Economic Development Board.

The consultants maintained liaison with the following major players, and groups that had expressed an interest in being part of the core ecocity site:

Anglican Community
BHP Ltd
Buddhist Community
Buttlingarra Aboriginal Corporation
Excel Enterprises
The Barngarla people
University of South Australia
Whyalla Economic Development Board
Whyalla Hospital
Whyalla Senior Citizens Welfare Association
Whyallina Aboriginal Heritage Committee

The consultants also liaised with numerous community organisations throughout the EcoCity Whyalla program, with particular input from the Agenda 21 Committee, the Friends of the Whyalla Conservation Park, Main Street Committee and many of Whyalla's primary and secondary schools, these being in the form of drawings and written visions for the future of Whyalla as an ecological city.

Hands Across the Water

Urban Ecology Australia provided a five month internship to an American environmental studies graduate who researched urban agriculture and urban food security in both Adelaide and Whyalla for her thesis and spent some time in Whyalla work-

ing with local volunteer ALCUE coordinator Jo-anne Waters. UEA intern Norbert Schulz also spent time in Whyalla. An environmental engineering graduate from Germany, he did some research into the embodied energy of various building products and processes but his main written contribution to the work of UEA was an important review of the Ecopolis Development Principles.

Guidelines and Goals

An important outcome of the consultancy was the creation of Urban Design and Architectural Guidelines for the Core Site. Initial plans included the preparation of Goals for the wider city context. Whereas the Guidelines aimed to establish appropriate performance standards for development on the core site, the Goals would have sought to provide the means to ensure that development of the whole city was headed in the direction of long-term ecological viability. The expectations of all parties were recognised as being optimistic with regard to achieving all the original intentions of the program. Thus, the Goals were only included in the consultancy outcomes by implication, as were the mooted Auxilliary Guidelines for retrofitting existing buildings in Whyalla. It was agreed that Guidelines and Goals would be included in any Community Title provisions established for the Community Corporation, or similar, which would be the management vehicle for the Core Site development[40].

A Critically Regionalist Built Form

> . . .a full frontal challenge against Modern architecture's nature of abstraction. It is a radical integrative proposal that is ecological to its core and attempts to showcase architecture as a means of renewal against the usual system of restructuring.
>
> (Hajamaideen 1999 p.34)

Faris Hajamaideen was writing about the 'Anglican EcoChurch', but his observations apply to the core philosophy of the entire Whyalla EcoCity Development (WED).

Building typologies were developed for the project based on ideas of regional specificity generated by climatic and ecological concerns and relationship to the lifestyle of both the suburban and post-suburban Whyalla citizen. Design guidelines were developed to stress functionality rather than style, with a clear intent to engender an appropriate regional style through the application of certain principles, such as requiring a high percentage of shaded external space around every building. Shade is extremely important in the Australian context. Severe stratospheric ozone

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[40] Community Title was passed by the State Parliament of South Australia in November of 1996 and represented a largely untried means of setting rules and enforcement procedures for multi-occupancy, multi-tenured, multi-use developments such as the Eco City project.

depletion has resulted in high UV radiation levels. A walkable city has to provide shaded pedestrian and bike paths to protect its citizens. Site zoning was designed to encourage 3 storey dwellings in residential areas and 3–5 storey apartments and shophouses adjacent to the public areas – but the current economic reality is that single storey construction is cheapest and any move towards medium-density is difficult to achieve.

Extensive use of verandahs and pergolas characterises an appropriate response to shade requirements, but the guidelines made no requirement that the verandah and pergola forms should be traditional. There was some hope that the guidelines would encourage the use of innovative, non-traditional forms. A 'layered shade' model was the favoured option to provide potential for a strong articulation of buildings in the third dimension even when the basic building may be only one storey high.

Both courtyard dwellings and pavilion house forms were addressed in the guidelines – the EcoHouse Types demonstrated the kind of response intended. Shop-housing, terraced housing and duplexes (semi-detached dwellings) were encouraged although they were generally regarded with suspicion in a place which consultant planner Angela Hazebroek identified as a 'regional city with a very suburban lifestyle.' (personal communication). All buildings would have been required to have low-to-no dependence on non-renewable energy sources, to maximise the use of solar energy and to be constructed from non-toxic, non-hazardous, environmentally friendly materials and processes.

Walking and cycling were encouraged in the core site design. The cycle paths linked with the growing network being provided by the present Council. Cars were accepted but their dominance was not. The public areas of the core site would have had no through traffic. An existing street to the west of the site would have been pedestrianised and links made with the city's biggest shopping mall and its car parking.

All stormwater would have been retained on site or taken to the adjacent proposed water treatment reserve for recycling for irrigation of the core site and existing nearby public areas and parklands. Council has already provided major storm water storage to enable the greening of the Whyalla Golf Course and other public open space and the creation of extensive artificial wetlands. Further investment in water storage facilities and infrastructure was planned. Sewage would have been taken to a solar-biological treatment facility in the proposed reserve. Water supply would have been from the mains in the first instance with water conserving practices reducing use for all purposes, by as much as 70% overall. In the proposed guidelines, all buildings on the core site would have been required to have solar space heating and cooling strategies, provide solar hot water and install grid-connected photovoltaics to make the Core Site a net energy supplier (Whyalla is cloudless for an average of 301 days a year)[41].

[41] The Plan Amendment Report eventually produced by Whyalla did not sustain the degree of environmental concern demonstrated by the Council's original brief for the EcoCity project.

Urban Design Guidelines and Site Planning

In order to achieve the social, environmental and aesthetic outcomes envisaged in the concept plan, a set of urban design guidelines were proposed. The following pages illustrate the Urban Design Guidelines and are based on diagrams first published in the 'mini-library'. The diagrams show how the site is organised to comply with ecological development principles and in response to the results of the Urban Design Workshops. The concept plan is based on the premise that landscaping is integrated with stormwater management on the core site. This would require more detailed design study but was based on the success achieved with this kind of integrated approach for residential subdivision in Davis, California. A similar strategy has been put into practice in the Christie Walk development.

The built form is most dense in the community, commercial and retail areas forming clearly defined public places. The pattern of residential buildings forms short streets and clusters, each a little different, with their own identity. It was proposed that the architecture would be subject to design guidelines intended to ensure the effective environmental performance of any buildings.

Community Developers

The project team had over two dozen members who represented various community organisations and interests in Whyalla, including the Chamber of Commerce and (at the suggestion of the Consultants) financial organisations[42], and Council. Several of those bodies indicated that they were planning, or expected to be planning to be developing premises on the EcoCity Core Site. These bodies, and some of the potential building developments, included:

- Anglican Church, Diocese of Willochra: New church, offices and social services centre
- Sakya Yigah Choeling, Whyalla Buddhist Meditation Centre Inc: Buddhist meditation centre, residence and study rooms
- Excel Enterprises Inc: Plant nursery with disabled access, café, offices and sheltered workshop
- Whyalla Senior Citizens: Residential facilities for the elderly
- Arid Land Centre for Urban Ecology: Offices and interpretive facilities
- Aboriginal Cultural Centre
- Combined Community Services Centre
- Community Hall

[42] Australian Central Credit Union was suggested because it represents community-based financing (ethical investment) and is the largest financial institution in the city in terms of domestic and local business.

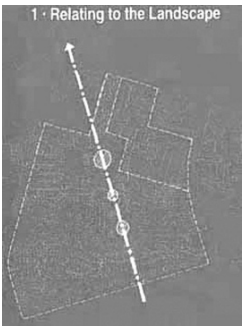

Figure 36: ***1 Relating to the Landscape*** Using Mount Laura as the Most significant feature in the nearby landscape, an axis is set up to provide a visual link between the existing environment and the new development

Figure 37: ***2 Landmarks, Gateways & Bridges*** Reinforcing the axis, landmark buildings create a 'readable' environment where important places stand out. Visual 'Gateways' signify entry to the special environment of the core site whilst 'Bridges' (which may also be gateways) link the site to neighbouring areas

Figure 38: ***3 Vegetation & Habitat Linkages – Landscaping and Urban agriculture*** Significant remnants of indigenous vegetation identified and protected in reserves linked across the site by vegetation corridors. Community gardens to visually link these 'green' areas. Use of native and indigenous vegetation and xeriscape promoted. Fruit trees and edible landscape part of overall strategy of creating a biologically productive urban centre. Community Gardens area central to the whole plan linking the various zones of the development with an active, productive, community focus

Figure 39: ***4 Courtyards, Public Places and Art works*** Sheltered, courtyard areas and places of different scales and sizes suit their function as either intimate or more open spaces. Their ambience varies from the very 'urban' courtyards associated with the community, retail and office buildings and the more village-like feel of the residential areas. Public art would be encouraged, integrating of art and architecture through community arts programs linked to educational projects, reinforcing community ownership of the development

Figure 40: ***5 Emergency & Service Vehicle Access*** Although the design for the site is based on dominance of the human being, rather than the machine, and there is no through traffic, it is still necessary to ensure that emergency and service vehicles (including delivery vans, etc) can easily travel across the site

Figure 41: ***6 Footpaths & Cycleways*** Footpaths and cycleways criss-cross the site in a 'distorted grid' pattern, ensuring that people can move freely around the site even though the movement of cars and other motorised traffic is strongly controlled. Walking and cycling are encouraged in the core site. The cycle paths link with the growing network being provided by the Council

Figure 42: ***7 Retail & Commercial Frontages*** All retail and commercial (and many community orientated buildings) have frontages directly to the main public areas, creating the equivalent to a linear pedestrian street which links the existing community buildings along Nicolson Avenue through to Westlands Shopping Centre

Figure 43: ***8 Solar Street Orientations*** Streets run predominantly in an east-west direction, ensuring that most buildings can be easily orientated to take maximum advantage of solar energy for heating, cooling and power

Figure 44: ***9 Restricted Vehicle Access to Residential Areas*** Hammerhead and cul-de-sac road layouts control traffic in the residential areas, making them safer for pedestrians in general, and children and older people in particular. (Traffic calming measures are still considered radical in Australia, which has the world's highest urban speed limits.)

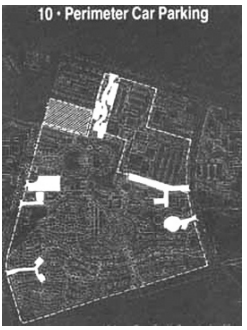

Figure 45: ***10 Perimeter Car Parking*** Car parking for the general public is mostly confined to the perimeter of the core site. The land to the south of the government offices in the north-west corner of the core site would provide an ideal area for extending the car parking if needed. It is anticipated that existing car parking will be sufficient and that very few new parking areas will be necessary as other car parking provision to neighbouring community facilities has been generous

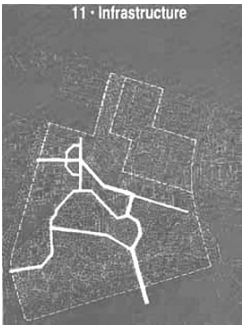

Figure 46: ***11 Infrastructure*** Easements and site boundaries are designed to accommodate pipes and wires for electricity, water, sewage and telecommunications in 'common trenching' across the site to provide readily accessible services with minimal disruption and no unsightly power poles

Figure 47: ***12 Buildings*** The built form is most dense in the community, commercial and retail areas forming clearly defined public places. The pattern of residential buildings forms short streets and clusters, each a little different, with their own identity. The architecture will be subject to design guidelines intended to ensure the effective environmental performance of any buildings

Figure 48: ***13 Trees*** Substantial numbers of native trees are proposed as both physical shapers of the environment, creating definite spaces and places, and as environmental modifiers and filters, working with the building and street layouts to modify the climate – not least with shade!

Figure 49: ***14 Allotment Boundaries*** A number of allotment boundaries were proposed to accommodate the early interest in community development on the site, and in order to shape preferred future development patterns. After initial concern about the 'odd' shape of some of the proposed lots, Council officers were extremely supportive and efficient in getting the survey work under way to accommodate what amounted to 'fast track' development of the core site

- Child and Youth Health Clinic
- Veterinary surgery

The majority of the developers and potential developers on the core site were community or not-for-profit organisations providing services to the community. As such, they were able to utilise land for the construction of buildings using the existing Community Reserve dedication in accordance with procedures under the Local Government Act.

It was assumed by all associated with the project that such things as the creation of allotments and detailed planning of individual blocks and buildings would come some time after the consultant's final report and concept plan was lodged with the Council. As it happened, the groundswell of support from the Whyalla community was such that building and allotment designs were formally underway by January 1997.

There were four major participant organisations in the EcoCity Development process during the period of the Ecopolis-UEA consultancy: the Anglican Church, the Buddhists, Whyalla Senior Citizens and Excel Enterprises. Representatives of these organisations formed a 'Target Team' in order to review issues, identify conflicts and complementarities and generally progress the project by ensuring that the consultants were well briefed on the Team members' particular requirements as initial developers on the core site. The stated requirements of these four major players strongly conditioned development of the urban design for the core site which included allocation of parcels of land to suit both the needs of the various community organisations and the overall goals of the core site program.

To try and ensure the organic form and ultimate integration of the core site layout with proposed buildings and functions, including the creation of public space in the project, I proposed controlling development by shaping allotment boundaries to encourage appropriate built forms. There was very strong commitment to this strategy early on, with the Buddhist site being delineated on the basis of 'irrational' geomancy, but it came under attack by commercial interests so that the Buddhist site is the only vestige of the ecocity allotment plan.

The Buddhists – Sakya Yigah Choeling

> The notion of Eco Dharma is helping us to express our understanding of the Buddhist philosophy in a way that is consistent with the Eco City development. Eco Dharma is about managing various forms of energy in our environments in harmony with spiritual principles. Traditional Buddhist values include respect for all life and the recognition of the interconnection of all living beings. We are being challenged to discover how we can express these values in a manner that is consistent with urban design using ecological development principles. (Muhlhan) [43]

There are not a great number of Buddhists in Whyalla's 25,000 population, but they are very active and share a strong belief in the need to set in place processes for positive environmental healing. Spokesperson Bruce Muhlhan talks of 'Eco Dharma' and how their Meditation Centre and Temple can demonstrate their beliefs in action. In the context of the core site design, the Meditation Centre and Temple is treated as a 'pavilion-in-the-park', with its relationship to surrounding developments mediated by a circular grove of 108[44] trees and shrubs. (This circular grove theme was partially reiterated to both the east and west of the Church and is a deliberate reference to a sense of spiritual place which has informed the human relationship to the environment since prehistoric times.)

The active Buddhist group was anxious to take advantage of the moment and proposed a site for their Centre before there was a developed plan for the site. This

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[43] From a media release March 1997.

[44] 108 is a sacred number in Buddhist cosmology.

was accepted by the consultants as a legitimate stratagem for establishing one of the key places on the core site area to be used as a 'springing point' for the design of the whole 15 hectares. The idea of granting the Buddhists an early opportunity to identify and lay claim to a specific site was tested in the Project Team meetings and put to community scrutiny in a public meeting in the Council Chambers at which there was strong endorsement of the proposal, with most of the overflowing public gallery being from the Anglican community. This reflected participation by both the Buddhist and larger community in the building process.

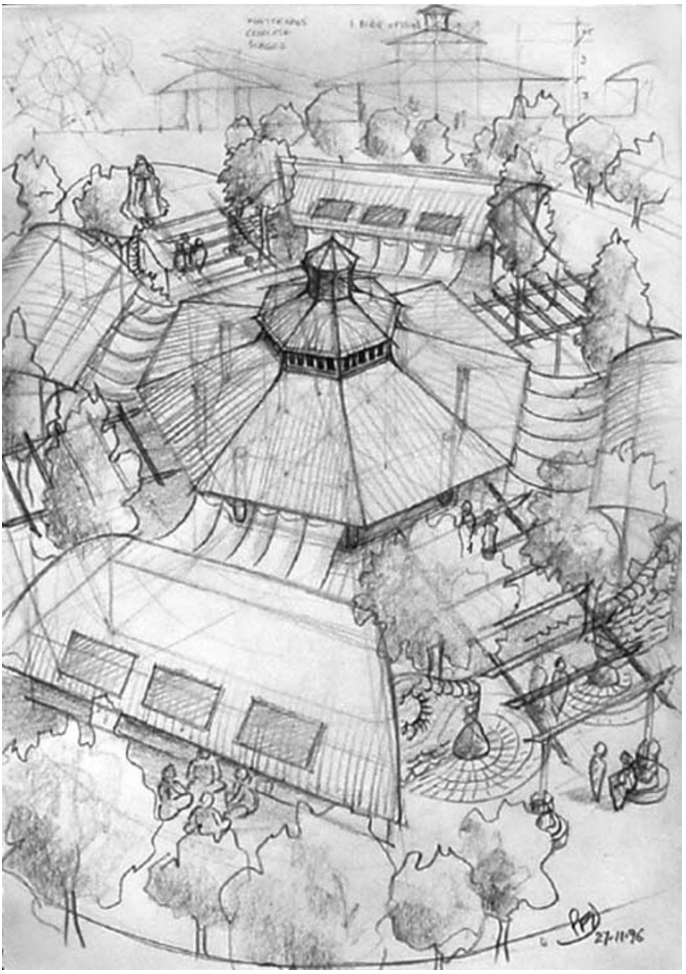

Figure 50: Sketch of the proposed Buddhist Meditation Centre, 1996. This design was developed in close consultation with the Sakya Yigah Choeling group; scrutinised and approved by His Holiness Sakya Trizin during a visit by HH and entourage to UEA's Centre for Urban Ecology

The Buddhists' site was established, with its exact centre – destined to be the centre of the Gompa (temple) – identified through the dowsing of a monk and the input of the group. Combined with the use of Mount Laura as the natural topographical reference and landmark for the site design, this produced an important design axis for the site.

The commitment of the group to starting on the site almost certainly helped public perception that the EcoCity project was a live program with palpable outcomes. The infrastructure and servicing requirements of the Centre, along with that of Excel Enterprises, helped to impel commitment of spending to initiate appropriate development on the core site at an early stage.[45]

Mixed Blessings

So much interest and commitment was displayed by Whyalla's small Buddhist community that Whyalla hosted a visit by the Tibetan Buddhist meditation master, His Holiness Sakya Trizin. His Holiness is second in protocol to HH the Dalai Lama and is the forty-first in an unbroken lineage that stretches back to 1073 AD. On 5 April 1997 he consecrated land for the construction of a new Buddhist Centre on the Eco City core site, by performing the traditional Terbum (wealth vase) Building Ceremony, for the first time in Australia.

This ceremony was integrated in a larger event on the core site in which the Aboriginal community and the Christian community took part, with members of other religious organisations attending. The site blessing began with a song from the Aboriginal representative, and was followed by the Buddhist Terbum ceremony and a service conducted by the leader of the Uniting Church, the Roman Catholic Bishop and the Anglican Bishop (see 'Anglicans' below). The event and its spiritual focus had been consequences of community participation rather than any predetermined program. Somewhat irreverently referred to as 'mixed blessings', this multicultural event suggested a significant resurgence of community activity centred around spiritual and civic values.

The Anglicans

> When Chartres was being built, Robert of Torigni reported glowingly that 1,145 men and women, noble and common people, together dedicated all their physical resources and spir-

[45] Whilst the Buddhists and Anglicans in Whyalla demonstrated a commitment to ecological thinking and action (and were joined by other religions and dominations at the inter-faith ceremony on the EcoCity Core Site in April 1997) and the major religions have, like other professionals, claimed to be guardians of environmental wisdom, there are those who claim that Paganism differs by being a fundamentally ecological spirituality that 'listens to a speaking Earth' (Harvey 1997). No Pagans identified themselves at the Inter-faith Ceremony however.

> itual strength to the task of transporting in hand-drawn carts material for the building of the towers. Such accounts suggest that raising an edifice was an act of worship in which the feelings and senses of a people were deeply engaged.
>
> (Tuan 1979 p.106)

The two Anglican parishes in the City were considering combining their resources to make a new church and were in discussions with the City Planner as part of exploring the option of locating a new facility on the 'core site' before it became identified as the focus of ecological development. When the Eco City concept was put before the local Anglican community through their priest, Father Michael

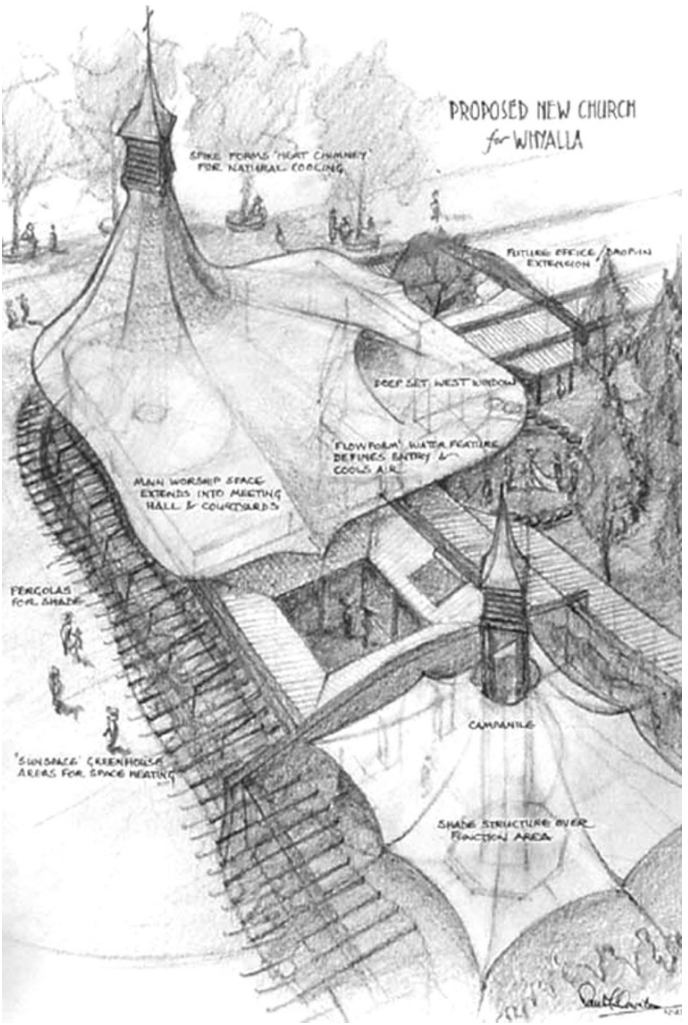

Figure 51: Whyalla EcoChurch original sketch proposal

Hillier, via workshops and presentations by Ecopolis, there was broad endorsement of the idea which translated to the formal commissioning of Ecopolis to design an ecological church complex for the core site intended to establish a community outreach and services arm for the church.

In the meantime, the idea of a church as the major landmark for the core site had been translated into initial sketch designs for the building based on the workshop sessions with the parishioners, and it provided the pivot of the urban design schema – a neo-traditional concept which the urban design workshops indicated would be a popular proposal. The proposed centre of the church spire became the setting out point for surveying the axes and allotment locations for the entire site.

In this process, we took an advocacy role with respect to the use of the future church building as a key element in the overall urban design for the site, and allotment boundaries were allocated in the proposed plan which required easements over the future church land to enable public use of vital spaces and thoroughfares. Thus the Church would have been charged with the responsibility for managing key areas in the development on behalf of the greater public interest in exchange, as it were, for its pivotal location and close integration with the central places proposed in the core site concept plan.

Jean Oates of the Anglican community in Whyalla was later to turn drawings of the proposed church into postcards, demonstrating a welcome appropriation by popular culture of 'ecocity' ideas and images. The links between architecture, ecology and spirituality are not dealt with here, but Cook suggests that 'Humans build to preserve themselves – at first in the physical sense, but ultimately in a spiritual sense.' (Cook1989 p.13).

As of April 2001, the parish had succeeded in raising approximately $250,000 to build the first stage of a church complex. By mid-2007 a great deal of effort had been made by Father Michael Hillier, the church community and Ecopolis Architects to produce a number of revised designs to fit the available budget and the shifting circumstances of the putative Ecocity site, but sadly, the project has had to be abandoned.

A Greeting

On behalf of the Christian community of Whyalla we welcome you to this ceremony. We acknowledge the original inhabitants of this land and express our thankfulness for their participation in today's celebration. We pray for true reconciliation between black and white in our land and ask for God's grace in our relationships with each other. (Father Eugene Hurley, Roman Catholic Church)

We acknowledge our brothers and sisters of the Buddhist community. With you we affirm that there is a deeper meaning and purpose to our existence

than can be found simply in the physical and material aspects of life. We seek communion with the divine and with you seek for truth and justice in human affairs. (Bishop David McCall, Anglican Church)

Thirdly, we greet the citizens of this city of Whyalla and pay tribute to the vision of the city council in adopting the eco-city project. We pray for God's blessing on this site and on this project. We also pray for God's blessing on this city and its citizens. (Father Frank Measday, Uniting Church)

The Lord be with you.

(From the Interfaith Ceremony)

Excel Enterprises

'Excel' are a government funded body providing services to people with intellectual disabilities. They were seeking premises in Whyalla with full disabled access or easy capacity to be remodelled for access without success and were attracted to the Eco City project core site as a potential location for new, purpose designed premises. Excel's then-CEO Sue Gilbey was inspired by the ecological focus of the development (she later became a resident of Christie Walk) and was in a position to direct investment into a development on the site provided work of some sort could begin in May 1997[46]. The dependency of her project funding on such tight timelines provided a challenge to the council and the consultants which was being met from April onwards. In order to get things happening quickly there were a number of 'impossible' bureaucratic and technical hurdles to overcome, too complex to detail here, which were successfully addressed through the commitment and professionalism of Council staff, particularly engineer Noel Modystach, but ultimately, again, the project was abandoned.

The Whyalla Eco City Information Feature

Early in the history of the project, city planner Payne discussed the idea of including a sculptural interpretive structure to explain and demonstrate key design and construction elements proposed for the EcoCity site. Ecopolis Pty Ltd was later commissioned to design the Whyalla Eco City Information Feature which was constructed in early 2000 with the assistance of a federal government grant. Urban Ecology Australia won the tender to build the adobe walls which it sub-let to Neil

[46] Personal communication.

Figure 52: The Whyalla EcoCity Information Feature

Mullard. Students from the Spencer Institute of TAFE (Whyalla Campus) participated in the construction of other elements. The Information Feature was launched on 3 August 2000 to 'provide information to both visitors and residents of Whyalla about the Eco City Core Site project, as well as environmental projects throughout the City, and other topics of interest.'[47]

The design for the Information Feature was drawn in plan, section and elevation but for construction purposes a model was provided at 1:20 scale. The design was sufficiently developed to ensure its buildability. Apart from the engineering components (steelwork and footings) the construction of the project was directly informed by the model, constructed by UEA intern Sherry Poon from Canada[48]. The EcoCity Information Feature, like the earlier Buddhist building, has suffered from being a separate, isolated structure on a large site. Its public reception has been lukewarm. Because the anticipated urban context of the design is completely absent the design makes less sense that it might otherwise. Without vegetation and appropriate context, such projects are not complete. This underscores the challenge of creating architecture and urban design integrated with vegetation and landscaping as part of an ecological whole.

EcoCity Housing

The City Council commissioned Ecopolis Pty. Ltd. to design three house types for the site, to comply with the design guidelines and principles set out in the EcoCity

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[47] Fiona Gardiner, Special Projects Officer, letter of invitation.

[48] On the journey to deliver and present the model of the Information Feature and 'EcoHouse' plans, Poon and I were accompanied by a guest from Indonesia – an opportunistic part of the Ecopolis wider community outreach and education program!

report. The commission was won in open tender. Three designs were requested; four were submitted, including a two storey dwelling, the three other single storey houses included footing design by Connell Wagner, engineers.

The houses were to be 100% solar, environmentally friendly buildings that could be constructed in Whyalla economically on sub-divisions on the Core Site. The houses were kept simple in plan and section and were designed for construction in a range of materials from strawbale to autoclaved aerated concrete, mud brick, rammed earth and timber-framed with light-weight cladding. The solar strategy was to encase high mass elements (an internal wall made into a feature of the interior design) in a highly insulated skin with high level thermal venting and shading to control solar penetration. This strategy was employed again in the Christie Walk houses.

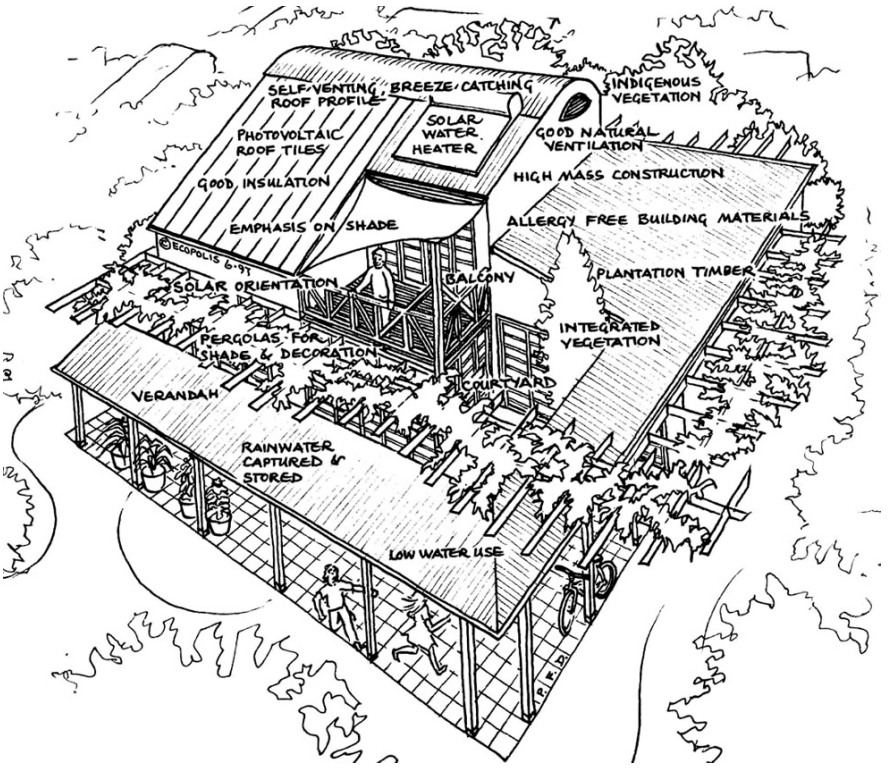

Figure 53: Drawing showing many of the intended features of dwellings on the EcoCity core site. The houses eventually designed by Ecopolis Architects Pty Ltd included all these features except for the photovoltaics

EcoCity Sub-Division Design

Ecopolis, in association with Connell Wagner, engineers, was also commissioned to design the sub-division of part of the core site according to the principles and overall

concept design for the Core Site set out in the Ecopolis report. The commission was won in open tender. The sub-division design was inspired by Corbett's Village Homes in Davis, California. The City Planner's intention had been that the Council encourage developers to adopt the EcoHouse building types to develop this first sub-division on the Core Site. This did not eventuate.

Conservational Development

Jack Mundey 'tried to drag environmental consciousness into the cities in his Sydney-based green bans in the 1970s' (Doyle 2000 p.116) laying the groundwork for UEA to succeed in helping change the view that 'conservation' was about simply stopping development and that appropriate development could be recognised and welcomed. 'The Conservation Council of South Australia today expressed its delight at the Whyalla City Council's announcement of its EcoCity Project, in pursuing its goal of creating a more ecologically sustainable city.' (Media Release 3 August 1996). Public engagement has become de rigeur for any 'ecological development' and this too is reflected in the comment that 'The Conservation Council of South Australia expressed its enthusiasm for the Ecocity project today, not only for its green credentials, but its core component of community involvement.' (1996). UEA's work made it possible for the environment movement to be simultaneously critical of poor development but otherwise supportive of development; 'A host of failed, badly thought through development proposals in the past decade has painfully illustrated to South Australia that leaving the community out of the planning process is a recipe for disaster' whilst Whyalla's engagement of UEA was 'proof positive, that the environment movement is right at the heart of promoting development in this state – appropriate, ecological development' (1996).

A decade on, it is clear that the original optimism was premature, and very conventional political and development interests have effectively killed the project.

There are parallels with other post-heavy industry dependent environments. Writing about British experience, Colin Ward says 'possibly the worst result of the economic rationalisation of the inner city is the way it has destroyed the fine grain of the city economy'. (Ward 1989 p.27) The position of the Whyalla Core Site plan in 2001 reflected a similar negative imperative in which the fine grain planning attempted in the original ecocity concept was seriously challenged. A review of the core site by an economic reductionist consultant reportedly proposed[49] that the only way for the site development to be 'economic' was to replace a mixed-use, fine grain layout with its short avenue and pedestrian-trafficked public space leading to the West Front of the church, by a monolithic hardware warehouse set in a sea of car parking.

[49] Personal communication with persons privy to the consultant's documents.

An 'Ecocity' Outcome?

As a result of the work of Ecopolis Pty Ltd and UEA a complex and sometimes obscure process led to there being a 15 hectare site in the heart of Whyalla zoned 'Ecocity' and actual buildings were constructed there, whereas the Halifax site was developed quite conventionally. The Whyalla EcoCity Development started well but was effectively sabotaged by the council that inherited the original proposal; it has had a limited impact on the cultural development of the city, although there are some people left in the community determined not to let the ecocity vision fade completely.

7.5 Fractal 3: Christie Walk

> Christie Walk has incorporated a variety of energy saving techniques, sustainable design principles, waste minimisation strategies accompanied by an emphasis on social cohesion and interaction, to make if a truly unique and innovative sustainable project.
>
> (Burke 2004 p.24)

> As the first development of its kind in South Australia, Christie Walk seeks to tackle sustainability issues with cutting-edge techniques while also modeling an inclusive, organic development process.
>
> (Farr 2008 p.226)

Commenced in 1999, completed and occupied in early 2007, Christie Walk is named in memory of Scott Christie who was a social and environmental activist[50]. Its location close to Whitmore Square is at the centre of the most mixed-use, the least wealthy, least business-dominated, least academic, least culturally self-conscious, and perhaps the most culturally rich part of the City of Adelaide.

Christie Walk was designed to provide an example of how to ameliorate the impacts of the built environment and to create a built environment that was resilient to future climate change. Its purpose was to provide a living example of ecological, community-oriented, urban development in an environment where such things did not previously exist.

The objective was to develop a mixed, medium-density housing project that maximised lifestyle options and minimised environmental impact for similar cost to conventional inner-urban development, with very low energy bills. The brief demanded energy efficiency, healthy environments and high ecological performance for an urban demonstration project in which user participation and ethical investment funding was vital. Christie Walk was designed to demonstrate that energy and water efficient buildings can significantly reduce on-going running costs (the big

[50] Scott worked for Community Aid Abroad for 20 years, in Perth and then in Adelaide. He died from cancer in October 1998. His partner, Joan Carlin, is one of the first residents of the development and one of its strongest supporters.

missing factor in 'affordable' housing in Australia) and provide an example of how to achieve comfort without massive energy costs.

Prior to Christie Walk there was a pilot project that was taken through design development to provisional development approval.

The Bourne Court Pilot Project

During the late 1990s UEA maintained a constant effort to initiate an ecocity project that was not dependent on the politically limited environments of local government.

In order to test the design approaches, technologies, funding and organisational systems for the Halifax EcoCity Project, the HEP protagonists initiated the development of a small pilot project within 5 minutes walk of the main site, in Hobsons Place, Adelaide. Named after the project's philanthropic supporter Joan Bourne[51], the project was to be developed by the privately financed non-profit co-operative, Wirranendi Inc. It was designed to test development processes and ecological systems and 'to eliminate unknowns and enable the main EcoCity Project to achieve its objectives with the confidence of all participating partners.'

Characterised as 'urban ESD research into dwellings as living systems', Bourne Court was intended, amongst other things, to provide an example of an alternative to computer-dependent 'smart house' technologies. It was designed as a passive climate response development incorporating the kind of difficult orientations that often arise in dense urban environments (as was to be the case with the later Christie Walk project). It was hoped that the project would enable the testing of location specific, 'dumb technology' systems of automatic ventilation that operated without computer control. This kind of 'dumb but responsive' technology was conceived of in the context of thinking of dwellings as living systems – inspired by Lovelock's definition of what could constitute a living system (see Chapter 8). The production process of Bourne Court was to be a model for the application of appropriate high and low technologies using very low energy technologies where appropriate (e.g. mud brick garden walls), innovative low technologies (e.g. poured earth walls), middle technologies (e.g. reinforced concrete floor slabs), and high technology (e.g. photovoltaic cladding). Resident involvement in design and integration of artwork was part of the program with a participatory development process that engaged the community through the mechanism of a non-profit co-operative and extended participation into the management of the project.

UEA has always been suffused with optimism. The project protagonists proclaimed in 1996 that 'The first development of five ecopolis solar townhouses is likely by the middle of 1996.' (Downton and Ede 1996 p.95). By September 2000 the project had still not gone ahead and the site was under contract to be sold. It was finally sold in early 2001 after site decontamination costing in excess of $100,000.

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[51] Joan Bourne was an extremely active woman and a regular volunteer at the Centre for Urban Ecology. She died after a long battle with cancer in 1997.

Christie Walk and the 'Roman Hut'

> On Saturday 4 December, the Christie Walk site in Sturt Street, Adelaide, was a hive of activity!
>
> Starting at 8am a crew of volunteers began clearing debris and making reinforcement frames for the footings of the first building to be constructed on the Christie Walk site. Within a week or two we expect to see those 'reo' frames set into the concrete of the slab for Roman Orszanski's strawbale cottage (the Roman Hut).
>
> . . .the workforce was all voluntary and activities were coordinated by Keith Jupe. Keith, who has years of experience working with community and self-build organisations like Habitat for Humanity, has offered his formidable building skills to Wirranendi, initially to build the strawbale cottage. (As reported in the Urban Ecology Newsletter #33 December 1999 p.1)

Experience gained with Bourne Court enabled the Christie Walk project to commence quickly once a site had been identified. The first building to be completed was a 55 square metre 2-storey cottage for Roman Orszanski. The owner moved in on Earth Day, 22 April 2001. Built almost entirely by volunteer labour, the 'Roman Hut' is a timber-framed, strawbale house as high as it is long. At the time of construction, it was the only strawbale residence in an Australian CBD.

Most of the initial purchasers were drawn from people with a demonstrated interest in the earlier projects. The design strategy, general built form response, and environmental performance requirements had already been established through the experience of working with the Halifax EcoCity Project and Bourne Court.

> Activist-driven from its inception, Christie Walk is pioneering sustainable urbanism in South Australia on the strength of a small team committed to realizing their vision of an 'EcoCity.'
>
> (Farr 2008 p.226)

As a microcosm of the processes, plans and propositions contained in UEA's vision of ecocity making, Christie Walk probably represents the smallest effective size for an urban fractal with sufficient mix of accommodation, community and commercial facilities to demonstrate social and economic dynamics as well as built form and technological features of ecocity making. It is a co-housing development, meaning that there are extensive common facilities organised and managed by its residents (McCamant and Durrett 1988 p.16). Apart from a grant from the federal government for photovoltaics, all funding for Christie Walk has come from the pockets of individuals and from ethical borrowings, notably the Community Aid Abroad Ethical Investment Trust and Bendigo Community Bank. All funding has been used to construct the project on a not-for-profit basis. The decision to make all borrowings from ethical finance sources constrained options slightly but was felt to be a progressive and liberating move in terms of maintaining an holistic and credible environmentally and socially responsible approach to development. The financial investment by future residents and supporters in the project was part of the ethical financing strategy and also part of engaging the broader community in the program, extending conceptual 'ownership' to actual economic participation in the project.

The core of financial support this provided was an essential component of being able to do the development.

Climate and Site

The Christie Walk project is situated on 2,000 square metres (approx. half an acre) of land. It is designed to accommodate a population of up to 80 (400/hectare or 160/acre) people and on completion had a population of 42 (210/hectare or 84/acre). The site is a former bottle recycling depot[52] located near Whitmore Square, the South Parklands, the Central Market and the Gouger Street Restaurant Precinct in the 'Square Mile' of the City of Adelaide, South Australia. UEA has been based in this quarter of the city since 1993 and established a good relationship with people in the neighbourhood, including Neighbourhood Watch and local businesses. The site is T-shaped, almost flat, and landlocked but has three frontages, the one on the north being to Sturt Street, one of the main east-west thoroughfares in the city.

Adelaide is at latitude 34° 56' S. The site is in a warm temperate zone and never experiences frost. The natural 'Mediterranean' temperature range provides for warm winters with a diurnal range that rarely goes below 8–10°C and the built environment of the city absorbs solar radiation contributing to a heat island effect further reducing the potential for frosts. The city experiences 500 mm of rainfall per annum. Most of the site had been paved for many decades and there was little in the way of existing fauna and flora on the site. The only significant flora, an old grape vine, was in poor condition and could not be retained.

All main services were readily available so a decision to reduce dependency on those services (water, sewage, electricity) was an in-principle decision made to demonstrate the potential for greater levels of autonomy in the urban context. Availability of public transportation and ease of pedestrian access to commercial and cultural facilities was a major factor, as it meant that reduced vehicle use could justify a lower than usual on-site carparking provision (11 spaces for 27 dwellings).

Research and Education

> Christie Walk was always designed to be an educational experience, and it has fulfilled that promise.
>
> (Farr 2008 p. 229)

Christie Walk is a research and development project that has proceeded without the government financial support that such projects normally require to get off the

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[52] On the one hand, acquisition of the site meant that a recycling service was leaving the city, on the other hand, it meant that Wirranendi was able to continue an environmentally responsible use of the site.

ground. Its independent path has helped the project maintain commitment to the original vision, with less pressure to compromise its ideals. The project contains a small interpretive Centre for Urban Ecology run by UEA as a focus for ongoing educational activities and as an interpretive centre for the project[53]. Thousands of people have visited the project to learn about sustainable development and the importance of urban environments and community processes to overall goals of sustainability.

Organisation

> Christie Walk's creators – a cooperative essentially comprised of concerned citizens moonlighting as developers – imagined it as a small-scale template for larger urban projects, and so were careful to include all the important elements of good sustainable design.
>
> (Farr 2008 p.226)

Organisational arrangements for the making of the Christie Walk project were generally unusual compared with conventional developments: participation by the wider community in any development processes is unusual, a co-operative management structure is also unusual, use of non-profit structures to undertake any kind of built environment development is unusual and engagement of volunteers in the design, development, and construction process is rare. Christie Walk enjoyed all these approaches and has been successful in terms of delivering what its protagonists hoped it would – a very complete microcosm of ecological development. There has been a price to pay. Some individuals have experienced greater or lesser degrees of emotional burn-out because of the stresses of working on the project over many years and dealing with financial stress as the timelines (and thus costs) of the project extended first one, then three to four years past the original deadline for completion.

The generally co-operative, sometimes ad hoc, but always community based arrangements underpinning the project have sometimes provided weakness (mostly because of limited knowledge at crucial junctures) but more so, these underpinnings have provided the strength of the project, enabling it to weather many storms and survive to successful completion[54].

Design and Construction

The overall strategy of the project was to use passive design principles throughout. Regardless of orientation, the strategy has been to use high internal mass within highly insulated skins with multiple user-controlled ventilation options and thermal flues. Solar exposure and control was varied according to orientation options and

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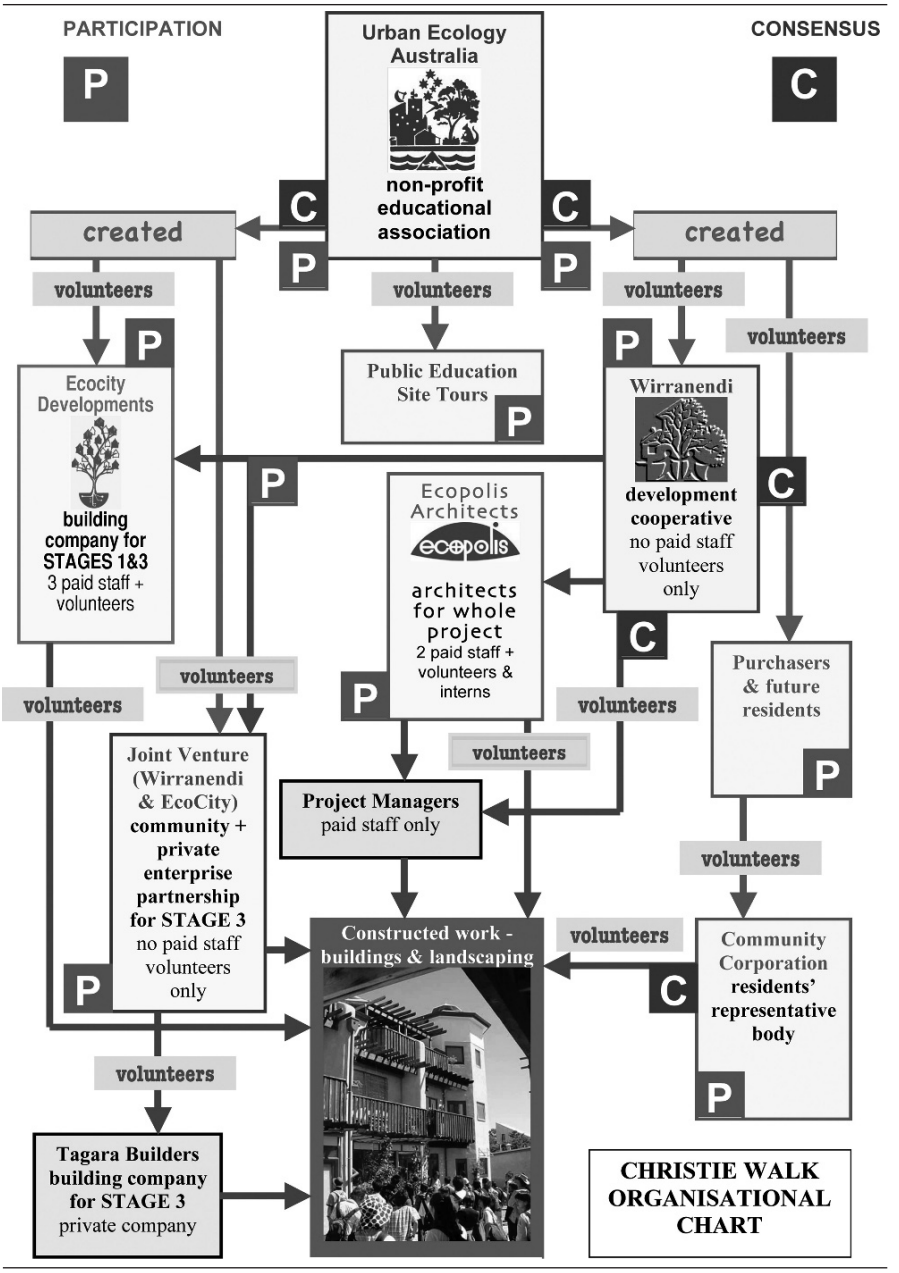
[53] The philanthropic contributions of Dr Barbara Hardy and Joan Carlin made the centre possible.

[54] Key people include Joan Carlin, Dr Effie Best, the late Beverley Vaughan, Roman Orszanski and Chris Hales.

Table 7: Christie Walk organisational diagram



overshadowing impacts of adjacent structures. The final design of dwellings for stages one and two was for a block of four linked three-storey townhouses with full solar orientation, a three storey block of six apartments with east-west orientation, and four standalone two-storey strawbale cottages, one of which possesses an attic third storey. The final, third, stage was completed and occupied in January 2007 and contains 5 storeys of 13 apartments with community facilities, including the interpretive centre, that serve the whole project (based on the co-housing model).

A variety of construction methods are employed including load-bearing autoclaved aerated concrete, poured low-strength concrete (earthcrete), steel framing, and timber-framed strawbale. The stage 3 apartment building uses steel and precast concrete panel structure clad with aerated concrete blockwork. Its roof is largely covered with photovoltaic panels. Non-toxic construction and finishes are used throughout, with a policy of avoiding formaldehyde and minimising the use of PVC. All timbers are plantation or recycled. All dwellings have solar hot water, the second stage apartment block intensive roof garden is productive and provides important amenity. Stormwater is captured for use on site to irrigate the gardens (including the roof garden) and flush toilets. Landscaping is based on low water use (xeriscape) plantings that favour native and indigenous species with pavings and feature elements constructed from recycled materials including bricks, stone, steel and timber retrieved from demolition of the few pre-existing structures on the site.

Architecting, Building and Developing

The design and physical planning process was controlled by the architect but proceeded on the basis of continual feedback from interested potential future residents and from direct input by intending purchasers of the dwellings. The architect took the responsibility of creating a collective arrangement of buildings and external space arrangements to deliver community benefits in terms of usable outdoor space, productive landscape provision and sociable space to facilitate community interaction. Each dwelling in Christie Walk presents a synergy of design derived from many individual inputs allied to the architect's vision and co-ordinating role.

Urban environments build up a patina of pattern and texture from a continuous history of intimate human engagement with place-making. A key design idea in Christie Walk was to somehow accelerate this process. Residents were thus encouraged to make their mark on the project individually and collectively – to occupy the place with evidence of their presence and provide 'instant patina'. The working bees that have been essential to the practical completion of all the landscape elements in the shared and communal areas have been de facto planning and design exercises at the micro level and they have also created an important social focus to the process that has, in turn, amplified the effects and experience of participation.

The management and development process was almost entirely unknown territory to all of the participants in the early phases of creating Christie Walk. The level of transparency and accountability has been high, with open, democratic institutions underscoring the entire program. As the project proceeded much was learned, by doing, by immersion and direct participation. Core participants in the project became active players in the urban development industry. The great majority of participants in the project would have characterised their ethical and intellectual position as being broadly opposed to the perceived rapacious nature of the conventional development industry. They were thus taken on a journey to the other side of the wide divide between the community realm and the development industry. This participatory process happened in a fairly ad hoc way but resulted in some profound changes in knowledge and awareness on the part of many people. An important consequence was that the promulgation of the idea of community-based development as a viable option to conventional development became current in the South Australian (and to some extent Australian) environment. E.g. the Aldinga Eco-village protagonists acknowledged the importance of Christie Walk in their decision to become developers and proceed with that project, as did the WestWyck people in Victoria.

At the time of commencing Christie Walk no builder could be found to take on the scope of the work with its embedded community and environmental values. A building company was formed from amongst the community of interest broadly represented by Urban Ecology Australia and this company built the first 2 stages of the project. The first building 'the Roman Hut' (named after its owner) was very much a hands-on, community exercise in building. Volunteers mingled with tradespeople as each learned from the other. As construction proceeded further and the buildings became larger and more complex the extent of volunteer involvement reduced, but the legacy of this process of direct participation in construction resulted in the creation of jobs within the project for a number of volunteers, and placement of 'graduates' from the site in other paid jobs afterwards.

Over the period of the project, from late 1999 to 2007, many people have been participants at one level or another in the project. Some have been planners, some managers, some gardeners and landscapers, some builders – and some have been all these and more! In total there will have been several hundred people involved with the project in greater or lesser degrees and their participation has both contributed to the success and realisation of the project but has also provided input, experience and education to their personal lives, informing their own choices about issues ranging from toxicity in construction materials to solar design principles, community gardening and co-operative working and decision making. Participation has been an essential component of raising awareness.

Community Self-Reliance

> One of the founding principles of Christie Walk is that a true sustainable development engages with the community rather than existing as a separate, privileged enclave.
>
> (Farr 2007 p.226)

Table 8: 'Green Spec' Environmental Performance Requirements

Fundamental	Negotiable
MATERIALS & CONSTRUCTION	
Timber from sustainably managed plantations	
Recycled timber	
No formaldehyde	
No PVC (goal)	
No chlorine	
Non-toxic construction & finishes	
Allergy-neutral construction & finishes	
Design for de-construction (re-use/recycling of materials and products)	
Minimisation of embodied energy over building lifecycle	
Specification of materials based on life-cycle analysis	
Preference for use of local & regional materials, products & services	Construction materials (subject to the 'Required' provisions)
Avoidance of Boral products until they improve their forestry practices	Construction methodology
ECO-TECH	
Provision/planning for photovoltaic power generation	Initial extent of photovoltaic provision
Provision/planning for wind power generation*	Staging of photovoltaic provision
Provision/planning for biomass energy harvesting*	Initial extent of waste water treatement facilities
Provision/planning for total recycling of waste water	Staging of waste water treatment facilities
Solar hot water systems supplying all premises	Extent & type of telecommunication/information technology provision
Capture and use/re-use of rain/stormwater	
Water conserving valves/flow control	
Specification of energy efficient appliances	

The client was the development cooperative, Wirranendi Inc., created by UEA. The cooperative structure provided a means for people to build in urban environments where single house blocks are rarely available. The clients included first-time homebuyers, investment purchasers, experienced home owners seeking the advantages of an urban lifestyle and older people wanting to retire in an active, mixed community. This has been a community based development heavily reliant upon voluntary effort in its early stages. The high level of community self-reliance in the project has tested the proposition that innovation and ecological development can be largely sustained by the non-government sector. The project contains many elements of experimentation and innovation funded by the development process rather than external agencies. The entire development program was sustained by an active local community of families, businesses and non-government and non-for-profit organisations. During construction the death of Beverley Vaughan, one of

Table 8: (continued)

Fundamental	Negotiable
DESIGN	
Climate-responsive design principles	Floor plans & areas
Extensive use of solar energy for space heating & cooling	Development mix
Maximisation of pedestrian/people spaces – limitation of vehicle spaces	Extent of vehicle/pedestrian mixing (e.g. Woonerfs)
Maximisation of accessibility (espec. Disabled access provision)	Type of vertical access provision
High level of bicycle parking	
Rooftop gardens and balcony spaces wherever practicable/feasible	
Integration of art & craft	Staging of the development
LAND-USE	
Linkage of the urban development with a rural degraded lands restoration program*	Extent & type of rural land restoration program
Prefer indigenous vegetation	Extent of indigenous vegetation
Next preference native vegetation	Extent of native vegetation
Low water use landscaping (xeriscape)	
Create productive landscape	Extent & type of food producing plants
DEVELOPMENT PROCESSES & FUNDING	
Ethical investment funding base	Proportion of ethical investment
Participatory design program	
'Green' performance requirements in lease and sale agreements (ensuring 'green address' for marketing purposes etc)	
EDUCATION & RELATED ISSUES	
Workshops for community education & participation programs (to be provided by UEA)	Type & extent of construction industry based training programs
Appointment of Ecopolis as architect & urban designers	

the most active people involved with the development, meant that for his partner to stay in the project a rapid and substantial redesign was needed to reduce the size of their dwelling[55]. This was achieved. Overall, the development structure enabled this experimental project to proceed and to withstand delays and personal tragedies and survive where a conventional development approach would probably have resulted in the project being abandoned or changed beyond recognition.

Christie Walk is a community-titled development. As well as owning their own property, residents share in the common property on the site. On just 2,000 sq.m, the project includes:

[55] Beverley Vaughan played a crucial role in the initial procurement of the site (he provided the deposit for Wirranendi to be able to purchase it) and was a determined advocate for the Christie Walk development.

- 27 dwellings of various types and configurations (4 two-three storey strawbale houses, 4 three storey townhouses, a three storey 6 apartment building and a five storey 13 apartment building with community facilities).
- Healthy, non-toxic, building construction.
- Gardens that run through the entire site (rather than roads).
- Community focused built form, an environment designed to create places for both spontaneous and organized meeting and social interaction.
- Passive solar/climate responsive building design in a severely restricted urban setting.
- Capture and use of storm water for irrigation and toilet flushing.
- Solar hot water to all dwellings, including multi-level apartments.
- Heat pump hot water to the five storey apartment building.
- Photovoltaics (provided in the Stage 3 development phase).
- Intensive (deep soil) roof garden shared by the community.
- Community gardens for organic produce active since 2003, with the garden at the centre of much community interaction.
- Unrestricted pedestrian access (not a 'gated community').
- Proximity to all city amenities – maximizing the benefits of existing urban infrastructure and minimizing transport energy use.
- Shared indoor facilities in the Stage 3 building comprising a kitchen, laundry, library, meeting space, interpretive centre and toilets.

All of the above is included in the price of each dwelling and helps make Christie Walk an affordable place to live. Christie Walk is a living example of an idea in action and functions as a show-and-tell research and educational tool as well as healthy habitat for an active inner-city community.

Lessons and Achievements

This was intended to be a medium budget project providing housing for an equivalent purchase cost to conventional local inner-city development. Building costs ended up being reasonably competitive in the medium-high range, but site development costs were inflated by time lags in the early part of the program that resulted, to a significant extent, from inexperience in development processes on the part of the original cooperative members. A number of rarely used environmentally responsible construction approaches were introduced to South Australian inner-urban development through this project, but the substantial degree of innovation and environmental performance, very high levels of insulation and substantial construction (e.g. avoidance of toxic materials, thick external walls and high internal mass) contributed to high costs. These costs were partly ameliorated by the non-profit structure of the developer body which enabled re-investment in the development in lieu of profit-taking as a means of covering the additional cost of construction associated with building considerably in excess of code requirements and with a full gamut of environmental technologies. The project has been as much a research

and educational program as it has been about urban development and it has carried costs associated with this role.

Christie Walk is currently perhaps Australia's only example of a fully featured and integrated inner-city environmental housing development and it has been identified as an exemplary urban ESD project by the Lord Mayor of the City of Adelaide, by Herbert Girardet in his report to the government of South Australia (Girardet 2003), and by the Australian federal government.

Lessons learned from the community based development process in the first two stages were adopted in a joint venture approach for the third stage of developing the project. Tradespeople have learned and are continuing to learn from engagement in an environmental and community orientated project and there is now a community of people with skills for whom the development process has been demystified. They are able to challenge conventional wisdom and expectations, where appropriate, from a basis of achievement.

The immediate beneficiaries of the project have been the residents, who live in healthy, energy-efficient dwellings in a strong and supportive, village-like environment. They have also paid the price of being pioneers with many having made financial investments to enable the project to exist and with everyone living at Christie Walk having to accept 'sticky beaking' by the several thousand visitors and dozens of tour groups (especially schools) keen to learn about ecological architecture, urbanism and community.

The co-housing elements of the project provide benefits that may be familiar to some Europeans but are extremely rare in Australia where the individual suburban house is the dominant domestic accommodation type – which creates expectations often taken into urban settings. The village atmosphere of the project already provides discernible benefits to residents and is remarked on by visitors. Some people clearly benefit from and express appreciation of community aspects whilst some are less comfortable and even challenge this perception. There has been a learning curve for all in terms of what really works.

Christie Walk demonstrates to a significant extent that it is possible to address virtually all of the key environmental issues through the manner in which the built environment is planned and developed – and that social sustainability, the support of community processes and the making of convivial places is integral to achieving this possibility. Discovering the pragmatics of making 'community' work with 'commercial' has been a defining experience for the project protagonists, some of whom are keen to see their hard-won knowledge put to use – others never want to be involved in development again!

A Successful Adventure

> An adventurous spirit and willingness to experiment has paid off for the creators of Christie Walk, who have produced a rare community-driven project with applicability to sustainable urban developments worldwide.
>
> (Farr 2008 p.229)

Table 9: Christie Walk environmental responses

Environmental Issue	Christie Walk Response
Water Conservation	Low-flow shower heads. Low-flush toilets. Low water use landscaping. Use of stormwater for irrigation and to supplement toilet flushing. Use of treated effluent for irrigation (deleted after the withdrawal of promised sponsorship by SA Water, the state government utility). Community laundry to minimise total washing machine use.
Water Capture	Stormwater capture from roofs, balconies and paved areas to underground tanks. Semi-permeable paving and open garden areas to maximise direct use of rainfall. All water on site remains there (no run-off to street water table).
Energy Conservation	Highly insulated building construction, including double-glazing, with appropriate use of thermal mass and climate-responsive design strategies – building energy conservation performance greatly in excess of Australian Building Code requirements. Low wattage light globes for most purposes (some homes 100%). Energy efficient appliances as standard provision. Central city location encourages walking and minimises transport energy use.
Energy Capture	Solar houses despite difficult site shape and orientation with all buildings designed to be passive climate-responsive structures capturing heating and cooling energy from the ambient environment. Solar or heat pump generated hot water to all dwellings. Photovoltaic panels mounted on apartment building as a collective power station feeding to grid (5 kW on main roof, 300 watts of semi-transparent pvs as integrated roof elements to central light well). Large areas of planting at ground and roof level turning sunlight into biomass.

A sense of engagement with and by the community and a commitment to educational and community outcomes have been the drivers for the success of this project. Participation in the design process was managed on the basis of individual consultation on dwelling layouts within an overall framework set by the architect for the site and approved by semi-formal processes internal to the developer organisation. These processes were formalised as the project developed. An interdisciplinary team was set up to co-ordinate services and engineering with the architectural and urban design demands. This team became less effective as the development time was distended and co-ordination was eventually directly managed by the architect and a new project manager brought in to help complete the project in a timely and cost efficient way. Landscaping workshops began prior to construction and have continued sporadically through the development of the entire site, fitting in around the building program. The landscaping has been carried out entirely by residents and within just 5 years was rich, diverse, verdant and well established.

Table 9: (continued)

Environmental Issue	Christie Walk Response
Biological Productivity	Garden areas are for productive landscape (including food plants), to assist in building passive cooling performance, to provide habitat (especially for birds and insects), and for aesthetic amenity. The site only had a few weeds, an untended grape vine and a small overgrown grass area prior to redevelopment.
Biodiversity	The extensive ground level garden space, roof garden and potted plants have contributed to a significant increase in biodiversity on the site.
Transport	The location of the project in the inner-city was central to the overall environmental strategy (and provided the biggest challenge to the project protagonists). Car ownership was discouraged as much as practicable with reduced car parking (some residents have initiated car sharing). No car parking is provided for Stage 3.
Air Quality	Non-toxic, environmentally responsible paints, stains and varnishes have been used entirely for all interior finishes. Toxic glues have been avoided throughout. Virtually no formaldehyde has been used in the project to the best knowledge of the protagonists. PVC has been avoided as much as practicable with most plumbing in polyethylene and some in copper. Three of the dwellings have the electrical wiring sheathed in non-PVC plastic.
Social Sustainability	Design and development processes have engaged the residents in the process to try and ensure a sense of ownership, understanding and input to the shared/communal areas. Working bees create a social focus that also contributes to the practical completion of landscape elements in the shared/communal areas in particular. The design of external spaces has been done so that casual interaction between residents is encouraged and so that there are areas suitable for shared, social activities. The development is knitted into the existing city fabric and neighbours use it as a pedestrian thoroughfare.

Organisational arrangements have been the key to the successes and integral to the problems of this project. The end result is generally successful and the amount learned by the community has been enormous. One result was that the third and final stage proceeded on a more directly managed and pragmatic basis than the broader community structures of the early stages. The role of volunteers was critical to the establishment of the project and maintenance of community and environmental ethics, including issues of gender equity and social inclusion.

Awareness

Raising awareness was a primary goal of the project. The idea was, in essence, simple – to build a demonstration project that would provide homes for the project

participants whilst creating an inner-urban development that did not compromise on its ecological goals and, simultaneously, contributed to the making of community and strengthening of neighbourhood values. By having the future residents of the project participate in every aspect of its making it was hoped that the knowledge and experience generated would then be taken into the wider community. By having a project located in an inner-city neighbourhood within 5 minutes walk of the CBD it was hoped that its impact as a small exemplar of 'eco-city' principles would be enhanced both in terms of visual presence and through the presence of an active, eco-city community living, working and playing within the local social networks. This has happened, e.g. with Christie Walk residents being active members of the neighbourhood residents' association.

As the project has progressed it has attracted a substantial amount of media interest. Much of this has been in the electronic media and has included independent film-makers looking at 'future possible worlds' as well as radio stations and film clips and features on an interactive DVD on healthy, environmental building produced by the Australian federal government's Australian Greenhouse Office[56].

The project has been instrumental in raising awareness from the local to the international level. It features in at least three international textbooks on sustainable urbanism and has enjoyed the attention of many overseas visitors. It is being used in consumer awareness programs and educational establishments, from schools to universities, and it has been, and continues to be, presented at conferences and seminars in public and academic environments. At a seminar on sustainable urbanism with national participants, a key presenter observed that Christie Walk is one of only 2 truly urban examples of sustainable development in Australia – and the protagonists of the other example (WestWyck in Victoria) acknowledged that it was inspired by Christie Walk.

Evaluations

The strengths of the project have been to do with the powerful sense of community that underpinned its very existence and its capacity to engage many people at many levels, each establishing a stake in the ideas and processes of urban ESD. The weaknesses derive, ironically, from the same source, with decision-making and management made more complicated and time-consuming than could easily be supported within the financial constraints of urban development.

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[56] Christie Walk was the only Australian example of residential sustainable development cited as a case study in the federal government's 2005 Inquiry into Sustainable Cities. In 2005 the project was a finalist in the Building & Social Housing Foundation/UN-HABITAT's World Habitat Award and it won Silver Prize in the 2006 Ryutaro Hashimoto APFED Award for promotion and practical demonstration of socially-equitable and sustainable city living from the Asia Pacific Forum for Environment and Development. In 2006 it was also recognised with two awards from the Civic Trust, including winning the People's Choice Award (Material Category).

Monitoring and evaluation by third parties have borne out the high level of performance of the project in terms of energy use. Regarding the improvement of environmental quality, energy efficiency, resource efficiency including recycling rate and the level of awareness, there is some researched data, represented in part here by extracts from two reports.

From the précis of Oliphant's report on Adelaide's Christie Walk housing development:

> . . .confirmed what residents and regular visitors had already noticed. These comfortable, beautiful homes really are energy efficient, preventing tonnes of greenhouse gases from damaging our planet and saving their owners hundreds of dollars each year in electricity costs.
>
> Internal room temperatures were monitored constantly and shown to have little fluctuation from the Energy SA recommended winter and summer temperatures, ie around 18–20 degrees on winter days and 25–27 degrees on summer days.

And from the report's summary:

> Results have been very positive for the Christie Walk development. The homes have an occupancy rate of mainly one or two persons and are virtually all electric. A comparison with the State average for such homes shows that there has been; a 60% reduction in energy use and carbon dioxide emissions for the 1 person all electric household and a 50% reduction for the 2 person homes.
>
> Additionally when a comparison with the 6 monitored homes at Mawson Lakes was undertaken it was found that on the peak load day the contribution to peak load averaged 0.4 kW/household at Christie Walk and 4.0 kW/household at Mawson Lakes[57]. (Note that sample sizes are small, however, it is expected that more rigorous work will confirm a large difference.)
>
> (Oliphant 2004)[58]

Researcher Katherine Daniell set out to find out how much the built form of Christie Walk affected its performance compared with occupant behaviour. Her conclusions indicate that the buildings and infrastructure assist good performance in much the same way that you can drive a fuel efficient car badly and still return better fuel economy than a gas guzzler:

> . . .these results show that even with the worst recycling behaviour, the infrastructure at the Christie Walk development, including composting and recycling services, helps to reduce the effect of behaviour to below the 50th percentile of the greater Adelaide population.
>
> . . .in the Christie Walk development, behaviour has very little effect on water sustainability compared to the rest of metropolitan Adelaide water users. This is thought to be predominately due to the inclusion of water saving devices and the use of stormwater for

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[57] A state government sponsored suburban development notable for its extensive water management strategies.

[58] Monica Oliphant is an independent consultant and Adjunct Professor of Research at the University of South Australia.

toilet flushing and garden watering, which reduces the overall mains water use in the housing development.

. . .in the Christie Walk environment, behavioural influence on energy use has very little effect on sustainability. . .energy use in Christie Walk remains at very low levels for a range of behavioural types compared to metropolitan Adelaide users.

(Daniells 2005)

Table 10: Comparison between Christie Walk and conventional development

	Conventional Development	Christie Walk
Site area	2,000 sq.m.	2,000 sq.m.
Number of dwellings	24	27
landscape	200 sq.m.	700 sq.m.
Productive roof area	NONE	170 sq.m.
Resource conservation, including recycling/re-use of materials	NO	YES
Energy efficiency	NO	YES
Non-toxic construction	NO	YES
Community space	NO	YES
Stormwater capture	NO	YES
Effluent treatment	NO	YES
Renewable energy	NO	YES
Community engagement	NO	YES
Educational programs	NO	YES
Diversity of dwelling types	NO	YES

When this project is completed,
and Christie Walk resounds with music, conversation, and breezes in the trees,
we will remember the moments
we felt worried or stressed and see that
in those times we evolved as a real team,
supporting each other, and that in getting through the harder times,
we gained the faith
that everything we want to do will be done.
Julia Winefield[59]

[59] Julia Winefield joined UEA early in its history and, after returning to Australia from a sojourn overseas, began working with UEA and Wirranendi, initially as a volunteer, later as paid staff. At a time when there were many challenges for Wirranendi and in response to a plaintive request from project manager Ed Wilby for something inspirational, she composed this 'creed'.

7.6 Fractal Dreaming

> Adelaide's Ecopolis development, pioneered by Paul Downton, Chérie Hoyle and Urban Ecology Australia Inc., has revealed an important element of this new environmental radicalism: its emphasis on the Dreaming. Inspirational architectural and decision-making models for society are being concocted without the self-censorship of the reformists.
>
> (Doyle 2000 p.216)

> Christie Walk was a breakthrough development which we've all learnt from.
>
> (Lou de Leeuw reported by Stott 2007)

Social Experiments

> Models and strategies are required for eco-neighbourhoods in urban areas in order to practically demonstrate innovative and appropriate solutions which could be readily applied by other neighbourhoods.
>
> (Rudlin and Dodd 1998 p.2)

The HEP and Christie Walk can be seen as self-directed social experiments, undertaken without coercion by people freely choosing to be part of an innovative,

Figure 54: Christie Walk rooftop looking towards the Stage 3 apartments and the CBD

non-government initiative. In Denmark, projects with similar overall goals have been undertaken by local government. Torsted West (a new 'green' town) and the Green Municipality Slagelse (an environmentally responsive retrofit of an existing urban area) are both projects which have been approached from the three angles of:

> The city as an ecosystem, that is matter and energy flows in the city,
> The functioning of the nature in and around the city, that is plants and animal life,
> Democracy, participation and everyday life. (Marling 1992 p.11)

According to Marling, 'Danish experiences with social experiments and urban ecology/green municipality planning create an effort towards a democratic sustainable development.' Even with government support, 'the experiments have been rather small and limited.' And 'It has taken a long time to mobilize both the grassroots and the authorities.' (Marling 1992 p.14). The case studies reinforce the centrality of social dynamics in any kind of ecocity program. By pursuing the Ecopolis Development Principles which underscore the Ecopolis theory, the Halifax EcoCity Project, Whyalla EcoCity Development and the Whitmore Square EcoCity Project have attained some degree of success, either as conceptual models (with the HEP), or as actual developments. They have helped to integrate knowledge through experiential means, bringing together dispersed information on technical, economic and social matters through the focusing processes of creative, collective action with the goal of making 'pieces of ecological city'. These 'pieces', no matter how incomplete, have possessed sufficient characteristics, in process (particularly) and form (partly) to represent urban fractals. With a high level of participation from the wider community (the measure of which is that, without that participation, there would have been no projects at all) the projects have been self-conscious demonstrations of the potential for systemic cultural change. As such, they have been influential; for instance, the idea of 'future residents' as an active community that could interact and contribute to ecological development was raised and developed in the HEP and has grown local roots with its adoption by the Aldinga Arts Eco-Village (Aldinga Arts Eco-Village Newsletter 2000). The HEP proposal included restoring degraded rural land as an integral part of the urban development program. The idea that cities have an ecological responsibility to their regions was rarely, if ever, stated at the time the HEP was first proposed but is now part of the lexicon of sustainability[60].

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[60] A note on urban centres in SA. South Australia's urban system belongs to a group that is rare in wealthier and more developed countries in that it lacks a well-balanced hierarchy of cities and is dominated by one very large agglomeration. This lack of balance is characteristic of many of the poorer, smaller and more populous countries of the 'South' (Stren, White and Whitney 1992 p.2). It reinforces the idea that Adelaide, despite its nominal 'first world' context, is functionally similar to many third world cities. As a 'developed country' city in the southern hemisphere and with its anomalous hierarchic positioning as a regional centre in a state with a larger territory than many

The Whyalla project opened channels of communication and stimulated the aspirations of the Whyalla community that had unplanned and unexpected outcomes which did not fit any presumptions about urban planning and renewal. Seen from an historical perspective, although conceived as a radical ecocity departure from conventional city making, the Whyalla EcoCity Development project may be most interesting for having 'spontaneously' established, as central to the remaking of its urban heart, a focus which may predate that of trade or political management – that of spiritual endeavour and the collective need to have more than just a political economy as the focus of human social activity.

The Halifax EcoCity Urban Fractal

> Examples of best practice tend to be confined to individual buildings, occasionally urban blocks – such as the car free development in Edinburgh – and to ecovillages in the countryside – such as Findhorn in Scotland. There are however very few projects which address sustainability at the neighbourhood scale, Kolding in Denmark and Halifax Ecocity in Australia being notable exceptions.
>
> (Rudlin and Dodd 1998 p.1)

The original presentation of the Halifax EcoCity Project concept was an attempt to make visible a buildable vision of an urban environment that integrated social justice and community control with strong ecological goals. It consolidated and gave form to a number of ideas about architecture, urbanism, environment and community politics that can be recognised collectively as ecocity concepts. With the support of people and organisations around Australia, the challenging task of creating a piece of ecocity began with the Halifax EcoCity Project. It provided the impetus for the EcoCity Projects in Whyalla and at Christie Walk. Though the HEP has not been built as a physical edifice, it exists as a cultural construct and as a historical experiment in participatory, community development processes that has been referred to as the 'Holy Grail' of urban environmentalism[61].

Rudlin and Dodd identified the HEP as a case study example of neighbourhood scale ecological development when they spelt out 'a brief for a sustainable urban neighbourhood' to be used as the basis for a design exercise (Rudlin and Dodd 1998 p.2). Acknowledging that it would be difficult to achieve the targets involved in creating such a neighbourhood, they claim that the scheme would not have failed if it did not meet all the targets and that it would nevertheless 'push the limits of urban development to show just what is and is not possible at present and how they could be tackled in the future. . . and hopefully demonstrate that the truly sustainable urban neighbourhood is a practical goal.' (Rudlin and Dodd 1998 p.3). The environmental targets to which they refer include reducing the eco-footprint of the neighbourhood

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countries, Adelaide manages to straddle circumstances that make innovations here potentially useful (and certainly intriguing) models for application in the 'North' and the 'South'.

[61] Comment in the 'Ecopolis Now' video documentary by Sam Stegman screened in Adelaide at the 'Wild Spaces – 5th Environmental Film Festival' Friday 3 November 2000.

to an ecologically sustaining level, looking at lifecycle costs and impacts, using ecological design principles and environmental purchasing criteria, eliminating fossil fuels for power and heat, creating a closed water system, exploring food production possibilities, reducing car use, and developing a community planning approach.

It is difficult to measure the success of a project that has not been built, lived in and independently assessed by users and critics, nevertheless, an important goal of the HEP was that it be influential in the wider community and raise popular consciousness of what was possible in urban development and community-based politics. Some evidence of the project's success in this regard can be seen in the (incomplete) listings of academic citations and courses that have incorporated the project as a case study, publications that refer to the project, media reports, exhibitions, and awards received for, or because of, the project.

Its value as a vehicle for imaginative scenario planning is demonstrated to some extent in relation to later UEA-Ecopolis projects. The 'Halifax Hypotheticals' (Prelgauskas 1994) offer a partial illustration of this.

The Halifax EcoCity Project set out to provide a model of ecocity development *processes* as well as a developed concept of what that process might lead to. It was, above all else, an exercise in citizen participation for ecological development. The HEP was featured as an exemplar of participation in the book of 60 international case studies published in Barcelona in 1999 (Ruano 1999). UEA received awards and recognition for that from KESAB, the Civic Trust and the South Australian State Government, it received the 1994 inaugural 'World's Best Ecocity Project' award from US-based Ecocity Builders Inc., and the HEP was featured as an example of Good Practice on the UNCED/Habitat 2 database. All such publications and awards helped to substantiate the value of participatory processes which were understood, at least initially, by Whyalla City Council with whom UEA had a productive working relationship for some years.

But even the most sympathetic people working in the Adelaide City Council administration were stymied by having to operate within a bureaucratic framework that did not have the necessary capacity to respond to community initiatives. At no time did the Adelaide City Council try to form a formal working relationship with UEA as a community organisation. There was always concern on the part of the HEP protagonists that there may have been a failure on UEA's part to communicate the issues and ideas more effectively. This concern was, at the same time, ameliorated by the evidence that thousands of people in South Australia, and even overseas, seemed to recognise what the project was trying to achieve.

The HEP certainly raised expectations, one of its primary goals and an essential part of cultural change. According to Wendy Sarkissian, internationally respected Australian planner specialising in community participation, 'All over the world planners, designers and ecologists are waiting to see what happens on this site. – There is enormous professional discourse about the concepts embodied in the earlier plans prepared by Urban Ecology.'[62]

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[62] Email communication from Sarkissian to UEA, August 1999.

The HEP proposal changed perceptions of what is possible in the city and by 1995 UEA had created a credible $60 million project from a capital base of zero, attracted worldwide attention as a model of ecologically sustaining urban development, served to educate school and university students about urban environmental issues, upset conventional development practices, contributed to a grassroots movement for change in architectural, planning and development practices and had direct input to dozens of architecture and environment university courses throughout the world as students studied the Halifax EcoCity Project.

The Shopfront

Community expectations about major developments are typically based on distrust and suspicion and there is no quick and easy way to allay such fears. Conventional developments are planned in an abstract, alienated way with community involvement confined to short-life exhibitions and meetings in one-off or institutional venues. In a public environment where people are cynical about media there is really no fast sell, only honest and open interaction with a community over time can establish trust and the basis for understanding. UEA's experience with each of the case study projects strongly indicates that a shopfront should be at or near the intended site of any project. Shopfronts open to the public on a daily basis are different in effect and intent and people react accordingly.[63]

Under-Valuing the Community Sector

In Whyalla, UEA set up a Centre for Urban Ecology as a deliberate early stage in promoting an eco-city development, whereas in Adelaide the Centre evolved from the need to house activities of urban ecologists promoting the HEP concept. Whyalla reinforced the relevance of a Centre for providing information on a current eco-city proposal, but also underscored the need for information, advice and referral on urban environmental issues generally. In both cases, thoroughly committed volunteers were essential to the operation of a Centre, and to achieving an ecocity project. Getting people involved has been essential to getting ecocity ideas into the public domain.

From its inception in 1992–1998, hundreds of volunteers contributed a conservative estimate of $AUD 3,000,000 to evolving the HEP, this kind of valuable community investment is not recognised in conventional economic terms and thus lacks importance in the conventional accounting approaches of the corporate sector. At all times, over the years of evolving the Halifax EcoCity Project, UEA has been vigilant

[63] A favourite tale told by Urban Ecology volunteers is about a neighbour whose initial reaction to the project was hostile but who later regularly brought flowers to decorate the Centre. Because the Centre was open to casual visits, the neighbour was able to satisfy her curiosity and learn about the project in her own time.

and acutely aware of the problematic dynamics of the development industry. Much work remains to be done to achieve real partnerships between the private, public, and non-profit sectors.

Inside Views from Overseas

Some of the interns hosted by UEA have had to produce reports to satisfy their university research requirements. Two of these are of particular relevance to any attempt to assess the Halifax EcoCity Project. They are by Neils Laustsen and Thomas Jensen, both from Aalborg University in Denmark. The original connection with Aalborg University came about from Gitte Marling's participation in the 1992 EcoCity 2 conference.

Part of Laustsen's analysis of the HEP was done on the basis of a method called SCOT (Social Carriers of Technology) from his host department of International Technology Planning at Aalborg University. He observes that the HEP was being proposed in a context such that the overall situation of development in Adelaide was not advancing towards 'sustainable development' (Lautsen 1998 p.17) and quotes Susie Herzberg at the time a planner with Adelaide City Council, saying that there was a lack of knowledge and understanding of environmental problems in Adelaide and that lack of action was 'because we actually are in ignorance of our impact on the environment.' (Laustsen 1998 p.22).

Laustsen noted that even in Denmark, which has an established, state-supported history of urban ecology projects, there have been problems with low levels of community participation in projects. The problem is certainly not confined to Adelaide.

Thomas Jensen, observed that 'Whereas Agenda 21 policies will provide the basis for sustainable urban development, urban ecology projects must work as demonstration projects to reveal the practical barriers of the implementation process.' (Jensen 1994 p.39). He went on to explain that it is only the practical implementation process that could uncover barriers in the area of technical problems, lack of political cooperation or resources, or lack of public interest and citizen participation. Without being aware of the Danish experience, UEA had inaugurated a project that completely fitted the Danish interpretation of 'urban or city ecology', which Jensen quoted from Miljøministeriet, 1994, as:

> . . .a special environmental program which, with the environmental conditions in a specified urban area and the participation of its citizens as the origins of action, seeks to promote holistic solutions to problems concerning the usage of resources, environmental effect and natural environment within the specific urban area.'

The difference between American and European perceptions of what urban ecology and ecocities are all about is demonstrated in part by comparing Laustsen's view that the HEP, even if realised, would not be a real 'piece of ecocity', with Register's statement that 'The Halifax Project is by far the most thorough-going ecologically informed project anywhere. It meets more of our Ecocity Prize criteria

for ecological building design, community layout and planning process than any other project known to us.'[64]

An urban fractal has to have integrity that survives analysis and process from conception through to financing and development, and later, occupation. If this living process is absent, or is severely damaged as it was in Whyalla, then the fractal is incomplete and incapable of full effectiveness. The HEP has been able to maintain its role as a fractal because it was never compromised. Although the tendering process saw UEA lose control at the very end, it also meant that UEA were not seen as responsible for what Hansen Yuncken did and, if anything, the process reinforced the proposition that success in making ecocity programs is dependent on adopting inclusive development programs that do not allow conventional development approaches to control the process.

Whyalla EcoCity Development

Unlike the Halifax EcoCity Project the Whyalla EcoCity Development has proceeded with some development on-site, although it has undergone some modifications. That it would be hard to get things started and that key structures would be needed to catalyse appropriate results was always understood by the City Planner and the consultants but a critical mass of development would be difficult to achieve in any city on a 15 hectare site. In Whyalla a high level of optimism and commitment was essential to achieving anything at all. Again, an important goal was to raise popular consciousness of ecological development and encourage community-based politics.

Community Engagement and Cultural Impact

The improvement of environmental quality, in the long term, depends on the community's understanding of, and commitment to, environmental issues. Whyalla Council already had a history of environmental endeavour, and its consultants-to-be had a history of interaction with the Whyalla community. Whyalla provided an opportunity to put into effect lessons about community education and participation learnt from the HEP experience. As a result, this small city of 27,000 people had a significant group of citizens (many closely associated with local religious and cultural organisations) who understood and were committed to the ecocity vision. Nevertheless, pressure from economic reductionists succeeded in replacing community areas with commercial interests.

In the first round of local government elections that followed the initiation of the Ecocity program the mayor lost his seat, but two elections later in May 2000,

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[64] From the Ecocity Builders' citation when presenting UEA with the 'World's Best Ecocity Award' in 1994.

two of the new councillors[65] were members of Urban Ecology Australia who had joined the organisation and become involved in community politics as a result of the workshopping, participation and educational programs run by Ecopolis-UEA during the Whyalla EcoCity Development consultancy in 1996–1997. The small but active local Buddhist community also became advocates for the ecocity idea and became the first community developers, initiating the first ecological building on site as part of a future meditation centre.

In Whyalla a 15 hectare site in the heart of the town became zoned 'Ecocity' and actual buildings were constructed. The Halifax site was developed quite conventionally. In terms of cultural impact, however, the Whyalla EcoCity Development example has had negligible impact whilst the Halifax EcoCity Project continues to exert influence. This suggests that the cultural/urban fractals in the Ecopolis proposition can be as effective in a 'virtual' sense. That the unbuilt HEP is more effective than the Whyalla project at conveying the ecocity message beyond the city limits is a challenge to the idea that examples need to be built and experienced to be effective.

The Christie Walk Urban Fractal

> Adelaide eco-business consultant Lou de Leeuw says we can expect more eco-villages in the city, following the success of Christie Walk and Aldinga EcoVillage. The eco-village expert says the high-density Christie Walk model in particular is the way of the future. . .
>
> (Stott 2007 p.30)

Christie Walk demonstrates more than just a similar built form response to the HEP, it contains and expresses important aspects of how the Ecopolis theory translates into practice, including:

- Community processes and social structure based on mutual aid and direct democracy;
- At-a-distance impacts related to financial decision making (Community Aid Abroad Ethical Investment Trust and Bendigo Community Bank);
- Technologies – showing how various aspects of design address key issues: water capture and re-use, solar power, etc.;
- Urban form – showing reduced transport demands and higher density facilitating notions of community and conviviality (thus returning to the social agenda of point 1, above);
- Built form manifestations of technology and funding as the means to reinforce community processes – thus achieving the scenario of sustainable human ecological development.

Perhaps significantly, the one example of sustainable technology that was not successfully delivered at the completion of the Christie Walk project was for sewage treatment. In the second stage of the development a sewer mine was installed (thanks

[65] Jean Oates and Jo-anne Waters.

to a Commonwealth government grant) but its operation was so energy expensive that it was financially non-viable for the community to continue to operate it and it was decommissioned. Determined to finish the project with all the key green technologies in place, the Christie Walk community spent many months negotiating with the state government water utility, SA Water, to install a biological, non-chlorinating, full on-site sewage treatment system. Everything was put in place, including the resolution of complex legal requirements for easements that navigated between private/community areas and the need for unfettered access to the proposed plant which would have been located under the car park courtyard closest to the main street and sent treated water down the street to a nearby public park. There was agreement and support from the community, Adelaide City Council and from SA Water who had prepared a detailed and costed proposal. The utility suffered from a kind of institutional Alzheimers as its personnel changed over the nearly two years that the proposal was developed and finally reneged on its agreement citing unexpectedly high costs. Perhaps significantly, this singular instance of failing to provide a key element of the project was when its delivery was dependent on a large, conventional institution.

Whereas the HEP provided grist to academic and professional mills as a partly realised, but unbuilt project, Christie Walk has been widely cited as an example of good practice in building and development. The Commonwealth Government's comprehensive residential design guide 'Your Home', now in its fourth edition in both printed and website formats, includes two case studies of the project, which stands out as one of very few urban sustainable developments[66]. A number of publications worldwide have included Christie Walk as an example of ecologically sustainable development and invariably point out the importance of the community aspects of the project (e.g. Beatley and Wheeler 2004, Farr 2008).

There was no structured research done *about* the HEP and its processes apart from occasional studies by students, interns and volunteers. It is therefore difficult to cite formal studies that can prove or disprove claims about its participatory nature. As the HEP was completely reliant on community volunteerism to provide the resources, people and skills for its realisation, the fact that it existed in any form at all for so many years and nearly became a built development is proof that community participation was core to its existence. Some documentary support is available for the contention that participatory processes were fundamentally important to the project (Ruano 1999). Collectively, members of Wirranendi have learned, and are continuing to learn, a great deal from managing the Christie Walk development. Any weakness in the performance of the organisation has been attributable to a lack of developed skills in key areas rather than the cooperative structure of the organisation itself.

Sustainability specialist Danielle McCartney cited Christie Walk as a mixed-density community housing project that demonstrates that sustainable living can be achieved in the inner city and noted that the project reintroduced the idea of 'com-

[66] I was the editor for the 3rd and 4th editions and a Technical Adviser to the program that resulted in the production of the design guide.

munity' to the city. In observing that "Car dependency is reduced and community facilities that have been the vital core of Northern European co-housing developments for decades create a 'calm oasis' in the middle of Adelaide." she praised the project 'for what it gives back to the community.' (McLeod 2004 p.36).

Media and Outreach

Achieving such close adherence to principles that are antithetical to much of the way the construction and development industries operate has required a lot of internal education for those involved in the project, and as has been noted, the work and time investments of committed individuals has been the only means to get ecocity projects happening without significant financial resources. Broad support from the community has also been a prerequisite for anything to have a chance of being built and the support and understanding of professionals such as planners and local government officers is also necessary. To get any of this there has to be education.

The media are crucial to effective community outreach for educational purposes in a democratic, pluralist society. Given that the media are mostly owned by corporate interests that may not perceive any self-interest in ecocity projects, it has been at the level of individual journalists that ideas have to be initially presented. In the process of promoting the three UEA Ecopolis projects the media was generally supportive[67].

Community Action

Barton observes that whilst Local Agenda 21 (LA21) 'calls for participation of local communities in the process of development. It does not see such involvement going as far as *citizen control*. . .but rather a process of devolution taking place within a framework set by the local authority.' (Barton 2000 p.7). Although the New Urbanism is primarily an American phenomenon and there is antipathy to LA 21 in the USA, its commitment to the 'charette' process suggests that it embraces a similar ideal of participation. The process brings together 'stakeholders'[68] in structured discussion forums and design exercises which provide a means of informing decision-makers but are not in themselves decision-making. Most certainly 'There are issues here about the degree to which such processes – however sincerely undertaken – raise public expectations of action without establishing effective means of implementation.' (Barton 2000 p.7).

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[67] Christie Walk has featured in numerous TV and radio programs since its inception in 1999. It features in the AGO Your Home video and interactive DVD and is studied and cited in a growing number of research papers in Australia and overseas. It featured as part of ABC TV's 'Catalyst Special' broadcast nationally on 24 May 2007.

[68] Who are self-selected or, more usually, nominated by interest groups – see Doyle 2000.

A charette-like process was employed in the Whyalla EcoCity Development program by Ecopolis and UEA in which an effort was made to reflect consequent design decisions back to the community for further commentary and approval (or otherwise). The Halifax EcoCity Project employed a much more extended (deeper and longer) process of design development allied to community participation. Christie Walk had limited participatory design processes embedded within it but has been wholly developed and managed by community organisations.

With the HEP, community engagement was vital to the project's mere existence, and over a period of 7 years hundreds of people became actively involved with one or another aspect of the project, whether it was helping to keep the Centre for Urban Ecology open and operating as an information centre for ecocity development, or sticking bits of recycled foam and cardboard together to make the numerous large scale models employed to communicate the project's architectural and urban design concepts.

In Whyalla, a small group of people worked to maintain an Arid Lands Centre for Urban Ecology. With only a small population base (27,000 in Whyalla and no nearby towns) it was hard to find sufficient volunteers for something as untried as 'ALCUE' as it became known, and it ended up being run virtually single-handed by Jo-anne Waters, who was one of the new councillors elected. When the Buddhists, led by Bruce Muhlhan and Rae, decided to become the site's first developers they researched ecological construction techniques themselves and chose to experiment with strawbale construction. Construction of their first building was through participatory workshops that further engaged some of the community in ecocity processes.

In Adelaide, Christie Walk has depended on community engagement. In this case it has been more directly to do with setting up the legal and financial structures, managing the co-operative, and working on the site. Fewer people have been involved but this reflects both the smaller scale of the project and the need to be more focused and conventionally professional in order to negotiate the legal, fiscal and temporal constraints of a commercial property market. Even so, UEA and Wirranendi have relied on volunteerism to get the project up and running with most of the initial work including construction of the Roman Hut to roof level undertaken by unpaid workers. It seems certain that similar levels of personal commitment would be necessary to ensure the functionality of ecocity organisational structures in most conceivable circumstances.

Leadership

Hundreds, if not thousands, of people have actively contributed to the birth and sustenance of these ecocity projects, but through all that has happened there has been a very small core group of extremely dedicated people without whom the broader community energies would not have been focussed or have found an ecopolitan purpose. These kinds of community enterprises are probably not possible without the leadership of people capable of simultaneously matching vision with pragma-

tism and a preparedness to not compromise on the core values of social justice and ecological performance[69].

In Christie Walk all the experience gathered with the Halifax and Whyalla projects had been brought together and whereas the Halifax EcoCity Project and Whyalla EcoCity Development ultimately depended on city councils for their realisation, Christie Walk did not. It is the size of one of the 'bite-size chunks' of development that were proposed as the means to incrementally develop the Halifax site. It was developed with almost no compromise on ecological performance, ethical funding considerations, or social values and educational and workshop programs were integral to its creation.[70]

Human Resources

Even where there is a poverty of financial resources there are still people. Mobilising the human power of the community through volunteerism can provide a wealth of resources not available through monetary exchange[71]. Volunteerism is a major part of all economies but, like environmental externalities, does not show up in conventional accounting. In Australia, even though the dollar value of volunteerism is not factored into economic analyses, it is openly acknowledged that the formal economy could not function without it.

It may be significant that efforts to initiate and sustain ecocity programs have had to address the issue and use of resources that are either taken for granted or are invisible in the formal economy. The natural capital and natural infrastructure provided by the environment are exploited with no financial costs attached in conventional development. Trees are there to cut down, gravel is there to mine and the air and the seas are treated as free sinks for waste. In the ecocity context, volunteerism can also be seen as using somatic energy in the production of the built environment in a way that, because it uses human energy that is already, in effect, 'latent', doesn't add energy costs to that production process.

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[69] A measure of the success of UEA's leadership can be found in its awards which include a Certificate of Commendation from the 1995 Volunteer Program Awards (SA) and Chérie Hoyle as outright winner in the Community Category of the 1999 KESAB Metropolitan Environment Awards.

[70] UEA's proposed process for evolving 'Ecopolis Adelaide' and developing the Halifax site incorporated the creation of a School of Urban Ecology. There are a number of aspects of the original School proposal in the educational and workshopping activities at Christie Walk. In the original proposal for the school, as project site works commenced, design workshops were to have involved craft and building construction tuition as the basis of a practically-orientated and site-based School of Urban Ecology. Workshopping and building construction tuition has been integral to the Christie Walk development process.

[71] In addition, this human resource is powered by somatic energy rather than fossil fuels.

Ups and Downs

The determined optimism of UEA ecocity protagonists has been both a powerful source of energy for enabling projects to be conceived, promoted and developed but it has also lead to unrealistic expectations and disappointment for many people. Looked at as a community project, this combination of high hopes and let downs is fraught with danger. Looked at as a development project, this pattern is fairly normal. It is not unusual for conventional developers to have to raise interest and confidence in their proposed developments long before they have the wherewithal to undertake them, and with no guarantee they can be undertaken at all. This kind of calculated risk is unusual territory for community organisations and is compounded, in a sense, because the unusual nature of the ecological development itself makes outcomes even less predictable. Much of the effort expended by UEA and its supporters has been in attracting and maintaining confidence in the overall goals of ecological development. Any success that has been enjoyed through this process could not have been achieved without the commitment of a large number of people in a general supportive role and a smaller group of people who have been able to invest significant quantities of money and time into enabling projects to have an opportunity to happen. This pattern can be seen quite vividly in each of the three projects.

Barriers

The Halifax EcoCity Project may have been influential but it has not been built. There are a number of reasons for this, but they are not unique to the project. The 'pattern of problems' associated with trying to physically develop the project are similar to those experienced by participatory, low-income groups and those in what Turner calls the 'third sector' which is neither commercial nor governmental and does not fit conventional patterns of development. The common ground is in the search for the means by which people can plan, build and manage their own homes and neighbourhoods 'at costs both they and society can afford.' (Turner 1990 p.182). Turner identifies a series of seven basic tasks that have to be carried out to overcome actual or potential barriers to any given program (Turner 1990 p.185):

- Organising, by those on whom implementation of the programme depends, and in ways that ensure the required degree of co-operation;
- Financing, to obtain the necessary services and material resources;
- Land and acquisition, or obtaining an appropriate form of tenure providing the necessary rights to the use of the property;
- Planning and the specification of practicable works that can be easily followed or adapted;
- Acquiring techniques and the necessary tools and materials for the works;
- Building, by contracted and/or voluntary management and/or labour;
- Maintenance of the works, if they are not to be lost prematurely.

Turner shows the tasks diagrammatically as vertical barriers that have to be sequentially traversed. Each of these tasks have been barriers that have needed to

be overcome by UEA and its associated organisations. With the HEP these were all addressed in theory but none were finally overcome. With the Christie Walk development they have all been overcome.

Habits of Competition

The nexus between social, physical and governmental environments is critical in the realisation of ecocity-type projects. Experiments in ecological housing have taken place in Denmark for many years on a wide scale of operations, arguably it is the world's leader 'in terms of implementing ecological aspects to urban planning' (Scheurer 1998 p.v). After reviewing projects in a variety of locations, some initiated by government, some by communities at the grass roots, and some in between, Jan Scheurer found that 'Urban ecology. . . is a functional concept when local communities show initiative and are granted responsibility over the process' (p.146) but that regardless of the 'geographical, social or physical setup', the ecological performance of a settlement is co-dependant on the level of cooperation of the inhabitants, governments and private industry (pp.vi–vii). With the Halifax EcoCity Project and Whyalla EcoCity Development this has proven to be the case. Scheurer calls for replacement of the 'habits of competition' between government, industry and civil society by 'complete cooperation' (p.146). The experiences with the HEP and WED reflected the veracity of Scheurer's critique in an Australian context. Knowing that the level of cooperation between the sectors was likely to be very small led the project initiators and protagonists of the Christie Walk development to make a point of avoiding any significant government or industry dependency in order to progress that project.

In his study of the HEP, Orszanski asks how an ecocity might be built and concludes that it might be done 'By replacing existing structures with ones more appropriate to the task, and by uniting people with similar concerns. . .' (Orszanski 1993 p.48). His analysis of the strategy adopted by UEA for the Halifax Ecocity Project captures the core concept of creating systemic change very well:

> The aim of the project is to act as a seed for the continuing transformation of the city of Adelaide, as an example of what can be done with denser city developments. By analysing the existing structures relating to land, money and power which underpin modern society, the Project has identified those rules which need to be altered or replaced to encourage ecocity building. The structures the Project has created are intended to function as replacements for existing structures, as a conscious attempt to *re*structure society. The structures make use of familiar (surface) forms (a company, non-profit trust, and a community association) to embody deeper concepts of community ownership, social equity and ecological responsibility. A process of structuration has changed the *structures* within the Halifax Project in an attempt to modify the *systems* which underlie existing urban society.
>
> They have substituted their structures for the usual ones in society in an effort to provide the conditions which will encourage the *production* and re-*production* of ecocities. (Orszanski 1993 pp.45–46)

That replacement of structures, as can be seen from the experience with the Ecopolis case studies, has to be achieved through a gradual remaking of existing structures rather than their immediate, wholesale substitution by new forms. Thus the creation of a Land Trust was not readily achievable but it was possible to create a

co-operative developer that effectively held the land in trust during the development process; a highly participatory 'barefoot architecture' program required too much in the way of people and resources to operate effectively but a scaled down version enabled people to engage in the designing of Christie Walk; a formally constituted non-profit building company did not exist but the company that was formed operated as a non-profit company to help make construction affordable; and the community title system was able to provide a legal organisational form for continued engagement by residents in the collective management of their environment.

Make Ecopolis Not War!

UEA has campaigned for ecocities in a broadly pluralist way, deliberately seeking ways to reach as many people in the community as possible, without limiting the outreach by buffering the reception of the ecocity message with ideological barriers. Notwithstanding this, UEA has maintained two positions which are ideological, but not party political. These are opposition to nuclear power[72], and militarism. Neither of these positions is exclusively the province of the political left or right. In using the slogan 'Make EcoCities Not War!' for instance, there was cognisance of a burgeoning movement towards retooling military industrial capacity for environmental purposes. The argument was that in the kind of balanced system advocated by the ecological city approach, the need for environmentally appropriate shelter would require technological innovation to supplement and extend the best use of traditional technologies. The impetus for technological innovation could, in theory, be at least equivalent to that generated by the military technology production underpinning much of the world's economic activity. In this argument, the city could provide the focus for activity along the lines of Al Gore's global environmental 'Marshall Plan' (Gore 1992).

The challenge of dealing with accelerated climate change demands tremendous levels of organisation and social mobilisation, as well as the application of military urgency to getting solutions in place. The South Australian experience has demonstrated that inspired, grass-roots community action is able to get uncompromising ecological development projects up and running despite lack of resources and funding and when government and mainstream industry is languishing. China is currently demonstrating a preparedness to get uncompromising ecological development projects up and running by central government decree with military urgency. Ecopolis has the potential to set constructive, challenging technological imperatives capable of generating industry and employment and enhancing economic activity for social benefit whilst creating healthy human environments and addressing climate change, but the evidence suggests that western democracies may lack the organisational capacity to rise to the challenge without, as it were, declaring war.

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[72] In addition, Ecopolis Pty Ltd sponsored the production of new anti-nuclear stickers in 1999 'Nuclear Target? No Way!'

Table 11: Ecological Settlement Projects – Halifax EcoCity Project & Christie Walk (Compare with Table 6 in Chapter 6)

	Halifax EcoCity Project	Christie Walk
Architects, Planners	Paul F Downton, Ecopolis Design Team	Paul F Downton, Ecopolis Architects Pty Ltd
Developer	Community/local government/builder partnership – unresolved	Wirranendi Inc, non-profit private co-operative
Dwelling Number	350 units	27 units
Site Area	22,000 sq.m.	2,000 sq.m.
Healthy Building	Use of materials open to diffusion, natural paints, timber joist floors, cork linoleum flooring, etc. Careful choice of materials for non-toxic internal environment. Use of recycled and recyclable materials	Use of materials open to diffusion, natural paints, timber joist floors, cork linoleum flooring, etc. Careful choice of materials for non-toxic internal environment. Use of recycled and recyclable materials
Energy	Use of passive solar energy, optimisation of floor plans according to illumination, ventilation and functional requirements of apartments. Solar water heaters. Low primary energy building materials. Photovoltaics, power to grid	Passive solar energy, optimisation of floor plans according to illumination, ventilation and functional requirements of apartments. Solar hot water. Low energy building materials. Photovoltaics, power to grid
Heating/Cooling	Solar heating primarily, some incidental unspecified heating. Solar cooling via passive climate responsive design. High mass/high insulation design strategy	Solar and body heat only. Solar cooling via passive climate responsive design. Low energy cooling to Stage 3 building. High mass/high insulation design strategy
Water	Rain water collection. Sewage water collected and treated on-site for re-use	Collection of rain water and use for irrigation and toilet flushing. Sewage mine installed initially, later decommissioned. SA Water utility reneged on later agreement to provide biological sewage treatment system after completion of project.
Open Space	Private, semi-private and public open spaces, intense vegetation, roofgardens. Vegetation-covered facades in climate and energy strategy. Productive landscape with increased biodiversity. Link to rural revegetation project	Private, semi-private open spaces, intense vegetation, roofgardens, community garden area. Vegetation-covered facades in climate and energy strategy. Productive landscape with increased biodiversity.
Traffic	Car free, car parking on periphery and underground	Car parking on periphery, car-free inner open spaces, accessibility by footpath

Table 11: (continued)

	Halifax EcoCity Project	Christie Walk
Waste Disposal	Garbage sorted according to type, communal composting	Garbage sorted according to type, communal composting
Social Concept	High quality of social living, neighbourly contact encouraged by communal open spaces, various community buildings. Centre for Urban Ecology, cafés, etc.	High quality of social living, neighbourly contact encouraged by communal open spaces. Community facilities and community gardens. Centre for Urban Ecology.
Floor Plans	Variety of design approaches in plans. Apartments built on open-plan system. Detail design developed with future residents through 'barefoot architecture' program	Variety of design approaches in plans. Lay-out oriented for passive solar. Apartments built on open-plan system with adaptable floor plans. Detail design developed with future residents through 'barefoot architecture' program
Design	Primarily high density and medium-rise with 2–5 storey buildings, varied architecture in general unified urban structure. Rammed earth and rendered facades, timber windows all double-glazed. Murals. Street facades in tradition of city with balconies and verandahs. Multi-layered, three-dimensional design	Low -medium-rise with 2–5 storey buildings, varied architecture in general unified urban structure. Diverse construction unified by rendered facades, timber and aluminium framed windows all double-glazed. Murals. Street facades in tradition of city with balconies and verandahs. Multi-layered design.
Commentary	Project offered car-free environment and human scale. Architecture combine healthy materials and construction techniques with flexible space planning. Ecological design explicitly supported by residents. Demonstrated potential that was not realised when 'mainstream' developer/builder erstwhile partner prepared incomplete/ misrepresentative documentation for final stage of procuring project site	Car-free environment and human scale. Architecture combines healthy materials and construction techniques with flexible space planning. Ecological design explicitly supported by residents. Demonstrates importance of committed developer, architect and builder – all based in the community. Strong community base, enjoyed momentum developed through HEP proposal. Cost control challenging.

Colour Plates

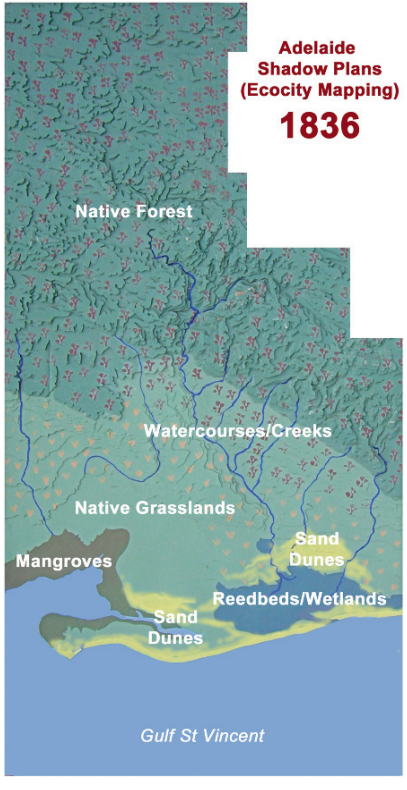

Plate 1: This panel depicts the River Torrens Catchment as it was (to the best of our knowledge) before Adelaide was colonized by Europeans. Aboriginal people occupy parts of the region but their low-intensity way of life has a relatively minimal impact on the ecosystem. The entire landscape is vegetated with native bush, the creeks and rivers are healthy, the coastal wetland systems are extensive and the Gulf waters sustain a healthy marine ecosystem. The plants and animals here are not threatened by pollution or high-intensity urban development. They function in a closed-loop ecological web, where waste from one species provides the sustenance for others

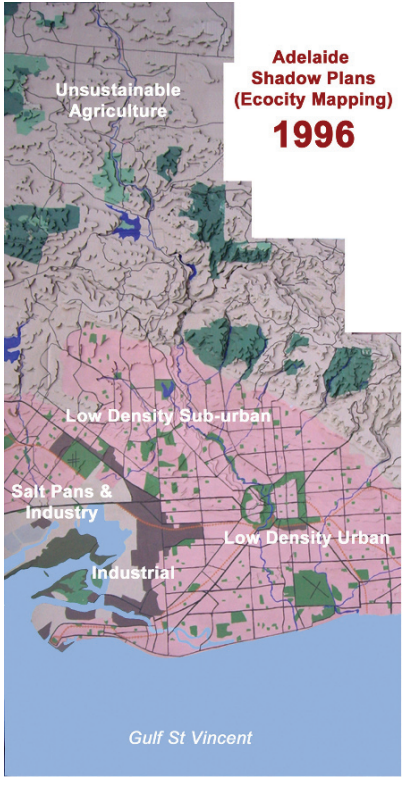

Plate 2: This panel shows Adelaide in 1996. The watershed is blanketed in suburban sprawl—an expanse of low-density developments, roads, unsustainable agriculture and industry. In just 160 years since European colonization began, this 'development' has almost entirely wiped out the original ecosystem of the bioregion. The Torrens Catchment is highly polluted, making the water unsafe for both human consumption and many riparian species. Regionwide, 44 of the indigenous animal species find themselves either 'vulnerable' or 'endangered' while 24 are already extinct. On a single day, Adelaide City alone disposes of an average of over 28 tonnes of domestic waste, and only 5.1% of possible recyclable materials are salvaged. In one year, the city emits 400 tonnes of CO2 into the atmosphere solely from electricity consumption. Add to this the alienation of suburban living, high levels of suicide, murder, depression, deaths from automobile crashes – and the list goes on. Metro Adelaide is neither healthy or ecologically viable

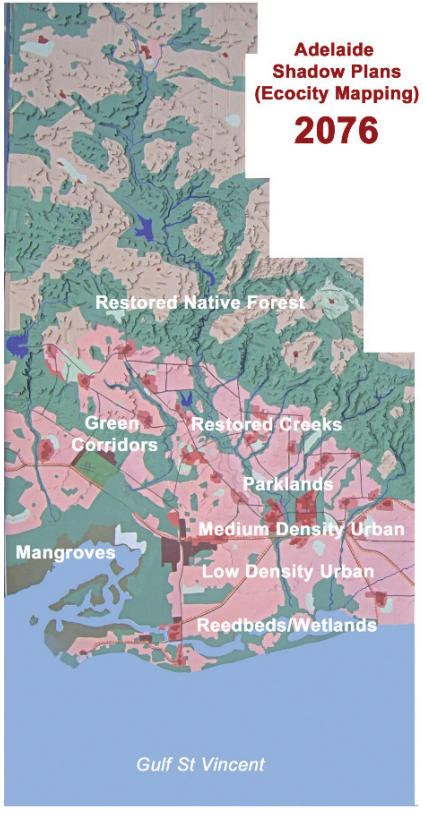

Plate 3: This panel marks the halfway point between old practices of 1996 and the Shadow Planned bioregion of 2136. There is a clear dichotomy between old and new land uses, urban sprawl and higher density urban centres—the beginning of a balance between human settlement and the rest of nature. Green corridors have begun to form and the sprawled urban development of the past has contracted into established urban centres—the future ecopolises of 2136. Water quality in the river catchment has been restored to acceptable levels, endangered species are making a comeback, and car use has dramatically declined due to the implementation of more accessible public transport networks. Citizen participation in local government has already become the norm, as communities continue to demand a better city and a healthier landscape

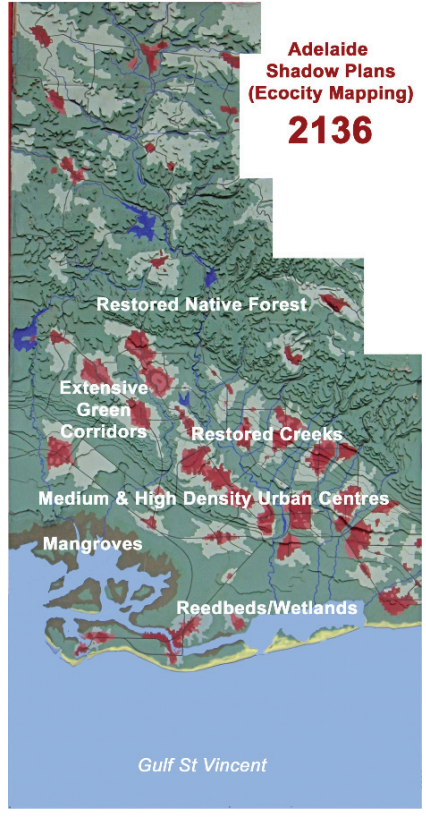

Plate 4: This panel represents the Adelaide Shadow Plan Vision fully realised. Urban centres have evolved into individual, compact ecopolises, each with their own character. Areas of sustainable agriculture surround each urban centre and provide the primary food supply. Public transport dominates efficient transit corridors—a mix of roads, light and heavy rail—with zero-emission technology in all modes of travel. Air quality is exceptionally clean. The Torrens Catchment is the primary drinking water supply, protected by the indigenous vegetation along riparian buffer corridors. It passes through naturally filtering reedbeds and mangroves before emptying into the Gulf. Endangered species have re-established healthy populations in their restored native habitat. Ecopolis Adelaide is lively, safe, and beautiful. Citizens are active in shaping and reshaping their cities. Everyone has access to the basic human needs—clean water, nourishing food, healthy buildings for shelter, employment, healthcare, and support within globally connected close communities

Plate 5: Ecopolis Salisbury. Commissioned by Salisbury City Council, South Australia in 1991 © Ecopolis Architects

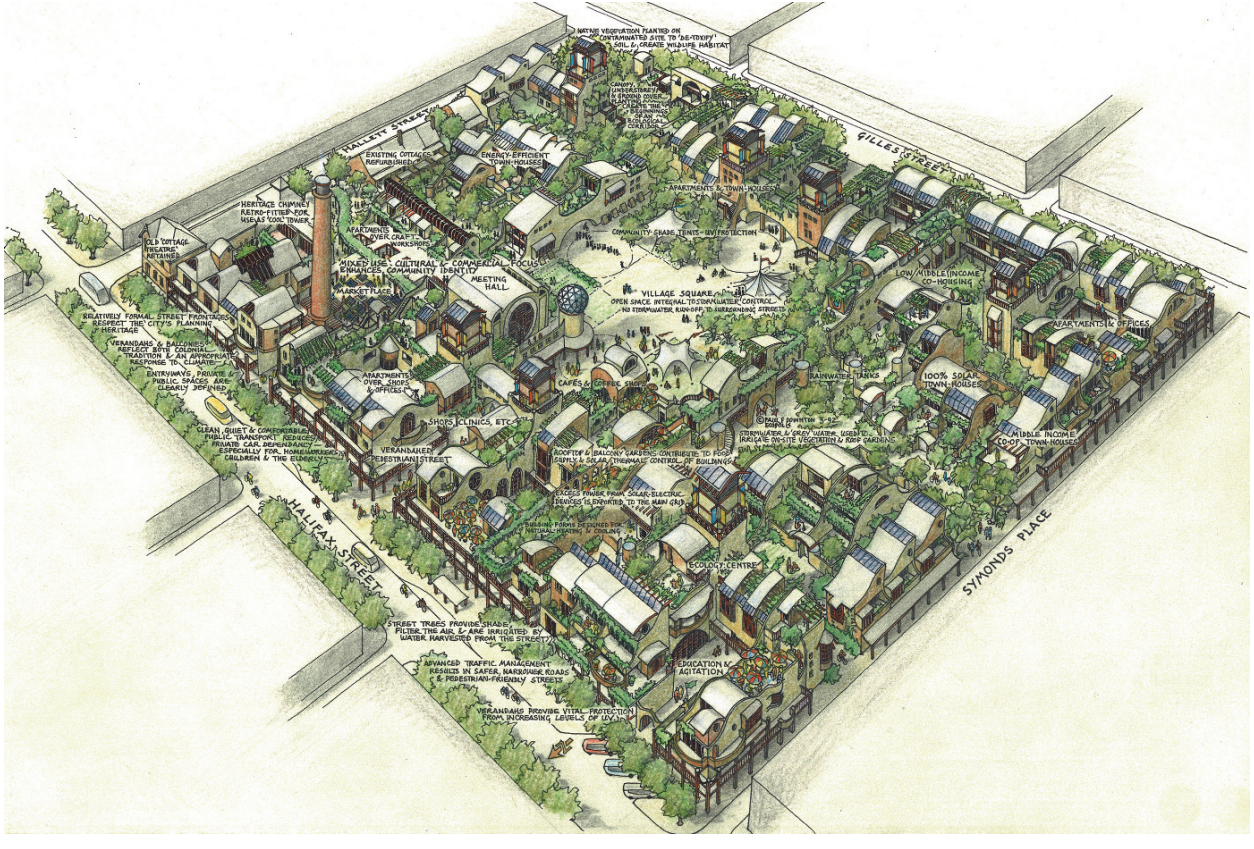

Plate 6: Halifax EcoCity Project. Perspective commissioned by the South Australian state government planning review in 1992 © Ecopolis Architects

Plate 7: Masdar, UAE An airiel view of what promises to be the world's first 'one planet', carbon neutral city. (*Image and architecture by* © *Foster + Partners*)

Plate 8: Masdar, UAE A car-free, pedestrian dominated environment in which there is substantial dappled shade from photovoltaic sun screens to help achieve livability in one of the world's hottest places. This is a street scene in what promises to be the world's first 'one planet', carbon neutral city. (*Image and architecture by* © *Foster + Partners*)

Plate 9: Dongtan – South Village A world-first model of its kind, Dongtan addresses most of the key issues in creating sustainable urban environments. Its designers, Arup, reckon that its ecological footprint will be just 2.3 hectares per person, when a conventional city uses 5.8 hectare. Like Masdar in Abu Dhabi, Dongtan is being created from the ground up on a 'green field' site. In this case, rather than being in the desert, it is on China's third largest island, Chongming, and is adjacent to a major RAMSAR wetlands and bird sanctuary. (*Image* © *Arup*)

Plate 10: EDITT Tower, Singapore Proposed for an ecologically degraded 'Zeroculture' (see Chapter 4) city centre site where the goals according to Yeang's Ecosystems Hierarchy and Design Strategy have to be to increase biodiversity and organic mass and rehabilitate the ecosystem. The design provides for a surface area of biomass equal to about half the tower's gross area and uses plant species compatible with the original site's biodiversity. (© *Llewelyn Davies Yeang*)

Plate 11: Chongqing Tower, China Conceived as a vertical extension of the roof garden of a proposed exhibition hall with sky courts located next to the lift core as pocket 'parks-in-the-sky'. (© *Llewelyn Davies Yeang*)

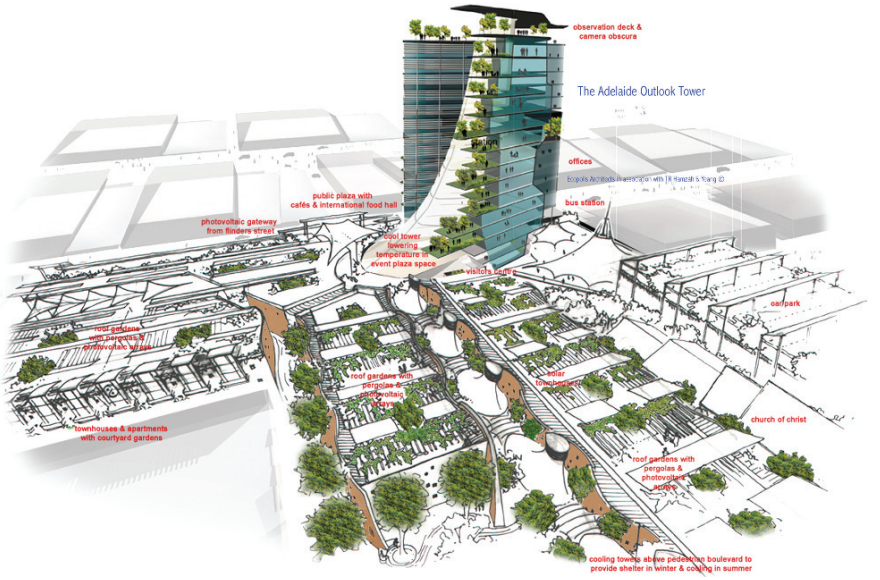

Plate 12: Adelaide Outlook Tower Inspired by the 'Outlook Tower' of Patrick Geddes (see Chapters 4 and 10), a collaborative proposal for an ecopolitan development in downtown Adelaide, South Australia. (© *Ecopolis Architects in association with TR Hamzah & Yeang*)

Plate 13: Arcosanti – The Foundry Apse with West Housing and the Vaults viewed from the south. (*Soleri Archives*)

Plate 14: Arcosanti – The Arcosanti Vaults (top right in the above image) viewed from the north. (*Soleri Archives*)

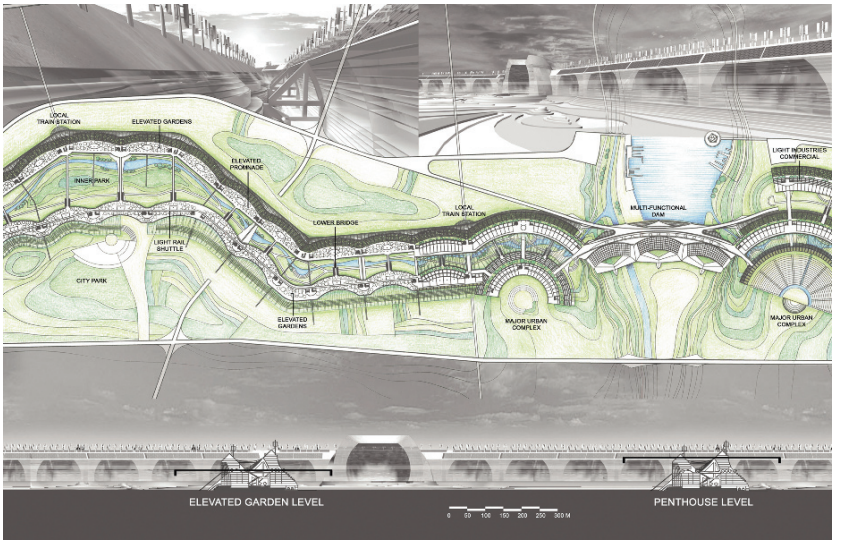

Plate 15: Solare – A continuous urban ribbon of parallel structures of twenty storeys or more, extending for many kilometers – built of modules 150 metres long, each accommodating about 1500 residents, with spaces for commercial, industrial, institutional, cultural, recreational and health maintenance activities. Intended as a means to connect existing cities and future arcologies whilst controlling urban expansion and maintaining connectivity with nature. (*Soleri Archives*)

Plate 16: A Future San Francisco "Intimate pedestrian access three-dimensionally throughout the city for people, not cars. . ." (© *Richard Register*)

Plate 17: Arcata Plaza, California Achieving higher density with additions above and behind existing buildings to make a plaza at the core of a future pedestrian ecocity Arcata whilst maintaining the city's existing aesthetic. (© *Richard Register*)

Plate 18: Strawberry Creek Plaza, Berkeley, California This 'Heart of the City Project' panorama illustrates the proposal by Register and Ecocity Builders Inc to create a lively cultural and natural centre with a restored creek as part of a new public pedestrian plaza with buildings oriented for solar efficiency and superb views from publicly accessible places. (© *Richard Register*)

Plate 19: Ithaca Ecovillage, New York A community corn roast takes place in the collective 'back yard' behind the houses in the ecovillage's first neighborhood. (© *Jim Bosjolie*)

Plate 20: Vegetable Car, Berkeley (Richard Register)

Plate 21: Curitiba's famous buses and bus shelters

Plate 22: Curitiba pedestrian street by day

Plate 23: Curitiba pedestrian street by night

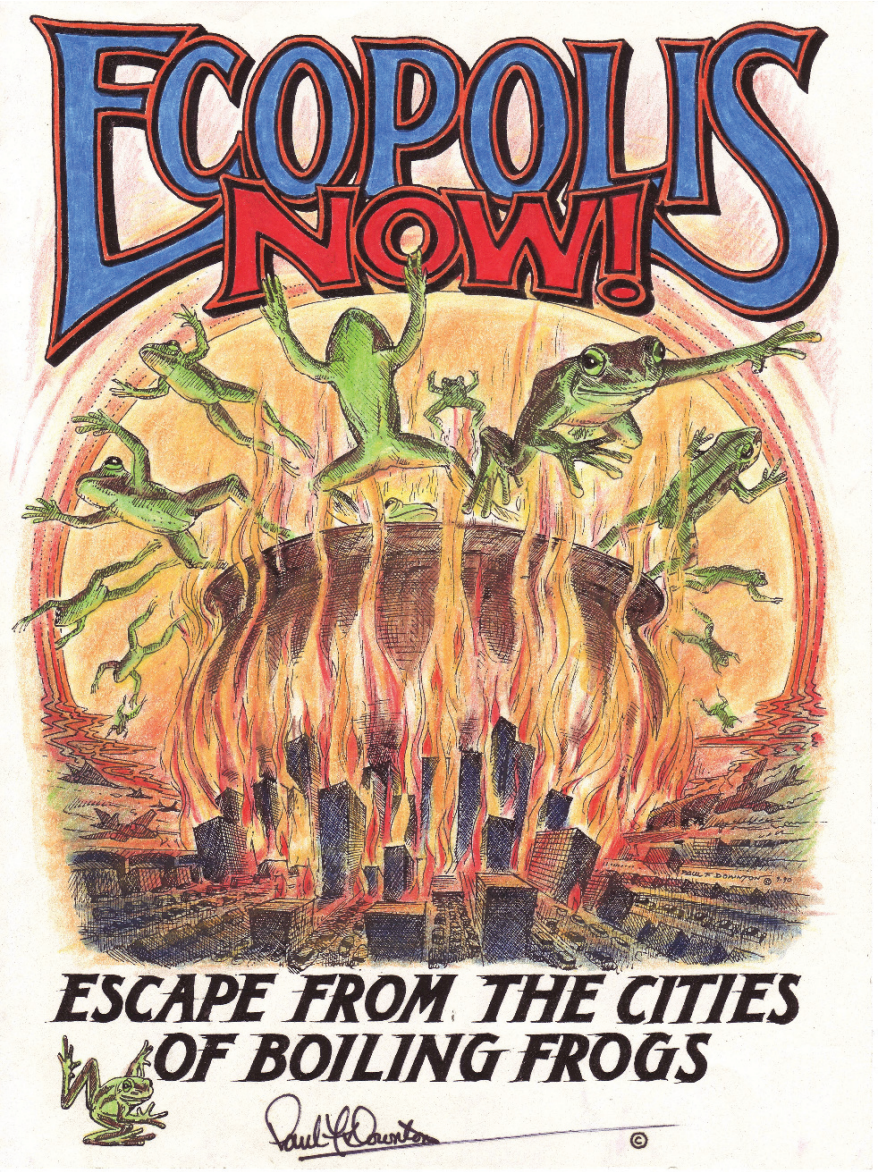

Plate 24: Ecopolis Now! This image is from the poster for the 'Ecopolis Now!' exhibition, held at the Old Parliament House Museum in Adelaide, for the two months of January and February in 1991. The 'boiling frog' imagery was derived from a story I heard David Suzuki tell on the radio circa 1989. 'If a frog is placed in a pot of water it is happily in its natural element; if you were to heat that pot, the frog doesn't notice the slow change in temperature until it's too late, and it dies.' This memorable, if inaccurate, urban myth became a staple part of my presentations. The image of aircraft flying into skyscrapers turned out to be horribly prescient. (*see Chapter 10*)

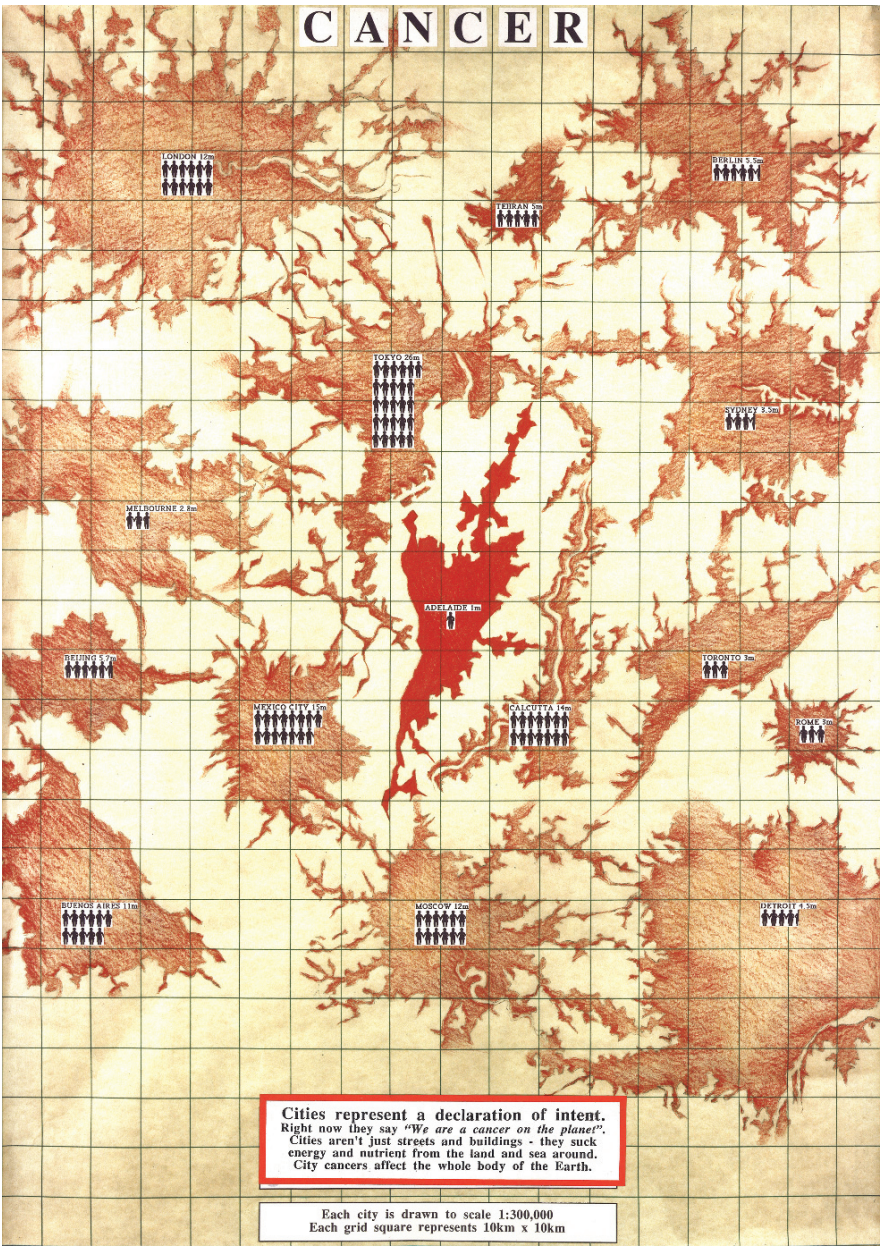

Plate 25: City Cancer Each city is to the same scale on a 10km grid. City sizes and population figures were drawn from a National Geographic atlas and are approximately correct for circa 1980. The cities, from left to right, top to bottom are: London, Tehran, Berlin, Melbourne, Tokyo, Sydney, Beijing, Mexico City, Adelaide, Calcutta, Toronto, Rome, Buenos Aires, Moscow and Detroit. The text at the bottom says: *'Cities represent a declaration of intent. Right now they say 'We are a cancer on the planet'. Cities aren't just streets and buildings – they suck energy and nutrients from the land and sea around. City cancers affect the whole body of the Earth'*

Plate 26: '**Your Planet Needs You!**' In an attempt to reinforce the idea that there are more than sufficient human and physical resources to tackle the prospect of rebuilding the world's cities, I pointed to what was available for waging war. Ironically, the exhibition was launched on the day that the Gulf War began. The newspaper text is from my interview by Joanne Painter that was published as 'City of the Future is Green and Clean' in *The Sunday Herald*, Melbourne, 14 January 1990

Plate 27: Beware the Technical Fix! When the Ecopolis Now! exhibition was on, South Australia was entertaining the idea of building a 'multi-function polis' on low lying degraded mangrove lands around Port Adelaide. There was speculation at the time about the pros and cons of the project but popular consensus was that it was a grandiose political folly (which is what it turned out to be after costing the taxpayer $100 million)

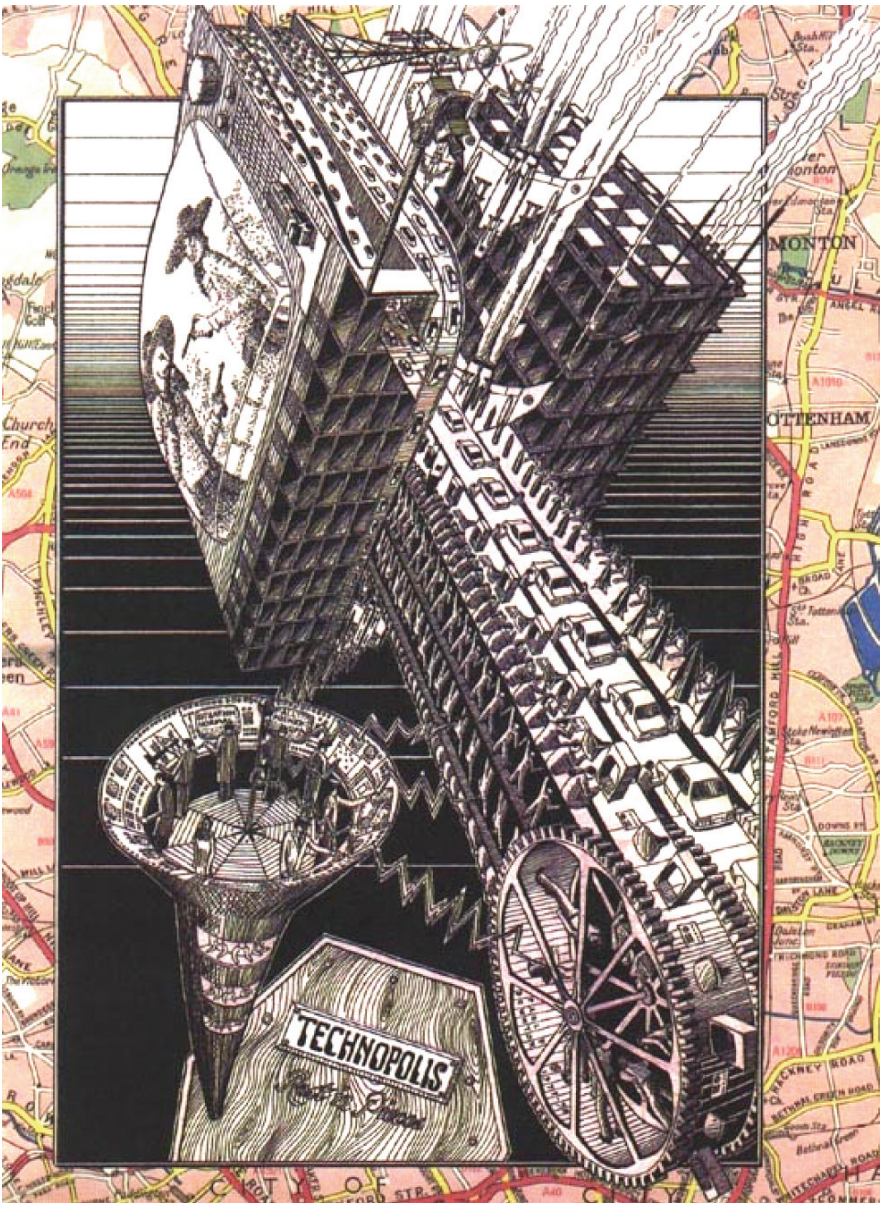

Plate 28: Ecopolis This is a portion of the panel that summed up the Ecopolis philosophy. It was later produced as a poster for UEA and FoE, sponsored by Roman Orszanski

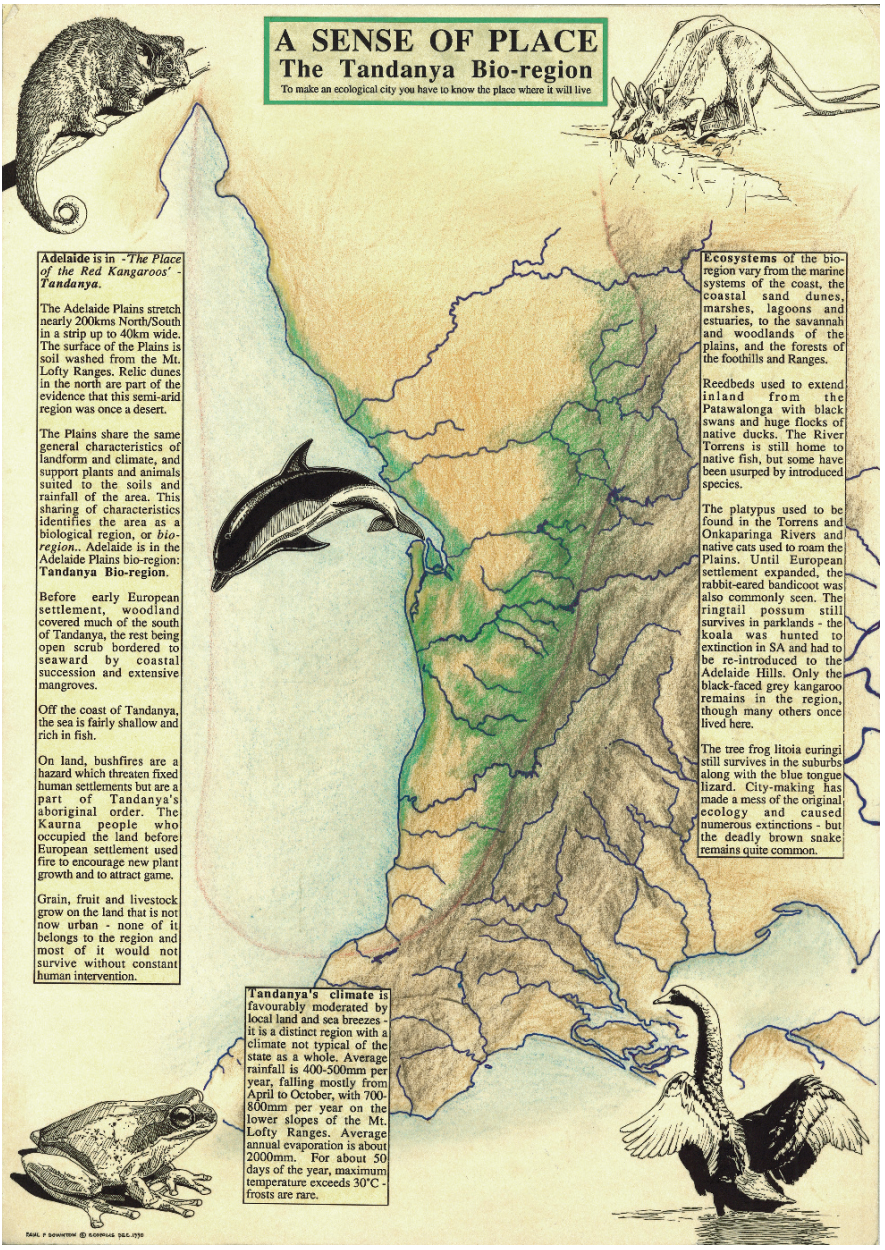

Plate 29: A Sense of Place – The Tandanya Bioregion This panel introduced the concept of the bioregion to many people in South Australia and was reprinted in the ACF 'Habitat' journal later in 1991 as part of an extensively illustrated article on the Ecopolis idea. This may be the first image of the bioregion of the Adelaide Plains and first published presentation of the region as a place defined by indigenous people, linked to an ecological perspective. Kaurna people confirmed the general veracity of the bioregional boundary which, it is important to note, extends into the waters of the Gulf of St Vincent

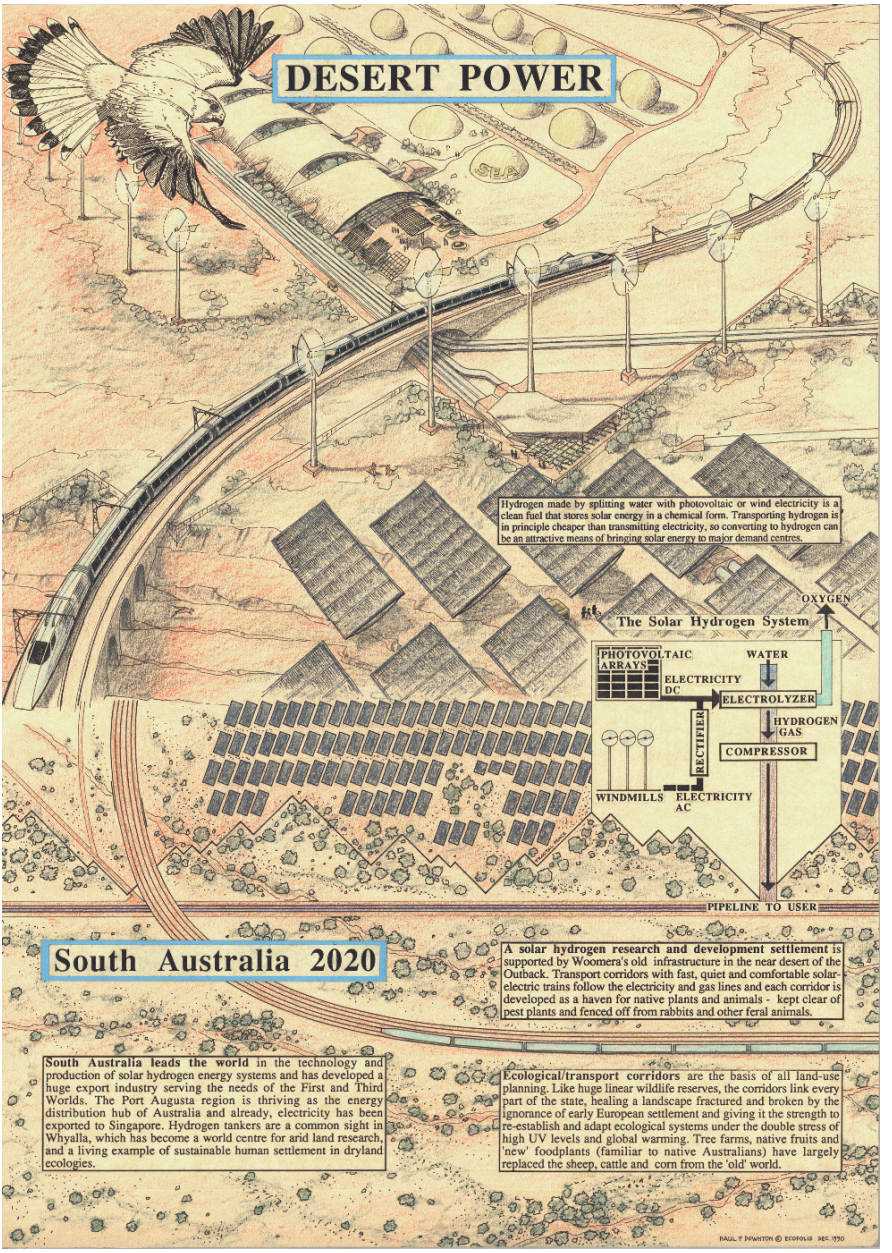

Plate 30: Desert Power South Australia is a mining state with large coal, oil and uranium reserves. It also has an extremely sunny climate and a large land area. A number of people over the years, notably Bockris (Bockris et al 1991) and Dr Barbara Hardy, have tried to advance the cause of solar-hydrogen as a future energy base for the state, without success. I included this image to try and bring to life the idea that there could be a different energy base to the economy and that the entire urban infrastructure could be powered by renewable energy through this kind of major investment in solar technologies – with all its positive economic implications

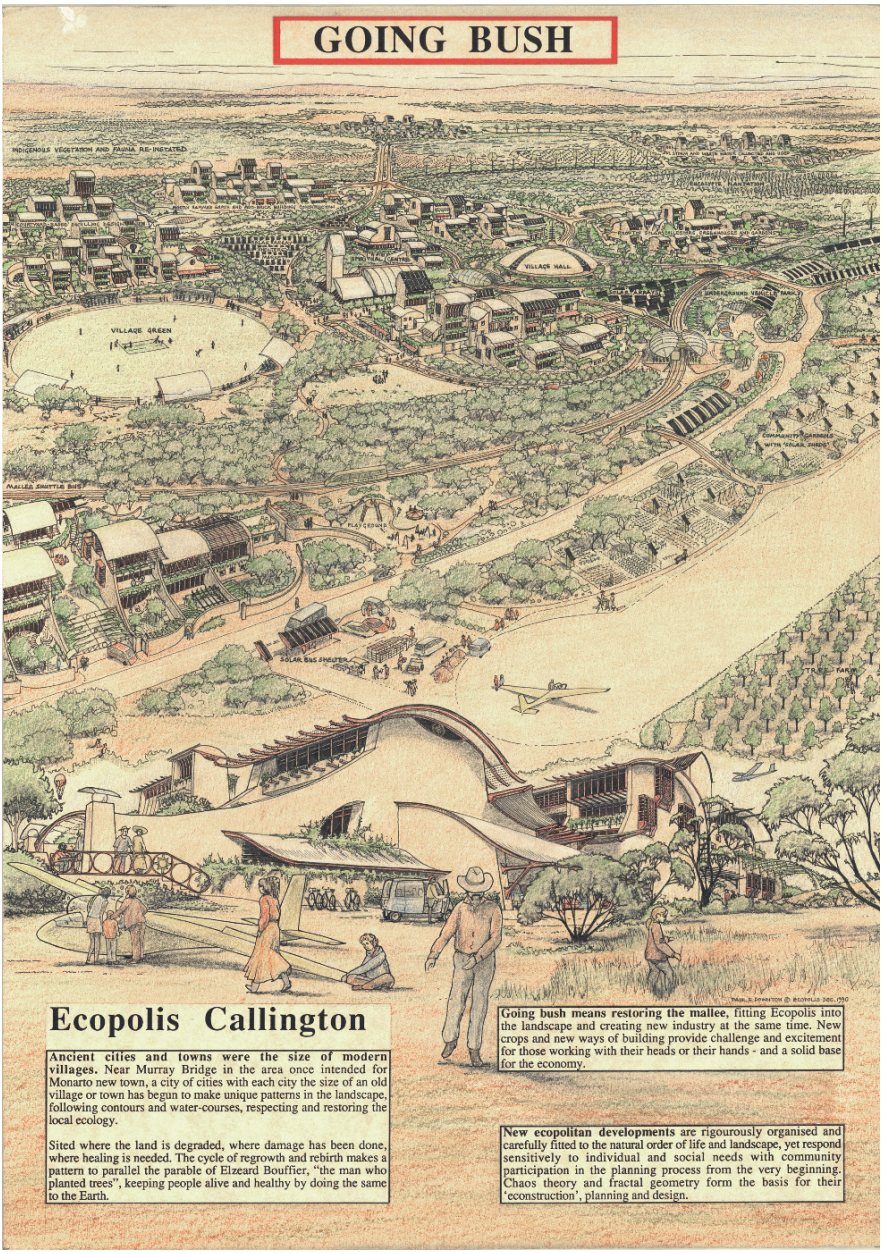

Plate 31: Going Bush Based on a view of the landscape around Callington and Monarto, about 60 km west of Adelaide, as seen from Emilis Prelgauskas' glider, this image was intended to show how the landscape could be restored to productive, ecologically sustainable use by inserting 'new country towns' into the severely degraded present landscape

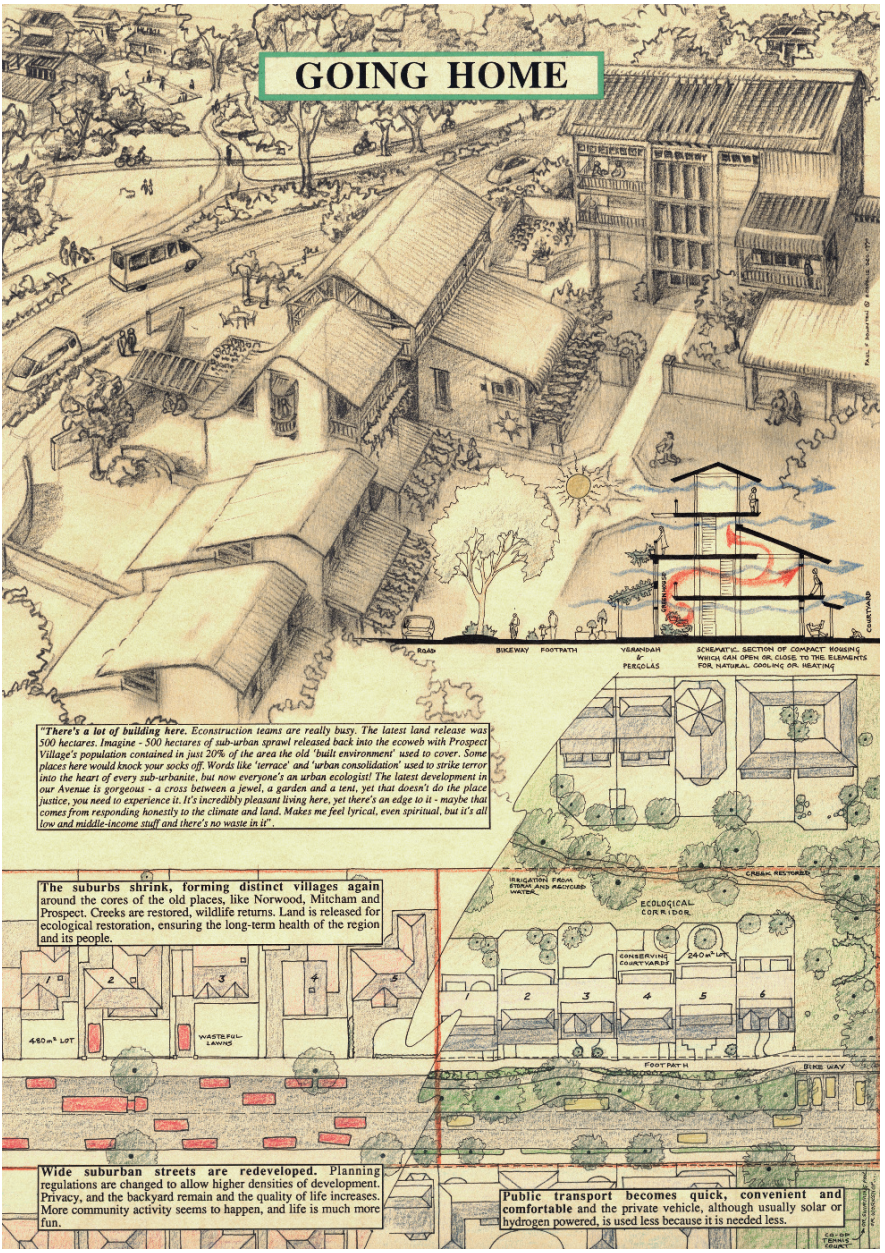

Plate 32: Going Home The diagrams in the lower part of the image show how suburban streets could be transformed with higher densities and greater areas of native vegetation, whilst at the same time reducing car use, making streets safer, and creating more convivial environments. It is interesting to compare the sketch of a putative development in the upper image with the actuality of Christie Walk which is *more* radical than the drawing shown here!

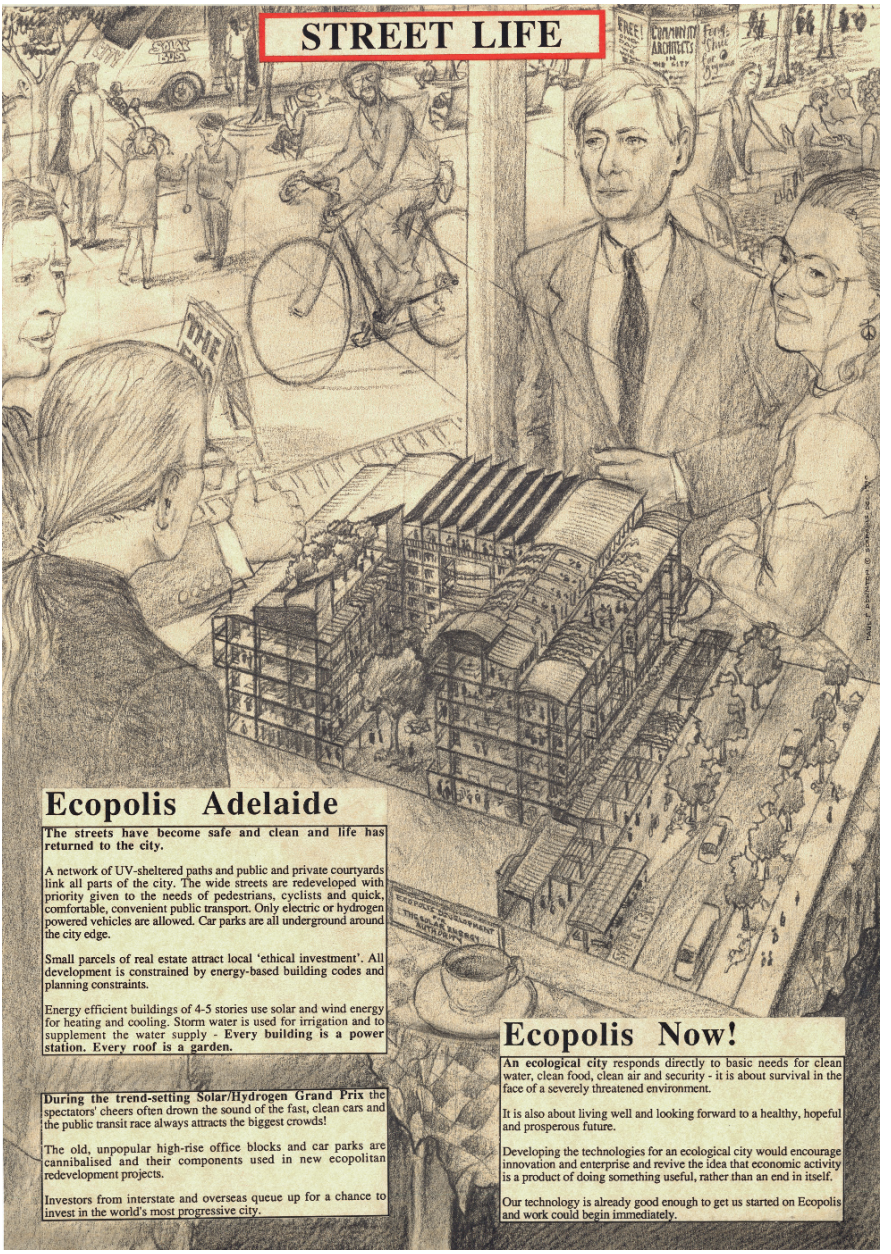

Plate 33: Street Life The inner-city is the environment that most needs to be remade. This drawing shows an imaginary model of a mixed-use headquarters building for the non-existent Solar Energy Authority. Trees and solar powered bus shelters and shade structures line the streets of narrowed traffic lanes

Plate 34: Ecopolis Adelaide – The Halifax EcoCity Project – Axonometric © Ecopolis Architects 1993

Plate 35: Whyalla Ecocity Development – Site Plan

Plate 36: Whyalla Ecocity Information Feature – Commissioned by the city council, funded by a federal grant, the Information Feature was a statement of faith in an idea that was only ever partially realised

Plate 37: Buddhist Meditation Centre – Whyalla's Buddhists really tried to live the ecocity dream

Plate 38: Whyalla Ecocity Development – A hint of the organic Ecopolis-in-the-bush that nearly was

Plate 39: Christie Walk, Adelaide, South Australia The 'stage 3' building on Sturt Street contains 13 apartments plus community facilities on a 16 m × 16 m footprint and carries 5.3 kW of photovoltaics. (© *Ecopolis Architects*)

Plate 40: Christie Walk, Adelaide, South Australia Designed for high density with substantial vegetation and a car-free environment. (© *Ecopolis Architects*)

Plate 41: Christie Walk, Adelaide, South Australia Situated in the centre of the state's capital city, the project is visible and influential as well as livable. (© *Scott Harding, Hardimage*)

Plate 42: Christie Walk, Adelaide, South Australia Seasonal shade for solar houses from vegetation and balconies

Plate 43: Christie Walk, Adelaide, South Australia Convivial outdoor environments add to neighbourliness and strengthen community

Plate 44: Christie Walk, Adelaide, South Australia On the ground or on the roof – community space and vegetation add to liveability. (*all images* © *Ecopolis Architects*)

Plate 45: Christie Walk, Adelaide, South Australia The architecture and urban design exploits scale and texture to create a visually rich environment and construction ranges from aerated concrete to timber frames and strawbale. (© *Ecopolis Architects*)

Part II
Towards a Theoretical Synthesis

Synthesis – SHED – Conclusion

II. Rebuilding the Foundations

> I swear the earth shall surely be complete to him or her who shall be complete, The earth remains jagged and broken only to him or her who remains jagged and broken
>
> (Whitman (1856/1881) 1991 p.68)

> Architecture is in the process of becoming the physical definition of a multilevel, human ecology
>
> (Soleri 1969/1973 p.31)

> Since there are now few places left on earth which man (sic) has not altered in some way we could say that much of the earth is really designed
>
> (Rapoport 1972 p.4)

> We are as gods and might as well get good at it
>
> (Brand 1968)

Philosophy, Practice and Popular Culture

The idea of ecocities necessarily involves cultural change but Ecopolis posits cultural change as the core requirement for consciously integrating urban systems into the processes of the biosphere to optimise the functioning of the biosphere for human purposes. It is about continuous process, with no omega point.

An important part of this overall proposition is to do with the dissemination and replication of ecocity ideas. As cities are the built expressions of values held in social, political and cultural processes, the *real* task is not the making of buildings but the creation of an ecological culture. Education is a vital part of the process of embedding ecocity precepts and values in the communities that comprise that larger culture. It is about a rediscovery of citizenship. In the chapters that follow I have dealt with education in its widest interpretation as a means of drawing out and transmitting information, knowledge and experience across society and not just to do with formal institutions (see 'Capturing the Transmitters' in Chapter 10). Most importantly, because so much of what we learn in mass society is not through formal institutions, and because the task of adjusting cultures globally is urgent and

P.F. Downton, *Ecopolis*, DOI 10.1007/978-1-4020-8496-6_8,

cannot rely on returning everyone to school, it is vital that mainstream popular media provide critical pathways for disseminating ideas. It is imperative to communicate effectively at the level of popular culture in order to both precipitate and maintain the changes in human settlement design, development and maintenance needed for humans to be successful organisms in the community of the biosphere.

Attack or Defend?

The truism that 'The history of man (sic) is the history of increasing mastery over nature' (Clark in Rapoport 1972 p.38) is typical of preambles in tracts on design, planning and the environment. Like Le Corbusier's proud boast about attacking nature, it is an enormous conceit and is fundamentally untrue. All that humans have done is extend their domain within the biosphere, we have pushed the limits of our niche just as any other species would. The difference is that we have evolved organisational skills and extra-somatically powered, extra-corporeal means to act on the environment at a scale over which the consequences are so displaced in distance and time that we cannot know whether we have yet to demonstrate any mastery whatsoever. What we do know is that, intentionally or otherwise, we are designing our fate. In the absence of evidence for the contrary it would seem wise to design in a manner that defends, rather than attacks the foundations of our existence.

Design Synthesis

The syntheses presented in the following chapters is about design in the sense that it is the totality of human decisions and choices made in order to provide and maintain conditions for human habitation within the biosphere. Linkages rather than barriers, commonality rather than difference, integration rather than separation and mutual aid rather than competition describe this totality. The following chapters bring together allied understandings of buildings, cities and living systems in a framework intended to facilitate sustainable human ecological development.

Chapter 8 describes biogeophysical aspects of urban ecology and their relationship with human culture and society through the built environment. It relates to the proposition that 'City-regions determine the ecological parameters of civilisation'. In particular, I maintain that cities are artificially constructed living systems in which the needs of species other than human have to be taken into account and that climate change provides an imperative for understanding the myriad relationships between the city and its environment in order to ensure the maximum chance of survival for all species. This chapter includes an unashamed attack on urban sprawl and outlines some of the strategies for integrating human habitat with that of non-human species.

I describe, in Chapter 9, various aspects of the development processes that may bring Ecopolis into existence. These include some of the means by which knowledge can be effectively integrated, i.e. by action rather than mere contemplation,

addressing the imperative of the Ecopolis proposition regarding the intregration of extant knowledge. In this chapter I introduce theories of politics, society and economics whose social and moral arguments say that authoritarian power structures are inimical to societies capable of sustaining ecologically responsive urban civilisations in the long term because such structures tend to filter and block critical flows of information. The rapid integration of knowledge requires good, uninterrupted communication. Cities require the maintenance of civil society over and between generations and this also requires constant, open communication. Cities occupy commanding positions in the flux of energy, resources and biology of the region they inhabit. The inhabitation of a place demands a thorough understanding of the living landscape and I propose that a critical approach to regionalism offers the means to gain and maintain that understanding.

Chapter 10 takes us on an exploration of some cultural 'change agents', those many ways of communicating ideas that inform and affect the cultural, social and individual realms of human life. It addresses the proposition that an ecological civilisation requires conscious, systemic cultural change and looks at ways to achieve and sustain that change. I describe a number of specific approaches to education for an ecological culture, each of which, with my colleagues in UEA, I have attempted to employ. An underlying theme is that the best education is learning by doing and that knowledge needs to be acted upon to have effective value in changing cultural norms, i.e. culture is not a spectator sport or an abstract concept but really is about how we live. Popular culture has been neglected in the design of buildings and the planning of cities and towns at a fundamental level, and the importance of its role as a catalyst for deep cultural change has been underestimated. I believe that it can provide the accelerant we need for achieving the speed of cultural transformation needed to deal with increasingly rapid climate change.

My attempt to reweave the many strands of analysis, theoretical positions and practical examples to create a workable synthesis, is set out as the 'SHED' (Sustainable Human Ecological Development) in Chapter 11. This chapter presents the four central elements that constitute the framework of the theory – *a mission statement:* the Charter of Calcutta; *a performance measure:* the Frogstick; *a set of principles:* the Ecopolis Development Principles; and *a process:* the Seven Steps. Taken together with the Propositions, these elements constitute the Ecopolis synthesis, and provide a step-by-step program and framework for cohering the many facets of design, development and maintenance into the fractals of ecocity demonstration projects.

Pattern Pieces

In a sense, this book represents an attempt to find a pattern language for making ecological cities (and to relate the organic, city-as-living-system typology to the science of ecology and what Geddes called 'civics'). Because such cities have yet to be made, the language for them does not yet exist in a clearly visible form. As pieces of ecocity get built so the understanding of which patterns do and do not fit

will improve. The Seven Steps (Chapter 11) and its relationship to urban fractals can be seen as a means of setting out some ecocity patterns so that they can be shared and tested.

Community processes are vital to establishing the social patterns that must underlie the making of ecocities and much of this theory is to do with how the community can be engaged in the entire gamut of processes and activities that create and maintain ecologically viable human settlement.

There are two approaches to defining ecological cities: the 'performance' model and the 'ideological' model. The performance model stresses measurable outcomes: air quality, levels of pollution, percentage of wastewater recycled, percentage of renewable energy captured, etc. It is essentially to do with urban biophysical environments and is typically dealt with in phenomenological texts that lay stress on description, classification and quantification[1]. The ideological model lays stress on conceptual and less measurable aspects, e.g. provision of roof gardens and community amenity, commitment to social justice in management structures, health and security, etc. This approach is more clearly focussed on the human ecology of the city.[2] This characterisation, or thematic identification of definitions based on 'performance' or 'ideological' approaches can also be interpreted in terms of 'biophysical' and 'social' themes. Human settlement is a consequence of the interweaving of these themes, which are reflected in the Ecopolis Development Principles[3] (Chapter 11) that have been developed and tested in the public domain through the case studies described in Chapter 7.

Over a quarter of a century ago, Ian Douglas told us that "The urban eco-system is the most elaborate geographical control-system or integrated resource-management system in human experience." (Douglas 1983 p.206) But we have yet to see this profound observation properly acted upon. There is a lot of good information available and a number of well-constructed texts that deal with ecological architecture, urbanism and design, but curiously, none of them seem to provide a framework for using and integrating the wealth of knowledge each provides, or the set of principles each encompasses. The Seven Steps provide a framework for dealing with these many ideas and bits of information. The Seven Steps do nothing to reduce the complexity or richness inherent in any of the theories, principles, procedures or practices they

---

[1] Characteristic of this approach to elucidating the relationship between human settlement and the biosphere is the textbook 'Urban Biophysical Environments' (Bridgman, Dodson and Warner 1995).

[2] It is interesting to compare this distinction with the different types of environmentalism identified by Doyle, in particular the Australian and North American 'preservationist' and the European 'human ecologist' (Doyle 2000). The one is 'at a distance' from social concerns whilst the other is focussed on them. Apart from this apparent similarity, however, it is difficult to find any consistent relationship between the parallel analyses because the two general approaches to ecocity thinking are just as likely to occur in Europe, Australia or North America.

[3] Initially drafted as a set of 12 precepts for ecological development in 1991–1992 by Prelgauskas, Hoyle and Downton.

relate to, but do provide a means of systematically accessing that knowledge and experience within the framework of a clearly expressed set of values and goals.

An Urbanism of Resistance

An important idea at the centre of the evolving Ecopolis theory is that community expectations are not, and cannot, be entirely conditioned by the current state of global capitalism and that what Kenneth Frampton calls "a contemporary architecture of resistance" (Frampton 1987 p.27) can be conceptually and practically extended into an 'urbanism of resistance' against the monocultural, monopolistic, life-threatening practices inherent in conventional city design, development and maintenance.

Technology Is the Key

> The time for real unification of art and technology is really long overdue.
>
> (Pirsig 1974 p.294)

Our global impact on the environment is a result of technology. Our survival as a species depends upon technology. There is nothing 'unecological' about this proposition; technology is the key. But what is technology? Humans are tool-using creatures. Other species have evolved some tool use, but we have developed more tools and have learned to use them in more ways. I always return to the definition of technology inspired by Mumford:

$$\text{Technology} = \text{Tool} + \text{Use}.$$

Thus technology is simply what we get when we decide how to use tools. The tools themselves are pretty dumb and cannot really be blamed for anything. Those decisions are based on values; they are culturally derived, which is part of why the terrorist's perverted use of everyday items is so frightening.

Thus technology is the key because it derives from and depends on the values we apply to the use of our tools, whether they be hammers or words. It is the application of *values* that makes the difference; we need to construct the cultural base of Ecopolis with care.

Essentials

> Cities must become socially, economically, and ecologically sustainable, fulfilling basic human needs for shelter, subsistence, and social cohesion. For this to work the active participation of people in shaping their urban environment is crucial
>
> (Girardet 1992 p.117)

For ordinary citizens to participate in city-making as an ecologically responsible activity in the context of conscious evolutionary endeavour, complex processes and concepts must be made as accessible as possible. The following chapters include a set of icons and Geddesian 'thinking machines' as a contribution to the community-oriented design program that must be at the heart of ecocity making. The challenge has been to make the complex processes of creating human settlement appear simple, to keep the goals of ecological development visible and understandable, and to reduce things to their essence. I have tried to arrive at a set of what might be called 'intellectual sound-bites' by way of trying to fit otherwise complex ideas into the communication framework of popular culture.[4]

In the final Chapter I have drawn some conclusions from the material presented in the previous eleven chapters and proposed that the most effective means of understanding cities is to see them as extensions of human physiology. Such an intimate and personal relationship with the built environment is a revolutionary proposition, first intimated in the work of Patrick Geddes in the early years of the twentieth century. I believe that this is an essential part of maintaining the focus and flexibility of mind needed for continuing to evolve a culture able to cope with the planet's rapidly changing climate and severely disrupted ecosystems.

[4] This approach is lent some credence by ecologist Eugene Odum's Ecological Vignettes in which he was clearly of a similar mind, saying 'I have tried to show with 'sound bite' vignettes, cartoons, and charts how ecological thinking and human common sense can help us understand and deal not only with environmental problems but with other human predicaments as well.' (Odum 1998 p.55).

Chapter 8
Synthesis I: City Ecology

Cities are both social and physical structures. While they may be analysed from many viewpoints, life in the city is an amalgam of social encounters and physical experiences.
(Douglas 1983 p.1)

The city is an organism of a thousand minds.
(Soleri 2006 p.132)

Cities are fragile creations balanced on the earth's crust . . . .
(Spirn 1984 p.91)

This chapter further explores the purpose of cities and the operation of the built environment as a living system. I have tried to avoid *analogist* thinking in regard to the relationship of humans and their cities with nature and to follow the work of people like Boyden and Turner in their studies of the behaviour of people and organisms respectively so that the reality of the connections between humans and the biosphere is dealt with, rather than a supposition about that relationship. Much as one can sensibly discuss the impact and limitations of gravity in relation to both human structures and termite mounds, so it should be possible to discuss ecological relationships in similarly direct and meaningful, if not easily measurable, terms. This chapter deals with biogeophysical aspects of urban ecology and their relationship with human culture and society through the built environment. It relates to the proposition that 'City-regions determine the ecological parameters of civilisation'.

The purpose of cities has always been to control territory so that their populations could be fed, watered, clothed and protected from the elements and enemies. Historically, the culture of cities has been developed in response to their limitations of their bio-physical situation – societies built with stone and featured it in their mythologies if it were plentiful and accessible, cultures that built with timber and venerated trees were founded in forest regions, maritime cultures developed in coastal regions. Control of territory has involved managing resources for the long-term benefit of the city, although the ultimate response to resource shortages has invariably been to try and extend the city's reach and expand its territory – thus did colonisation begin. The extent of collective control by our cities now extends to the whole Earth and, as was observed by the Japanese Minister for the Environment some years ago, there is nowhere left to colonise. In order to provide the necessities of life we have to recognise the limits of territory provided by a finite world. The city-region is now a planet.

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8.1 Structures of Life

> A town is a thing like a colonial animal. A town has a nervous system and a head and shoulders and feet. A town is a thing separate from all other towns, so that there are no two towns alike. And a town has a whole emotion. How news travels through a town is a mystery not easily to be solved. News seems to move faster than small boys can scramble and dart to tell it, faster than women can call it over the fences.
>
> (Steinbeck, 1980, p.27)

Life Cycles

All living organisms have a lifecycle. The assertion that cities behave as living organisms can be substantiated by reference to definitions of life being adopted in current life sciences, and particularly by the 'Gaian' hypotheses of James Lovelock and Lynn Margulis (Lovelock and Margulis 1975, Lovelock 1991). Cities possess discernible boundaries in both space and time and have a lifecycle. Employing organic analogies, Magnaghi discusses human settlement in terms of living systems and organisms and identifies the *neo-ecosystem* as 'a living system apart from the two agents that generated it: human society and nature.' (Magnaghi 2000, transl. Kerr 2005 p.3). Cities are not just simulacrums of life, they exhibit enough of the characteristics of living organism to be considered 'alive'. It seems reasonable to conclude that an inhabited city is a living system which may be considered to possess the characteristics of living organisms.

The science of cybernetics and systems theory (which, like meteorology and climate science, evolved in response to military preoccupations) seems to allow that cities can be considered organisms – a 1950 report on the US air defence system proposed that organisms are of three kinds: 'animate organisms, which comprise animals and groups of animals, including men (sic); partly animate organisms which involve animals together with inanimate devices such as in the Air Defense System; and inanimate organisms such as vending machines. All these organisms possess in common: sensory components, communication facilities, data analysing devices, centers of judgement, directors of action, and effectors, or executing agencies . . . ' (Turner 2006 p.27).

If a city is considered as an organism it may be healthy or sick (see Holurbanism, Malurbanism and Vital Signs). Whereas most of our cities currently display the behavioural characteristics of cancer, they should be healthy organisms. In terms of cybernetics, 'It is the function of an organism . . . to achieve some defined purpose.' (Turner 2006 p.27). If organisms are purposeful then the purpose of an ecological city organism must be to heal the landscape. This idea was at the core of the thinking behind the Ecopolis projects described in the previous chapter. The idea of an Ecopolis is not merely about minimising environmental damage; it is about restoration – maximising reconstruction of the biosphere. Ecopolis Proposition 1 links the city to its region and makes the whole a vehicle for restorative action in support of the processes of the biosphere for human purposes.

Is the city a superorganism? The term is so variously defined and so contentious that it is hard to use sensibly in relation to termite colonies, never mind human settlements. History has shown that city structures of a certain scale (albeit often within conurbations or larger urban structures) arise time and time again. Cities have an inevitability about them once certain conditions of resources and population exist, and their behaviour is certainly, and usually consciously, as one thing.

Although the science of cybernetics and systems theory allows that cities might be considered organisms, it may be more correct to say that a city is not an organism, but it is alive. The 'city as organism' is a useful and powerful metaphor, but 'city as ecosystem' is not a metaphor. It is an entirely appropriate and scientifically defensible description. A city is a massive constructed device that integrates living and non-living components into a total living system that is a physiological extension of our species. It only lives when it is occupied, and it can die. Dead cities are the subjects of study by archaeologists, who can discern a great deal about their living state from the condition and disposition of their carcasses and bones, whilst an analysis of the land around them tells much about the way they lived and the impacts from their reach into the hinterlands.

The city is a system of living matter in which the most active component is people. 'Living matter embraces and reconstructs all the chemical processes of the biosphere . . . Living matter is the greatest geological force, growing with time.' (Vernadsky, quoted in Lapo 1979 p.113). The processes of life capture, transport, refine and transform the minerals that make up the planet's substance, cycling matter from the lithosphere and atmosphere into and around the biosphere. Through biological activity living organisms are continually mining the planet for the substances essential to their existence. The scale of this activity is astonishing '. . . the vegetational cover of our planet annually concentrates mineral matter in amounts comparable to most of the elements with their reserves in the lithosphere, accumulated there during millions of years of geological history.' (Lapo 1979/1982 p.99)

To understand the global impact of human activity, consider how much the combined activity of living organisms effects the planet. Human activity is a special case of biogeochemical activity, with the distinction of being directed by organisms with some awareness of their impacts, particularly on the processes of the biosphere. Cities present extraordinarily concentrated examples of this transformative power, they are, in effect, our most advanced tools for terraforming the world. Lapo draws attention to Vernadsky's 1935 statement: 'In the rapidity of concentration of solid substance from its scattered state, biogeochemical energy is probably the greatest force – in the sense of geological time – existing on our planet.' (Lapo 1979/1982 p.99). As the current peak operators of biogeochemical action on the planet, we have greatly accelerated the movement of matter through the biosphere – particularly carbon. And it is not only through what we might regard as conventional mining that we have extracted chemicals and cycled material through the biosphere but also through management and manipulation of organisms and organic processes, such as farming billions of head of cattle. Consciously or not, as an integral part of the biosphere's operations, our species has increased the speed at which life reworks the geology of the world. This capacity to accelerate the rate of transformation of the matter

that makes up the world has been a direct consequence of our ability to think about what we do and to invent and create the means to do things that were not otherwise happening 'naturally'. Our ability to transform the world increased as a consequence of being able to think and put our thoughts into action. The rate of transformation of the planet has risen in proportion to the growth of sentience in the biosphere.

A city is not *like* a living system, it *is* a living system. Human culture is not *like* a force of nature, it *is* a force of nature. By working together in a social and cultural framework we have amplified our capacities as individual creatures and created the collective means to move mountains, dam rivers, level forests and reshape the world. We have speeded up the processes of climate change and even geology, and have accelerated environmental changes to the extent that other species have not been able to keep up. As Stephen Boyden reminds us, we are a force in nature, but we are also *of* nature (Boyden 2004). Our challenge, right now, is to understand how to use that force constructively, rather than destructively – for good, if you will, rather than evil.

Given the deep and wide changes that we bring about with biogeochemical transformation through city-making, it is clear that continued development of the built environment along its present lines will not address the requirement given by William Rees' analysis that says we need to reduce the impact of the built environment 10 fold by 2040 (Rees 1998 p.11). Architecture and urban planning must adopt a paradigm that embraces and is embraced by a profound understanding of ecological processes. 'No species in nature has increased permanently beyond the capacity of the environment to support it, nor has it persisted if its effects were destructive of the ecosystem.' (Sears 1970 p.184).

Little Cities, Big Impacts

> A city of 1 million, it has been calculated, takes in 9,500 tons of fossil fuels, 2,000 tons of food, 625,000 tons of water, and 31,500 tons of oxygen every day – and puts out 500,000 tons of sewage, 28,500 tons of carbon dioxide, and great quantities of other solid, liquid, and gaseous wastes.
>
> (Sale 1991 p.56)

Precipitated by the end of the last Ice Age, the innovation of city-making co-evolved with agriculture during the change from predator/scavenger societies about 10,000 years ago (Brown 1971). Past urban settlements have been very small by modern standards (city populations rarely exceeded a few tens of thousands until the advent of industrialism) and although this, by default, made the resource consumption and overall ecological footprint of such cities much smaller than urban entities in the modern era, no city has ever been 'ecological' in the sense of being consciously integrated into the processes of the biosphere with the intent of maintaining the optimum functioning of the biosphere from a human perspective. Even the impressively climate-responsive, compact urban constructs of the Anasazi's Pueblo Bonito in Arizona ultimately outstripped the carrying capacity of its environment '. . . destroying the ecology of its supporting hinterland.' (Cook, 1989 p.15).

Urban impacts are pervasive. 'Processes of urbanisation have strong impacts on the elements of the atmosphere, the geosphere, the hydrosphere and the biosphere.' (Bridgman et al. 1995 p.1). Rees maintains that our highly consumptive cities now represent 'a new ecological reality' (Rees 1998 p.3) in the context of an environmental crisis which results from deeply-rooted cultural values (Rees 1998 p.6). Nevertheless, those cultural values have allowed for some responsiveness to the global environmental context (e.g. at the conservative end of things, the 1992 UN 'Earth Summit'). In relation to the built environment manifestations of responsiveness can be seen in recent decades as climate responsive, energy efficient design has become more sophisticated (Szokolay 1987) and the need for architects and urban professionals to look beyond the impact of individual buildings has become imperative (Szokolay 1989 p.90). A renewed sense of citizenship is a fundamental requirement for the ecological re-making of cities and '. . . we need to explore the possibilities of grassroots electoral politics.' (Bookchin in Aberley 1994 p.48).

What is this Life?

> Because life exists simultaneously in the separated realms of physics, chemistry and biology, it has no definition.
>
> (Lovelock 2007 p.163)

Pattern recognition is an essential trait for us humans, part of our kit of survival tools. Pattern recognition is probably innate in many creatures as they process feedback from the environment. According to Margulis and Sagan, for our ancestors, pattern recognition was such a useful trait that '. . . even if occasionally wrong, the *Aha!* feeling of discovery would have been reinforced . . . Even foolish and outlandish notions would have been retained and reinforced if they in any way aided our ancestor's survival.' (Margulis and Sagan 2000, p.30). Life, according to Margulis and Sagan '. . . is a material process, sifting and surfing over matter like a strange, slow wave.' (Margulis and Sagan 2000, p.31)

Alexander's notion that particular patterns represent, or manifest, the essence of life may be a valid way to interpret the world as a means of translating human needs into effective built form, but his definition of 'life' is necessarily somewhat particular. Alexander argues that life – as he has defined it – is mathematical, arising 'because of the mathematics of space itself' and that 'living structure' is 'susceptible to mathematical treatment, and may therefore be regarded as a part of physics' (Alexander 2002 p.469). I have struggled with his definition of life, trying to find some correspondence between it and the kind of life that a biologist might recognise, but, notwithstanding the fact that most biologists have trouble defining 'life', I have come to the conclusion that he is talking about something different. Alexander's observations about, and attempts to describe and measure 'life' seem to be largely to do with aesthetic preferences.

Douglas summarises some organic analogies for the city in history, citing, amongst others, Cobbett in 1830, Elisee Réclus in 1885[1], Rolt in 1974, and Geier in 1972 who saw the city in the terms of a life-support system (1983 p.9–10).

> It should be emphasised that ecosystems may be conceived and studied in various sizes. A small pond, a large lake, a tract of forest, or even a small aquarium can provide a convenient unit of study. As long as the major components are present and operate to achieve some sort of functional stability, even if only for a short time, the entity may be considered an ecosystem.
>
> (Odum 1971 p.10)

> Ecosystems can be thought of and studied in many sizes . . . one could study an aquarium, a greenhouse or conservatory, or a formicary or ants' nest. As far as human activities are concerned, the town, suburb or farming village are all good subjects for ecological enquiry. The important point to bear in mind is that whatever unit you select as your ecosystem, it should contain major components of existence, which are operating together in some sort of stability, even for a short time, and functioning in a coherent manner.
>
> (p.41–42, Sholto Douglas, 1974)

Perceptions about the aggregate qualities of life exhibited by complex systems as championed by Margulis et al. are gaining acceptance but there is no agreed scientific definition of what constitutes life (Lovelock 1991 p.29). Although, according to Lapo "The functional definition of life, given by Friedrich Engels, has become classical: 'Life is the mode of existence of protein bodies, the essential element of which consists in *continual metabolic interchange with the natural environment outside them*, life ending with the ending of this metabolic interchange'." (Lapo 1979/1982 p.78).

Natural patterns we associate with living things may also be found in patterns generated by chemical reactions and other non-biotic processes. The capacity for self-organisation permeates the natural world but its significance in relation to living systems remains unclear (Ball 1999). In addition, recent developments in genetics, medicine and computer engineering '. . . exist in a netherland between the technological and organic and fall outside our traditional systems of classification.' (Channell 1991 p.4)

In the absence of agreed definitions, the choice of parameters becomes critical to any consideration of what is biotic rather than abiotic. To a Lovelockian geophysiologist, '. . . a living organism is a bounded system open to a flux of matter and energy, which is able to keep its internal medium constant in composition, and its physical state intact in a changing environment . . . ' and it certainly includes ecosystems (Lovelock 1991 p.29). Ecosystems contain both biotic and abiotic material (Odum 1974) but if an ecosystem is not alive, what is it? A dead ecosystem is not an ecosystem. Cities and buildings may be regarded as ecosystems, and when they operate as such they are as alive as any ecosystem is alive with their biotic and abiotic components functionally interlinked by necessity. Thus people and other organisms are integral to the ecological description of any architecture or urban construct.

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[1] See also 'Geddes – A View from the Outlook Tower: Cities in Evolution' in Chapter 4.

Dead or Alive

> . . . an ecosystem if a stable self-perpetuating system, composed of living organisms and their non-living environment . . . a Gaian ecosystem sees the two components of the system, the living and the non-living, as two tightly coupled interactive forces, each one shaping and affecting the other.
>
> (Lovelock 1991 p.50)

> Living means dying.
>
> (Engels 1883)

There is a clear distinction between the inhabited and uninhabited states of buildings and cities. The uninhabited state represents the abiotic components 'at rest' in the form of art, whilst the inhabited, active state represents the full flowering, or coming into being, of the thing we call a 'building', or a 'city'. This distinction helps clarify differences between conventional architecture, urban design and planning and their ecological counterparts that contain the emergent properties of living systems. Thus ecological architecture is not simply solar panels, low energy construction, etc., but only comes into existence when the architecture is occupied and 'alive'[2]; and, likewise, ecological cities are not made solely by the provision of stormwater recycling, renewable energy systems, and so forth. Cities, even more than architecture or buildings, depend on people to inhabit them to have a coherent existence – buildings can be quite empty of people (as they often are in architectural magazine and promotional images) and still attract interest as art objects, but the 'dead' cities studied by archaeologists lack meaning without some knowledge of who lived in them and how they worked. With this added meaning, human values are added to matters of artefact.

The best writing about urbanism reflects this distinction with evocative articulation of active urban space. With its focus '. . . on ordinary days and the multitude of spaces that surround us.' Jan Gehl's influential 'Life Between Buildings' is a good example (Gehl, 1987) and Lewis Mumford's works are seminal in this regard. Organic architecture in its various manifestations has always emphasised the making of buildings as a living process of human interaction with matter – with some acknowledgment of continuing change and adaptability as buildings are used over time.

The idea that an occupied urban environment is consequentially, qualitatively different from an unoccupied urban environment follows historical precedent inasmuch as it reflects the difference between the *civitas* – the functional, cultural entity, and the *urbs* – the physical entity. Douglas suggests that 'No biophysical study of the city can . . . be divorced from the ancient view of the city (*polis*) as a political conception.' (Douglas 1983 p.2). Any attempt to reduce the view of urban life to

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[2] Strictly speaking, not only is the vegetation around the Roman Hut part of the air conditioning system (cooling and filtering outdoor air) but so is Roman. The inhabitant of an ecological building is part of its total ecosystem, integral to its operation.

the single dimension of consumerism is a denial of its political reality, yet this is exactly what can be seen happening in cities like Adelaide when new townhouses are seen only as isolated product and city planning processes effectively eliminate consideration of the realm of the *civitas*. Environmental concerns and urban management have long been inseparable. Douglas shows that '. . . political change or reorganisation in cities is often prompted by the need for better management of such apparently mundane matters as water or transport.' (Douglas 1983 p.2). Given the close relationship between socio-cultural and built environments and the insistence of theorists like Bookchin that social change can best be initiated and articulated through direct action in citizenship, rather than through centralised state or industry institutions, the reshaping of the *urbs* required by ecological concerns may yet be the catalyst for social change.

Life Form? A City Is not an Organism

> No organism eats its own waste.
>
> (Margulis reported in Brockman 1995)

Engwicht fondly hopes that the 'ecological revolution' is under way and sees 'the Eco-City' as one of the new life forms that will help usher in change (Engwicht 1992 p.159). Having it both ways, he describes the city 'as an organism, an ecosystem, with its own internal life, creative energy and interdependence.' (Engwicht 1992 p.116). But an ecosystem is not an organism, and although his book is replete with ideas and techniques for making cities work better it is unclear how Engwicht intends to connect his organism insights into an holistic program for creating these organism-ecosystems.

Recent commentators, such as Spiro Kostof, have dismissed the biological metaphor as have Kevin Lynch ('Cities are not organisms') but their comments betray a preoccupation with urban morphology rather than function, and a limited understanding of the functional relationships of biological organisms. Senett is another who does not make a strong case for seeing the city as an organism. Instead, he relates the form and functions of the city in history to perceptions of the human body and to the human corporeal experiences of the city. If there is a connecting theme it is that society is the organism and the city happens to be where it lives. According to Sennett, the medieval period in Europe saw 'scientific humanism' create an image of 'the body politic' (Sennett 1996 p.155–156). By the mid 17th century William Harvey's discoveries about the circulation of blood set off a revolution in the understanding of the body that led to 'a new master image of the body' that coincided with the birth of modern capitalism and helped bring about the social transformation to individualism (Sennett 1996 p.255). 'The modern individual is, above all else, a mobile human being.' (Sennett 1996 p.255–256). The idea of free movement allied to growing comprehension of economic forces was integral to Adam Smith's conceptualisation of a free market of labour and goods 'operating much like freely circulating blood within the body and with similar life-giving consequences.' (Sennett 1996

p.256). According to Sennett 'Harvey's revolution helped change the expectations and plans people made for the urban environment.' It changed conceptions of what constituted health and led to a much greater emphasis on ease of movement within cities so that 'Planners sought to make . . . a city of flowing arteries and veins through which people streamed like healthy blood corpuscles.' (Sennett 1996 p.256). Sennett argues that by the nineteenth century this approach led to ' . . . urban spaces made for individuals in motion, rather than for crowds in motion.' (Sennett 1996 p.257) In the analogous design language of Enlightenment planning lungs became as important as the heart and circulation so that urban 'gardens' and forests were conceived as organs in the civic corpus as a means of ensuring the health of cities.

Kostof says 'A study of true organic form proves that the atomized behavior of the elementary particles is forcibly restrained by an overarching discipline.' (Kostof 1991). But the biological metaphor may have a lot more potential than has traditionally been recognised for this view of how organic systems organise themselves (with 'an overarching discipline') is not reflected in the kind of holistic thinking currently represented by James Lovelock's work on the Gaia hypothesis, for instance.

The Gaia hypothesis is that the Earth, taken as a whole system, displays the self-regulating characteristics of a living organism. It does not attribute supernatural qualities to the planet, nor does it suppose any element of consciousness on the part of the planet, it simply observes that the sum of the activity of the planet's organisms results in the overall performance of a superorganism. Lovelock's work with Lyn Margulis develops a definition of life that supercedes that used by Lynch in his dismissal of the view of cities as organisms. According to Lovelock's definition of what makes a living organism, a city may very well be alive:

> An organism can be said to be alive if it:
> has defined outer limits or boundaries
> takes in free energy, either as sunlight or chemical potential energy stored in food
> excretes waste products, high in entropy
> maintains a high level of internal disequilibrium
> maintains a constant internal medium, regardless of changing external conditions.
>
> (Lovelock 1991 p.30)

Lovelock argues that bacteria, mammals and trees are organisms, and are indisputably 'life forms', but unless one considers an ecosystem to be dead, small ecosystems like beehives are alive too. It is not difficult to extend this line of reasoning to include the ecosystems we build. The following table extends Lovelock's comparison of the characteristics of life forms – which include beehives (Lovelock 1991 p.30) – to include human built environments.

Ecosystems have boundaries within which they maintain the conditions for continued existence of the living matter of which they are partly comprised. They have measurable metabolisms, taking in free energy, excreting waste, maintaining a high level of internal disequilibrium and repairing damage when it occurs. They evolve. Ecosystems may not reproduce, but they sustain themselves into the future, adapting to changing conditions through processes of colonisation and succession. Cities do all these things. City boundaries are not defined by walls but have boundaries of

Table 12: Characteristic Life Forms *(after Lovelock)*

	Bacteria	Mammal	Tree	Gaia	Beehive	House	City
Reproduction	+	+	+	–	–	–	–
Metabolism	+	+	+	+	+	+	+
Evolution	+	+	+	+	+	+	+
Thermostasis	–	+	–	+	+	+	+
Chemostasis	+	+	+	+	–	–	–
Self-healing	+	+	+	+	+	+	+

exchange that merge into the landscape where agriculture and mining capture the materials and free energy needed to sustain their existence – particularly the chemical potential energy of old, and ancient, sunlight stored in food and fossil fuels. And just as the cells of which we are now comprised are not the ones that made us years ago, so it is with cities. Very little of the original fabric of ancient London, Edinburgh or Rome is still there, but the cities undeniably remain.

City Skins

> The city is a biomental organism contained in a mineral structure.
>
> (Soleri 2006 p.132)

If a city is a living system, then its outer layer might be likened to a skin. A complex organ, skin is a multi-layered permeable membrane which conveys gaseous and aqueous fluids, supports receptors for sensory information, and forms a protective layer which provides insulation, helps buffer mechanical injury and prevents desiccation. Skin can be studied as an ecosystem (Andrews 1984) and is also a habitat in its own right. *Pityrosporum ovale* yeast, for instance, lives on the skin of most humans where it can reach populations of half a million per square centimetre (Andrews p.60).

Traditionally, many cities had very clearly marked defensive boundaries within which were contained most of the city's functions. Their city walls were more carapace than skin.

Fully enclosing urban environments have been the stuff of science fiction for many decades.[3] The geodesic domes within which they are typically enclosed were invented by Buckminster Fuller in 1947 (Meller 1972 p.33). Fuller proposed domes over Manhattan as a means of improving the efficiency of the city as a climate modifier for human comfort (Baldwin 1996 p.189). The Biosphere 2 experiment in Oracle, Arizona demonstrated the enormous difficulties involved with making truly contained environments (see Chapter 4). To build a city completely enclosed by a semi-permeable membrane with the sophistication of living skin we would need to fully understand that skin's function as an environmental filter and its relationship to the city organism. We would need, in effect, to re-invent the city wall.

[3] See, for instance, Scott Sanders' 'Terrarium'.

The Ecopolis city wall is such a semi-permeable boundary – a zone of transition rather than a hard edge. It is the place which defines the extent of the city organism, its biophysical limits and bioregional fit. Historically, the green belt is the most apposite equivalent of such an ecopolitan city skin. To be considered in an ecological framework, and as an ecosystem, the city needs to be seen as integral to its context. The city-region is an entity that includes the entire landscape that supports it. It is a manifestation of culture in the landscape identified by Alexander in southern England (see Chapter 6). City-regions form whole spatial and temporal patterns of settlement which are manifestations of culture in the landscape (Dickinson 1970 p.82).

Ecosystems maintain life but being entities of biotic and abiotic material they are, in a sense, 'half dead'. The life they do maintain, with us, achieves consciousness. Ecosystems thus provide cradles, or crucibles, for the gestation and development of consciousness, turning matter into thought (and, as Paolo Soleri would have it, into spirit) (Soleri 1973). That thought provides the self-regulation necessary for the function of urban ecosystems. Regulation of urban systems is about the management of resource and energy flows in the urban metabolism and is expressed in social, political and economic terms. Socio-political-economic activity is mediated by culture – science and art. An ecological culture must integrate the life sciences that seek to understand living processes, with architecture and urban design – which may or may not make art from them.

Skins and Layers

As environmentally responsive building has developed in recent years there has been a rediscovery and reworking of pre-industrial design elements and techniques. Framed views, articulated openings, layers of screening, thickened walls, filtered edges and the modelling of light have begun to displace the hegemony of the flat, sealed glazed box of undifferentiated plate glass as an architectural paradigm (Stonehouse 1999 p.17). In seeking to reduce energy consumption and pollution by 'a return to selective modes of environmental control' (Stonehouse p.17) there has been 'an increase in the sophistication of the layering between the inside and outside.' (Stonehouse p.18). Such buildings possess external envelopes that act as environmental filters, more akin to the skin of organisms than the hard surfaces of the architectural machines of modernism.

This re-placement of architectural technique has also seen 'the reintroduction of degrees of enclosure at different scales a the edge of the building, e.g. porches, arcades and conservatories, and often deep into the building, e.g. atria, galleria and courtyards, so that the building is formed of zones of differing degrees of enclosure which interact environmentally and may be inhabited and used differently in response to changes in the external environment.' (Stonehouse p.19). There is a return to living in and with the diverse, constantly changing conditions of the environment instead of fighting against it. This edge condition of permeability and responsiveness brings architectural thinking much closer to the concept of building as organism

or ecosystem, and not only in respect to physical function. There are no walls in nature, only zones of transition, and as Stonehouse notes, 'this layering of enclosure not only works environmentally, psychologically and phenomenologically, it also underlies the way we structure our lives socially, for instance in sequences of spaces of increasing enclosure and privacy and in such situations as the porch, which is the place of transaction between public and private worlds.' (Stonehouse p.18). This layering is reflected in the concern with social ecology demonstrated by the New Urbanist codes which insist on providing porches and verandahs on new dwellings to facilitate social interaction between the private realm of the house and the public realm of the street. Critics of modernism identify courtyards as ways to make more humane space for living (Charles 1989 p.124). There is an increasing preparedness to recognise that these traditional, and even archetypal, means of shaping human space represent a pattern of expression that is simultaneously functionally appropriate and culturally sustaining (Stonehouse 1999 p.19).

The manufacture of the built environment is a response to extant conditions but the extant conditions are never entirely 'natural' by the time a human civilisation has been in place long enough to settle and build – the extant conditions are ultimately provided by a system of economic relations and a power structure. These 'invisible' structures are integral to the function of the urban ecosystem.

Constantly Renewing Skins

Brand proposes a view of buildings that sees them consisting of a number of layers, each changing at a different rate in time. The slowest layer is the *site*, next slowest is the *structure*, then the building's *skin*, then *services*, then the *space plan*, and finally, the quickest layer to change is *stuff* – the furniture and paraphernalia that we use, from furniture to computers. 'Because of the different rates of change of its components, a building is always tearing itself apart.' (Brand 1994 p.13). Conversely, a building is held together through time by constant maintenance, and so it is with organisms and ecosystems (and is thus an intrinsic requirement of ecocity systems). Brand's 'layer' analysis can be applied to ecosystems and organisms generally. This may provide a way of linking understanding of the various components of organisms and ecosystems with construction systems. A tentative comparison is given in tabular form below. ('*stuff*' could include what might be called 'tenant organisms' – which may or may not be conscious.)

Architecting[4] and Nature

> In the days of hand-power it was easier to go round a tree-root or a boulder or follow a contour than go straight through. The lines that resulted – for path, field boundary or building

[4] Architecture as a verb – see Seven Steps #7 (Chapter 11).

Table 13: Layers in ecosystem function

GENERIC CONDITION	BUILDING LAYERS	ECOSYSTEM/ORGANISM
CONTEXT	SITE (biotic & abiotic)	ABIOTIC ENVIRONMENT/SITE
SUPPORTING SYSTEM	STRUCTURE	STRUCTURE/SKELETON
BOUNDARY CONDITION	SKIN (constantly renewed)	ECOTONE/SKIN (constantly renewed)
MATERIALS TRANSPORTATION	SERVICES (fluids)	SERVICES (circulatory)
INFORMATION TRANSFER	SERVICES (electromagnetic)	SERVICES (neurological)
SYSTEM ORGANISATION	SPACE PLAN	SYSTEM LAYOUT/BODY PLAN
SUPPORTED ACTIVITIES	STUFF	STUFF

> placement were, for pragmatic reasons if no other, in conversation with the landscape. Powerful machinery finds it easier to disregard the irregularities of the surroundings. When you get to know old buildings and old fields you can start to notice how the climate differs when you step beyond their boundaries. This sort of sensitivity in placing does not occur when you design things on paper. Paper design and mechanical construction have changed the relationship of buildings to surroundings much more dramatically than first appears.
>
> (Day 1990/1995 p.13)

Some architectural theorists have regarded the development of green architecture and design as an extension of aesthetic concerns, with emphasis on stylistic developments and with a sense of the environment as a backdrop to architectural concerns rather than a driving force in design and social endeavour. '(Architecture) . . . is the art we can inhabit; because it also caters for our brute needs, it can show more comprehensively than any other how fast or fragile are the connections of mind to body, or the relationship of human society to the natural world.' (Farmer et al. 1997 p.6). Architects and architectural theorists have often turned to the natural world to inform their designs and commentaries. 'Organic' architects like Gaudi looked to nature for guidance and inspiration, evolving structural forms and aesthetics as expressions of natural forces. '. . . Gaudi believed architecture was a living organism, with a life of its own. It possessed a structural skeleton, a flesh inspired form, and a coloured skin. What could come closer to Nature without being a living being?' (Gupte 1999 p.49). And, yet, fairly typically, the creation of ecological building is simply regarded as a technological challenge (Daniels 1996).

At the more pragmatic level there have been increasingly sophisticated efforts in recent years to measure energy and environmental impacts inherent in the processes of manufacturing the built environment. Whereas Boyden et al. provide ecological analyses of human settlements which differentiate between somatic and extrasomatic energy (Boyden et al. 1981), embodied energy analyses of built environments typically do not make this distinction (e.g. Lawson 1996), perhaps because the measurement of energy input into manufacture is so difficult. Ideally, analysis

of energy use in the construction of the built environment should be divided into somatic and extrasomatic categories to correspond better with ecological analyses. This distinction might contribute to a more complete description of the profound inter-relationship between the biotic and non-biotic components of building and city-making.

Buildings as Ecosystems

> Buildings are mini ecosystems. Pipes and wires link every building to the city's water supply, utilities, and sewage system. Water and energy flow in, sewage flows out, and waste heat radiates to the surrounding environment. The building interacts not only with the urban infrastructure, but also with the surrounding air, land, and water.
>
> (Spirn 1984 p.246)

Eugene Odum identifies four basic components to an ecology (Odum 1974). The following diagram shows these as part of a simple ecological building. Living organisms – human and plant – are integral to the function of this constructed ecosystem

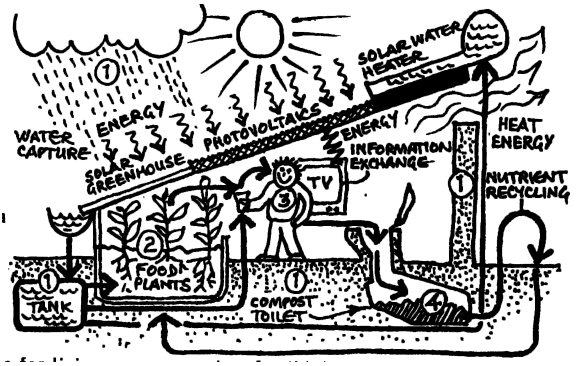

Figure 55: Ecological building: Not a machine for living – an ecosystem for thinking

1. **Abiotic Substances** – Basic elements and compounds of the environment
2. **Producers** – Autotrophic (food making) organisms, largely the green plants
3. **Consumers/Macroconsumers** – heterotrophic (food eating) organisms, chiefly animals that ingest other organisms or particulate matter
4. **Decomposers/Microconsumers** – heterotrophic organisms, chiefly bacteria and fungi that break down the complex compounds of dead protoplasm, absorb some decomposition products and release simple substances useable by producers

Any ecosystem requires functional, unthinking engagement from its constituent organisms[5]. In an ecosystem containing conscious organisms, that engagement must

[5] An organism is 'a living individual consisting of . . . a group of interdependent parts sharing the life processes' (Concise Oxford). An ecosystem is not necessarily an organism.

also be conscious. In an ecosystem constructed by conscious organisms in order to support themselves, that engagement is critical, and conscious information exchange becomes central to ecosystem function. Thus an ecological building or city is dependent for its function on engaged, intelligent information exchange. Rather than being a reductionist, Corbusian 'machine for living', an eco-house is an ecosystem for supporting consciousness.[6]

The Living City

If cities can be regarded, cybernetically, as organisms, then they can certainly be regarded as ecosystems (Douglas 1974, 1983, Sprin 1984, Hough 1995). Whereas any city can be analysed and understood as an ecosystem, 'ecocity' is a term intended to denote a particular *type* of city[7]. That type is a city conscious of its operation within the flux of the biosphere. On this basis, by having a population with a system of governance that recognises its situation as a component of the biosphere, any city can become an ecocity.

Paraphrasing Sears, one might define a perfectly conceived ecocity as 'a living community operating on the current supply of energy from the sun, using the materials of the environment and returning them in forms suitable for continuing re-use, keeping the air pure, regulating the movement of water and protecting the earth's surface from violent and destructive change.' (Sears 1970 p.184). But this neglects the socio-cultural dimensions of an urban ecology. The growing global ecocity movement tends to support the contention that 'Ecological cities are about balance within human society as much as they are about balance between humans & nature.' (Downton 1994). It is to clearly position the human presence in ecological processes, to establish the value base of decision making, and to remind us that cities are artificial ecosystems, that the concept of Ecopolis extends the definition of ecological cities to define them as urban systems consciously integrated into the processes of the biosphere with the intent of maintaining the optimum functioning of the biosphere for human purposes. On this basis, the nature of cities is purposeful and they may be seen to be operating as constructed extensions of our physiology.

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[6] Arguably, a house is as much alive as any ecosystem. Humans are themselves both containers and supporting environments for life. At the microscopic level there is a fascinating variety of fauna swarming over our bodies in a close, warm, symbiotic relationship with each and every one of us – a part of the human ecology of which we are normally blissfully ignorant (Andrews 1984).

[7] A type that would seem to transcend, or rather contain, Lynch's three city types, as it is conceivable that the 'celestial' or 'mechanical' types might be as capable of becoming 'ecocities' as the 'organic'. Whereas the celestial and mechanical city typology is strongly related to formal representation of a particular kind of functional demand (obedience to the centre, interchangeability of parts), those forms do not preclude their function as managed ecosystems. The most important aspect of city form in this respect may in fact be *density*, as a sprawling city of any type is harder to service efficiently. Walkability, complexity and internal interconnectivity are strongly related to density and any city type might be developed to provide these characteristics.

8.2 The Mindful Organism

> And it is with this belief and this knowledge that I say,
> You are not enclosed within your bodies, nor
> confined to houses or fields.
> That which is you dwells above the mountain
> and roves with the wind.
> It is not a thing that crawls into the sun for warmth
> or digs holes into darkness for safety,
> But a thing free, a spirit that envelops the earth
> and moves in the ether.
>
> (Gibran 1979/1926)

Living matter has transformed the nature of the planet over millennia. Until very recently this transformation has been gradual and slow.

Since the development of consciousness the role of the human species as a living agent for transformation has been growing at an accelerating rate.

Co-opting the Environment

Some animals build structures that adaptively modify flows of matter and energy through the environment. These structures are the agents for the organisms to achieve those modified flows of matter and energy. (Turner 2000 p.212). In such structures, Turner tells us 'organisms co-opt the environment into a physiology that extends well beyond their conventionally defined boundaries.' (Turner 2000 p.212).[8] In other words, they extend their physiology by adapting the environment to provide physiological services. This is done, as far as we can tell, unconsciously, there being no evidence of intentional thought although there is evidence of apparently purposeful activity.

The adapted environment is manifest as structures that are neither accidental nor solely the consequence of other environmental activity. To some extent, this is true of humans who make shelter reactively in response to immediate environmental conditions, e.g. by spontaneously pulling leafy branches together to create shade or shelter from rain (and reduce heat loss or gain relative that might accrue to the unprotected human organism).

In all cases of the unconsciously extended organism there are no designed activities, objects or processes; everything is a consequence of dynamic homeostasis produced through feedback systems (after Turner 2007). The physiology of organisms extended unconsciously has evolved with, and is closely matched to, a particular set of environmental conditions and the extended physiology can only function in relation to that condition. The behaviour of organisms in the environment results

[8] I find Turner's work wholly inspirational; these interpretations of the extended organism idea result from my own musings.

in changes in the environment and the relationship between that behaviour and the changes is constrained by feedback, thus grazing animals 'learn' to move on to new pasture rather than stay in one place and destroy the pasture. Any physiology extended unconsciously in this way is constrained by limits imposed by the environment and experienced through feedback loops that are inter-generational, with changes that evolve gradually over time.

The advent of consciousness extends the capacity of an organism to modify and adapt its environment by purposefully seeking physiological advantage, ie. thinking in advance about consequences and designing potential solutions, e.g. using leafy branches in such a way as to make a roof in advance of any requirement for shade or shelter from rain. Consciousness enables an organism to assimilate, communicate and act upon information about the environment very quickly, i.e. within the lifetime of an individual or its generation, so that it does not rely on generational transfer of information through genetic material.

An organism that extends its physiology *consciously* can transcend the limits derived from a given set of environmental conditions by actively seeking physiological advantage from other sets of conditions in that environment, i.e. it can innovate (and as far as we know only humans have been proved to possess this capacity). This innovation is the basis of design.

An organism that extends its physiology by the application of consciousness can continue to seek innovative extensions as long as it remains conscious (i.e. survives). Each innovative extension of physiology generates feedback loops and adds complexity to the overall pattern of environmental adaptation and feedback. Additional complexity requires an expanding capacity to assimilate and process information which in turn places more demand on conscious processes of thought. This increasing demand promotes the growth in intelligence of the conscious organism and adds to its capacity to manipulate the environment. However, the resulting proliferation of impacts and feedback can provide more information than can be effectively processed and may reduce the organism's ability to control its manipulation of the environment. Consciousness enables us to respond to information very quickly, but the things that we do may be counter-productive. That counter-productivity may not be immediately obvious. It often takes many years for feedback loops to return information about changes to the larger environment. The consequences of immediate changes may not be apparent until there have been generational changes in the environment among many species and the extent of the changes will depend on the number of species effected.

It is inevitable that a species with consciousness, able to make significant environmental changes more or less immediately (i.e. within the timespan of a single generation), will make 'mistakes'. At the same time, conscious awareness of information about the environment provides the means to quickly notice those mistakes and respond accordingly. But what constitutes a 'mistake' and what accords to an appropriate response may be far from clear.

The generally slow pace of change forced by the need for individual organisms and species to transfer information genetically, allied to the multiplicity of organisms in the environment, creates a 'buffer' that prevents systemic changes in the

biosphere from taking place too rapidly. This is a necessary feature of homeostasis. As a corollary of this, although it may prevent catastrophic change taking place 'unconsciously' it makes the whole system vulnerable to catastrophic agents from outside the immediate system boundaries – like stray meteors. By creating rapid systemic change that overwhelms the buffering effects in the system, it seems that industrial human civilisation may have a similar capacity for catastrophic impact. Current debate on the extent of human impact on the atmosphere provides a case in point.

Cities Are Us

> By structurally modifying the environment . . . organisms manipulate and adaptively modify the ways energy and matter flow through the environment. In doing so, they modify the ways energy and matter flow through them. Thus, an animal's physiological function is comprised really of two physiologies: the conventionally defined 'internal physiology,' governed by structures and devices inside the integumentary boundary of the organism, and an 'external physiology,' which results from adaptive modification of the environment.
>
> (Turner 2000 p.6–7)

Cities are not only elaborate resource management systems whereby humans 'adaptively modify flows of matter and energy through the environment' they are also extraordinary communication centres from which we throw our voice and show our visage around the planet, sending sound and vision far beyond the distances reached by a shout or the wave of an arm.

Architecture and city-making are our primary means of manipulating the environment for the purpose of extending our physiology and they define civilisation. Their importance as transformative agencies is enormous. In constructing buildings and their associated infrastructure, humans co-opt the environment into a physiology that extends well beyond the limits of our bodies (i.e. 'our conventionally defined physiological boundaries'). One way or another, most of our modification of matter and energy flows have to do with making shelter – requiring less energy from us as individual organisms to maintain our body temperature when it is cold, to stay cool when it is hot, and stay dry when it is wet. Our capacity to augment the basic characteristics of shelter has led us to evolve systems that range from life supporting machines which keep patients alive by employing extensive augmentation of their physiologies, to the constructed environments that astronauts depend on to survive in a bubble of partially extended biosphere[9].

The design and construction of a building is the consequence of a great deal of environmental co-option and manipulation and is never a solitary undertaking; it is a

[9] I am not sure whether an augmented physiology is the same as an extended physiology, but if survival depends on the augmentation then it seems to me that it is no longer an addition but something vital and integral to the total living system that is the organism.

social activity that requires collaborative activity and high levels of communication between many individuals.[10]

As we have progressively transformed the globe we have begun to breach the limits set by environmental conditions. Our conscious manipulation of the planet's resources now has to be matched by conscious responses to the feedback we are receiving about the breaching of those limits.

Accelerated climate change provides the most powerful example of breached limits, and because of its fundamental interconnectivity with all life on earth it is the most pressing issue requiring conscious attention in order to preserve conditions of acceptable homeostasis for human civilisation.

Our efforts to consciously expand human physiology are unlikely to stop and may only be limited by the capacity of the environment to support us. Our conscious understanding of the limits of the environment is essential.

Agents of Change

As agents of conscious change, cities represent nodes of an emerging global consciousness. Bateson believed that as civilisation continued to develop, its citizens would begin to 'recognise mind as a property of the aggregate interactions of the individuals with their surroundings'. (Turner 2006, p.123) He held that a 'mental determinism' is immanent and 'especially complex and evident in those sections of the universe which are alive or which include living things' (Bateson 1973 p.441). With cities we have extended our physiology to reach across the whole planet. Our built environments are the most visible physical manifestations of our role as conscious agents of change in the extended physiology of Gaia, coordinated through the urban ecosystems of our cities and fine-tuned through the making of architecture.

It is through our cities that we not only act on the earth but can best understand that action because our cities are centres of communication and culture. As historical centres of social change, cities are best placed to be primary agents of conscious environmental change.

The idea that we have to recognise ourselves as agents of conscious global change is not a moral imperative. Even the proposition that we owe it to our progeny to make conditions favourable for their future is not intrinsically moral as such, it is simply a statement of a survival imperative operating at the species level.

The extended physiology of the human species is, like all other physiologies, about maintaining homeostasis. The mind-less feedback-based balance of the biosphere has been significantly damaged by our conscious, but ill-informed, activities. Now the only way to regain homeostasis without enormous loss of life, both human and non-human, is to mindfully intervene in the feedback loops.

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[10] Even the most remote and individualistic 'owner-built home' represents a case in point. Without the benefit of the rest of industrial society there would be no glass in the windows and no wires to run current or communicating electrons. "You need a mess of help to stand alone".

As agents operating collectively on a planetary scale, the conscious action of cities has the best potential to achieve the degree and rate of change required to deal with a rapidly changing global climate.

8.3 The Nature of Cities

Time, and the Art of City Maintenance

Brand writes of the 'long now' and how we have lost a meaningful perspective on time, and he points to the problem of living too much in the present, without a sense of history (Brand 1999). The 'long now' is a device for re-establishing a context for the present, connecting when we are to when we were and when we might be. Architects, more than most, need a sense of time that embraces past and future. Because buildings exist in time as much as in space, they are intrinsically about process, although much architectural theory and nearly all architectural criticism treats buildings as if they were objects frozen in time. Goethe memorably and poetically referred to architecture as 'frozen music'. Real buildings degrade and decay. Without constant attention and maintenance they weather, rot and eventually fall into ruin. Brand's framework for understanding the rates of change that permeate buildings was a revelation to most architects and it was only published just before the end of the last century. Earlier in that century Wells observed:

> We live in the all-too-familiar *now*, which never seems to change, unmoved by any event more than 48 hours in the past. We have no anchors in our drift through time.
>
> Seeing the world from other points of view – historical, physical, biological, social, geological – sometimes helps us to see the present moment, and ourselves, in perspective.
>
> (Wells 1982 p.3)

And, he says about his book Gentle Architecture 'This is an architectural point of view.' (Wells 1982 p.3). Wells speculates on the fate of cities if they were divested of their human population. Using the Empire State Building as a case in point, Wells charts the future of a wilderness come to 'reclaim' the city. He says 'The timetables, of course, are unknown to us, but surely, long before the Great Collapse of the Empire State Building, trees and flowers would have begun to grow from hundreds of its windows, there above the new forests of Thirty-Fourth Street.' (Wells 1982 p.20).

That timetable gives us a good measure of how important maintenance is to the existence of cities as human habitat. Left alone, they not only lack any human purpose, they quickly revert to a condition that gives urban humans as little comfort and succour as wilderness (see box). The deserted city of Pripyat, near Chernobyl, shows how quickly nature can take its revenge.

Cracks in the Pavement – The Leaving of London

What would really happen if we took humans out of their cities?

The following scenario is based on an article by Laura Spinney in the New Scientist, 20 July 1996. It looks at what would happen to London if everyone had suddenly chosen to leave, in 2007.

"Most cities already have the biological potential – microorganisms, soil nematodes, earthworms . . . to rapidly begin the natural processes that humans interfere with just by being around." (John Hadidian in Spinney 1996)

2007

Within 1 year weeds grow in gutters and emerge from cracks in paving and walls.

Shrubs like buddleia (an exotic) have roots powerful enough to penetrate bricks and water to find moisture – and they grow fast. Plant litter, mosses and lichens create soil on top of concrete and tarmac – within 5 years roads, pavements, parking areas and city squares are carpeted with weeds and a rich turf of nitrogen-fixing clover. Alder trees establish, deeper rooted plants take hold.

2012–2017

Fire releases nutrient and plants rush in to take it. Flooding is inevitable – river banks erode and subside – marshlands return. After 10 years wildlife comes into its own, weeds yield to indigenous plants – including orchids.

Parks provide seed banks for regeneration, with plants come butterflies, bees and invertebrates – larger insects, birds and mammals follow as the food chain rebuilds. Kestrels, foxes, hedgehogs, bats, toads, frogs and newts return – birch trees flourish. Feral cats do well, wolves return.

2017–2067

Steel structures rust and collapse, masonry holds out longer.

20–30 years after humans leave, birch woodland fills the empty spaces, elsewhere impenetrable elder thicket dominates – sycamore and maple move in. Ivy grows down from the roofs of skyscrapers and climbs as high as 40 metres. Wooden structures disappear, many concrete towers remain for centuries.

2056–2556

Brick buildings have been gutted by fire, undermined by water, battered by storms and infiltrated by roots and insects – the ones nearest the rivers are first to go.

After 200 years many buildings are crumbling, near collapse, as carbon dioxide dissolved in the rain carbonates concrete surfaces, acid from decaying

organic matter in the ground has infiltrated concrete foundations and rusting steel reinforcement expands 3 times in volume and concrete spalls off.

The Thames is wider now, lined with elder and willow, dominating the landscape whilst buzzards circle overhead.

The forest of Greater London is predominantly oak, interspersed with foreign species like sycamore, Norway maple, Turkey oak and conifers. Bird life includes ring-necked parakeets from Asia. Wolves roam the forests preying on roe, muntjac & sika deer & feral pigs descended from the zoo & city farms – in the suburbs sweet chestnuts are flourishing.

After 1,000 years the ecology is mature & transformation is virtually complete.

Modelling the Nature of Cities

Ecological analysis and modeling of city functions include the exchange space/ movement space issue identified by Engwicht (Engwicht 1992) and the more formal, overtly scientific analyses of urban ecological function found in the work of Rusong Wang et al. in China (Wang 1992, Wang et al. 1990, 1991a,b) and the 'landscape ecological approach to urban management' such as that posited by Keith Smith in Adelaide (Smith 1993). The life sciences are increasingly sophisticated in their analysis of non-biological processes in living systems. Thus, for instance, the branching structures of many natural organisms are now seen to be following the 'fractal dimension' rules that govern such things as the branching of crystals. "However crude the present models, they promise that a marriage of physics with biology will surely have much to tell us about the ramifications of growth and form." (p. 139, Ball, 1999).

In a "life sciences-integrated" model of city development it should be possible to analyse urban systems behaviour to assist in conceptualising, constructing and managing cities. Michael Batty and Paul Longley have identified in the fractal characteristics of cities the same "diffusion-limited aggregation" patterning process that appears to create many natural branching structures. According to Ball, Batty and Longley have developed credible models for describing how cities grow, enabling them to predict the pattern and extent of urban sprawl and potentially assist in long range urban planning. This work is important for its focus on actual cities' behaviour as opposed to their theoretical performance as planned entities. Ball acknowledges the nature of cities as 'organisms' and quotes Batty as saying "The time is now ripe for the new approach to cities and urban form for which we have been waiting for more than a generation." (Ball 1999 p.251).

Alexander has long advocated acceptance of 'natural' growth patterns in the making of urban form and proposed patterns of development that accept the inconsistencies and apparent randomness in the 'organic' nature of our built environments (Alexander 1977). Batty and Longley's work, along with that of Makse and others (Ball 1999) promise a macro-level modeling and planning tool that is congruent with Alexander's

A Artificially generated vascular network in which, as in leaf vein and blood vessel networks, the vascular systems interconnect *(From Ball 1999 Fig. 5.30, p.132)*

B Street map of Brussels.

C Whyalla EcoCity Development Core Site proposal *(Downton 1997)*

Figure 56: Vascular street patterns

smaller scale processes. Convergence of these techniques promises the possibility of modeling and planning for ecosystems within the daunting complexity and scale of cities where realistic planning has historically proved extremely difficult.

Mapping the Nature of Cities

> It is because so many of man's (sic) activities result in poorly devised ecosystems, fabricated to suit human purposes only, that these malfunctioning units, often termed civilisations, carry in themselves the seeds of their own destruction and will not last.
>
> (Douglas 1974 p.43)

In his case study of the urban landscape ecology of Salisbury, South Australia, Smith observes that 'Human dominated landscapes are characterised by land phases where the ecological processes are dominated by human influences.' and that in such environments the disturbed native biological communities are rarely able to regenerate naturally because of those influences (Smith 1993 p.23).

An approach to urban development in which outcomes are uncertain and are attained by extrapolation is a kind of undirected evolution. The goal directed approach is purposeful and expects certain outcomes. An 'undirected' model for urban development might use sophisticated modeling to predict urban sprawl patterns but it would accept the imperatives of sprawl. Subsequent planning would mitigate the consequences of that sprawl but would not seek to stop it. Conversely, the purposeful approach sets out to create ecological cities consciously integrated into the processes of the biosphere with the intent of maintaining the optimum functioning of the biosphere for human purposes. This approach may still employ the same urban sprawl models, but include the goal of halting sprawl to create more efficient and sociable urban form. In either case the techniques of prediction and analysis may be much the same, but the difference in their use derives from the existence or otherwise of

an overriding goal. To fully fulfill human purposes, that goal has to include all the creatures and living systems of the city.

8.4 Habitats and Design Guidelines for Non-Human Species

> We're all in this web together, and our very human nature depends on that quality of richness and complexity in the living fabric that enfolds and sustains us. Accordingly, habitat restoration and the reintroduction of extirpated species become important human occupations, tributary to this larger process of giving Nature room to move.
>
> (Mills 1995 p.21)

Figure 57: Nest constructed by Paper Wasps in an Adelaide inner-city garden. Sophisticated, elegant, functional. An example of what Turner (2000) would claim is a physiological extension of its creators and home to what the neighbours might claim was a hazard to humans

Having recognised the imperative to incorporate nature in our human designs, we are obliged to recognise that the optimum functioning of the biosphere sets an imperative for designing to explicitly accommodate non-human species. This is a neglected aspect of eco-city theory that requires much greater study. It is not simply about creating more parklands in and around urban areas but is about understanding the city as an ecosystem in which humans are but one of the species. Clearly 'The city has innate opportunities for complex wildlife habitats.' (Hough 1995 p.184) Some species (other than obvious candidates like rats and cockroaches) find benefits in urbanisation, peregrines, for instance 'have always been attracted to urban environments' and have a long history of attempts to nest on tall buildings which provide cliff-like environments that peregrines favour (Bell 1994 p.22).

Humans are not the only builders of habitat either,

> Just as life as we know it would be impossible without the artifacts we make, many species have no choice but to modify their environments in analogous ways to survive
>
> (Gould and Gould 2007 p.4)

> Many animals, like human beings, live in environments of their own construction rather than simply in nature. An evolutionarily advanced animals such as birds and mammals are not the only species that can build. Even single-celled organisms construct shells for themselves out of things like sand grains . . . .If humans nonetheless claim a certain superiority, the claim must rest on grounds other than architectural achievement. It must rest on awareness
>
> (Tuan 1979 p.101–102)

Architecture and urban design rarely takes account of non-human species except as pests, with nesting boxes and dovecotes being obvious, and rare, exceptions. But human edifices can be dangerous to wildlife. Buildings and other aerial structures are hazardous to birds with over half a million birds a day killed by collision with artificial structures in the USA alone (Wheater 1999 p.56). Wheater makes the point that the attachment of warning objects to high-risk lines such as those in flight paths can reduce the danger to avians. This kind of non-anthropocentric design response should be integral to the design of ecological cities.

Moving to ecological design of cities means reassessing historical approaches. Marshes and wetlands used to be areas to avoid or places to fill-in and develop. The habitat value of wetlands is being increasingly recognised, reversing, to some extent, the trend to eliminate wetland areas that has been historically associated with city-making. Reedbeds are important edge environments, providing habitats for both aquatic and terrestrial organisms and they also have properties that can help clean urban run-off (Wheater 1999 p.65) Full management of such cleansing systems requires consideration of what to do with silt and vegetation that has accumulated toxins over time.

Wheater notes that habitat enhancement and creation has received significant attention in recent years, citing Gilbert and Anderson 1998, Baines 1995, Baines and Smart 1991, and Emery 1986 (Wheater 1999 p.99). In the UK ‘community forest’ programs are creating new habitats with recreation and conservation uses (Wheater 1999 p.99). Stephanie Mills has written about ‘restoring the Earth, ecosystem by ecosystem, watershed by watershed’ and described a number of volunteer-based restoration projects in the USA as well as the grand urban experiment and land restoration project in Auroville, India (Mills 1995). In Australia the idea of urban forests is gaining currency with cities like Adelaide planting significant areas of urban woodlands with species selected on the basis of ecological pertinence rather than aesthetic preference, reflecting the understanding that ‘Habitat diversity is an important focus, especially when establishing new areas.’ (Wheater 1999 p.99). In discussing urban habitats Wheater makes recommendations about management of such areas noting the need for guidelines, continuity, diversity, use of suitable species, and the need for monitoring.

Wild Law

> Wild law recognizes the rights of rivers to flow unimpeded, the rights of mountains to remain intact instead of having their tops blown off for coal mining, the rights of old growth

> forests to remain unlogged, and the rights of all humans, animals, birds, insects amphibians and other beings to a habitat that supports their existence.
>
> (Sustainable Business.com 2008[11])

There need to be systemic changes in all aspects of human society and culture so that every aspect of living fits the ecological paradigm. Just as we now legislate through our building codes that buildings must stand up and obey the law of gravity, so we need legislation which requires daily life and developmental processes to operate within the constraints of ecological function. The movement towards this is already under way and in the USA it is represented by 'wild law'. Wild law is a term coined by Cormac Cullinan for an idea about legal relationships that returns humans to their rightful place as members of the wider community of the biosphere and acknowledges in law and governance that nature and all its elements have rights. According to Sustainable Business.com, wild law 'is a framework for the reform of our current approach to law and governance which accords corporations the right to pillage and plunder, destroying human habitats as well as that of other beings, sending species after species into extinction.' (Sustainable Business.com 2008).

In a similar way, education about wild life is essential to maintaining civilised human environments. The role of wildlife in cities is fundamental in regard to educating the human population about how cities themselves exist within the context of non-human living systems. Bharne writes of different 'natures', one made without human assistance and a 'second nature' of sterile urban environments. This second nature is precipitating a fight back from the first nature: 'The contemporary city, born and created by inorganic forces of processed consumerism and capitalism, engenders a third nature.' (Bharne 2000–2001 p.25).

Cities are not wilderness. Wildlife corridors are not 'natural'; but non-human species already live in our urban constructs, mostly without special consideration for their requirements. Ward observes that '. . . changes in rural life, especially in agriculture, have resulted in the paradox that . . . wild creatures can often best be studied in the cities.' (Ward 1989 p.98).

In an ecological city program there needs to be an interactive relationship with nature derived from a perception of humans as part of the ecosystem in which for any organism to survive, all organisms must thrive. Humans need the birds and the bees for practical purposes. The bottom line is survival, not sentiment.

Ecological systems employ a range of transport methods to carry seed, biological material, information and other resources. Animals are like vehicles plying the ecological highways. Water is carried through the plumbing of living organisms, trees, roots and soil. Information is transferred through DNA and other sophisticated mechanisms which require a degree of proximity. And in both country and city the demands of ecological systems remain the same.

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[11] 3http://www.sustainablebusiness.com/index.cfm/go/news.printerfriendlyfeature/id/1529 (accessed 18 February 2008).

> Urban wild habitat is a place for untamed animals to live within and around the metropolis. It includes parks, marshes, lagoons, estuaries and creeks . . . it can also include less obvious homes, such as peregrine falcon nests on the ledges of high-rise buildings. It requires not only physical room for animals to live and roam but also freedom from harassment and enough territory to support the rest of the food chain that the animals depend on
>
> (Berg et al. 1989 p.46–47)

Ecological Corridors

The importance of wildlife in cities has become more widely recognised in recent years perhaps as a consequence of the increasing ubiquity of urban environments.[12] The pressures on 'wild' habitat clearly contribute to awareness of the diminishing space for wild things and their increasing need to invade human occupied space.

> Urban habitats sometimes conjure up images of disused canals filled with old prams and shopping trolleys, or derelict building plots . . . However, an amazing range of habitats with their associated plants and animals are found in towns, cities and areas of urbanisation on the urban fringe
>
> (Wheater 1999 p.1)

According to Wheater 'Some habitat patches behave like islands surrounded by a sea of unsuitable or less suitable habitats' where, in accordance with MacArthur and Wilson's theory of island biogeography 'larger islands . . . recruit more species and have lower extinction rates than smaller islands.' (Wheater 1999 p.10) Increasing fragmentation of island habitats by urban developments increases the isolation of populations and hinders movement between patches. Thus larger islands, or patches, are to be preferred in the creation of viable non-human habitats in urban contexts. Nevertheless 'Small areas should not be dismissed as lacking wildlife values, especially if they add to the overall habitat diversity of the area. They can even override the species/area effect if several small sites contain more species than one large site of equivalent area.' (Wheater 1999 p.11).

This supports the ecological corridor basis of planning that has been part of the Ecopolis theoretical position since 1989. It was integral to the conceptual design of the HEP and the planning of the Whyalla core site (see Site Planning Analyses in Chapter 7). I have used it in Ecopolis design studies for other projects including a proposed development in Queensland. It is a theme picked up in the Whitmore Square EcoCity Project where the overall vision is one of developments that each contain islands of green – deliberate habitat creation. In the Ecopolis strategy, each island or patch would be enhanced in its effectiveness as habitat whenever another patch, or patches, were established close by, leading in time to a patchwork quilt of urban habitats that effectively linked into ecological corridors through the urban fabric. This is not simply a reiteration of the idea of creating linear parks as

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[12] One might speculate that this is also because of an increasing awareness of environmental issues generally.

Figure 58: Part of a concept plan for a 10,000 population 'new town' for Hall Construction Pty Ltd by Ecopolis Architects that was based on ecological corridor planning and walkable city principles. (*Ecopolis Architects 1995*)

wildlife corridors (Lewis suggests parks and parkways, street corridors, boulevards, parkways, bicycle trails and walking trails as urban corridors (Lewis 1996 p.85) and Hough points to canals and railway rights of way as 'potential biological links through the city to the surrounding countryside.' (Hough 1995 p.145) This is proposing that every urban development can contribute to the piece-by-piece creation of increasing biodiversity. In effect, the whole of the habitats would be greater than their sum.

Ecological webs or networks must form the basis of all land-use planning, with urbanisation subsumed in that web, if only because, as Michael E. Soule notes:

> Wildlife corridors can be viewed as a kind of landscape health insurance policy – they maximize the chances that biological connectivity will persist, despite changing political and economic conditions
>
> (Soule 1991)

Wildlife corridors may fully incorporate built form and artificial structures.

> Some of the harshest urban habitats are constructions of brick, concrete and stone which, at best, provide analogues of cliffs and bare rock. They are inhospitable, often deficient in moisture, nutrients and shelter, and yet may be rich in both plants and animals
>
> (Wheater 1999 p.51)

Citing Darlington, Wheater tells us that there is an estimated one hectare of vertical wall surface for every 10 hectares of urban habitat (Wheater 1999 p.51) It is possible to imagine an approach to architecture and urban design that encouraged vegetation to gain a foothold on buildings and accrete organic material over time, designed to erode in such a way as to increasingly support plant life and allow a progressively more diverse natural community to develop. Derelict structures are quickly colonised and the lifespan of a city as a human habitat is surprisingly short without constant maintenance of conditions favourable to human use. There is a design challenge in the idea that cities could be made in such a way as to facilitate the accreting, evolving creation of non-human habitat whilst sustaining human comfort conditions and simultaneously reducing maintenance demands and costs.

Citing Laurie, Hough notes that ‘While urbanization reduces the amount of vegetation, it has been shown that in European cities there is a comparatively high number of species present compared to the surrounding agricultural countryside’ (Hough 1995 p.105)

> Urban forestry, an increasingly well understood concept in Britain, Europe and North America, involves the transfer of ecologically sound forest management practice from the rural to the urban setting. Its objectives are based on the premise that forests, existing or introduced into cities, function to create low-cost and self-sustaining landscapes
>
> (Hough 1995 p.114)

Cities may support forests that not only provide recreation amenity but are productive. 2,200 hectares, nearly a quarter of the urban area of Zurich, population 500,000, is mixed forest and common land park space that has been maintained for many years ‘on an integrated management basis, providing timber, recreation and athletic facilities, wildlife, agriculture, visual amenity and education.’ (Hough 1995 p.126). The initial plantings of the urban forest in ‘Park 23’ of the Western Parklands in Adelaide were a result of collaboration between one of the councillors and Chérie Hoyle of UEA, demonstrating UEA’s active role in promoting urban non-human species habitat initiatives in association with local government.

Ecological corridors will assume ever-increasing importance as a means of providing some resilience to restoration ecology works as the climate continues to

change, and the dynamic stability of the living landscape is threatened by rapidly changing conditions. It is only by establishing processes of urbanisation that include land restoration that we can hope to see a way through this period of atmospheric turbulence that is already gaining speed.

Urban Wildlife

Whiston Spirn sees mutual benefit arising from paying attention to wildlife in city design. Purposefully designed wildlife habitat has the potential to increase the abundance and diversity of species that humans find desirable for aesthetic reasons and may also contribute to controlling pest species. Spirn notes that this need not mean great economic expense and points out that:

> The design and use of an area for wildlife habitat is compatible with many other urban function like flood control and sewage treatment, climate modification and air quality management, erosion prevention, forestry, and recreation.'
>
> (Spirn 1984 p.226)

And she insists that the opportunities for developing wildlife habitat in cities is much greater than commonly recognised (Spirn 1984).

> Animals cannot tell whether or not they have just crossed the line between a national park and the 'no-animals' land called suburbia. What they can know, however, is whether or not an area can provide them with the three ingredients for local survival – food (and water), shelter and a nesting site
>
> (Pastorelli 1990 p.15)

Suburbs can make accommodation of wildlife easier, or at least it make it relatively easy to provide for some selected species with concepts like 'Animalscaping' (Pastorelli 1990 p.11–16). A number of authors and organisations have identified the value of urban wildlife including Taronga Zoo who published a practical and inspiring guide to the care of Australian urban wildlife which includes advice on creating appropriate habitats (Walraven 1990).[13] Thirty five years ago, Gill and Bonnett's 'Nature in the Urban Landscape' included chapters on 'Planning for Wildlife in the City' and 'Management of Wildlife Habitat' (1973).

Barriers to Wildlife in the City

Where people have made sustained efforts to introduce wildlife into existing cities and integrate nature conservation with city living they have found a number of impediments to implementation. 'Some of the most difficult obstacles to overcome include problems with funding; competition for land; how nature is perceived by

[13] And a poem about a galah being splatted by a bus!

different groups in society; confusion about terminology or in explaining what urban ecology is; and other priorities which take precedence over access to wildlife[14], (Johnston 1990 p.239). Historically, such 'barriers' have been the basis of development.

> One of the lesser-known statutes of the French Revolution was the formal abolition of all marshes . . . *two centuries later* . . . these habitats were still being polluted and destroyed
>
> (Purseglove 1991)

The challenge is to redefine and re-understand potential barriers from being problems to being potential opportunities for integrating human and non-human habitat requirements. Wetlands were once seen as impediments to human progress and city-making. Now they are being constructed as part of urban water management systems and are understood to be important habitats for non-human species that can co-exist with humans. Forests, for instance, can act as 'living filters' for urban sewage (Sopper 1990). The Netherlands existed as a largely unpopulated area of tidal land until its reclamation and transformation that began in the Middle Ages (Deelstra 1990 p.83–84). Its entire modern landscape can be attributed to human intervention in natural processes. Even in this highly artificial context urban environments can be reconfigured to create productive landscapes and 'urban forests are now . . . viewed as a means to reinforce the ecological infrastructure of the country.' (Deelstra 1990 p.88) In designing for the sustenance of non-human species, it seems that biogeographical studies again indicate that ecological webs or networks should form the basis of all land-use planning, with urbanisation subsumed in that web, if only because, as Soule notes:

> Wildlife corridors can be viewed as a kind of landscape health insurance policy – they maximize the chances that biological connectivity will persist, despite changing political and economic conditions
>
> (Soule 1991)

The implications of this approach for design strategies are profound. The shape of city it implies is quite different from the pancake city of urban sprawl. Instead of islands of parkland and greenery scattered in a sea of urbanism, the consequence of combining biogeographical precepts with an understanding of the nature of the city as a place of human exchange results in a plan of clustered, dense centres set in a living landscape.

> An essential ingredient in the rehabilitation of degraded landscapes, and a sign that the project is successful, is the return of native fauna to a new and viable habitat
>
> (Buchanan 1989)

The pursuit of complementarity between ecological (wild) and human (civilised) land-use suggests that existing transport corridors should also be ecological corridors

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[14] 'An application to develop much-needed public housing on an area valuable to wildlife illustrates how difficult it may be to decide political priorities: which is the more important land use?' (Johnston 1990 p.241)

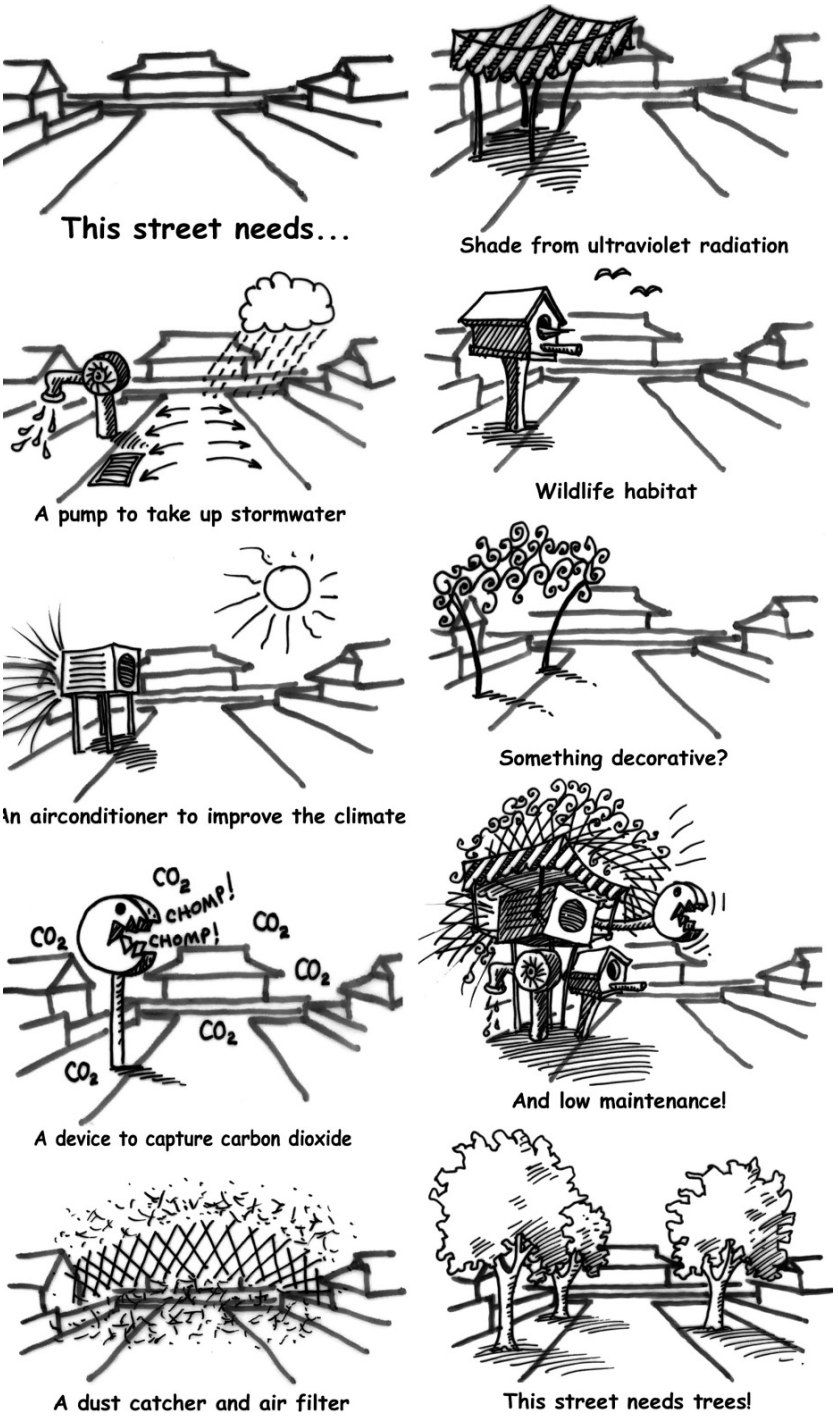


Figure 59: The many contributions made by trees

to create a network which services the needs of both human artifice and natural order. Rehabilitation of degraded land has to be a primary goal of ecological city making and the success of an ecocity depends on much more than the energy efficiency of its built form. Ways are needed to measure this. Indicators have been developed by a number of cities and institutions to address this idea. Frogs have been identified as particularly sensitive environmental indicators, not least because they live in, and are exposed to the vicissitudes of fortune of the realms of land, water and air. If the frogs return to a place after its restoration, it may be regarded as a fair measure of the success of a project. The 'Frogstick' in Chapter 11 offers a yardstick to assess human settlements with an emphasis on their ecological performance.

A healthy habitat means a healthy ecosystem – the primary goal of any ecocity. As a general rule healthy water and healthy ecologies depend on healthy vegetation, which is powered by the sun through photosynthesis. Whilst direct measurement of the extent of photosynthesis in an urban environment may be an intriguing option for assessing ecosystem health it does not adequately relate plant-captured energy to broader ecological activities; a relatively sterile hydroponic supported vegetative mass could read well on a photosynthetic scale, for instance, but fail to support any life form other than its gardeners and incidental, generally unwanted microfauna.

> Pollution, the spread of noxious species, dereliction and the need for reclamation, restoration, habitat protection and species conservation are all important in urban environments. However, there area also many opportunities for wildlife in novel artificial habitats or by the creation of new habitats
>
> (Wheater 1999 p.80)

Edge Effects

> Where two communities or land uses meet, they form an edge that can appear abrupt. However, the effects of adjacent communities can penetrate into each other, often deeply
>
> (Russo and Young 1997 p.171)

Just as conventional urbanism is informed by design guidelines derived from an understanding of socio-cultural requirements to accommodate the various aesthetic, economic and legal issues that are part of the human ecology, so, as part of a framework for making ecological cities, there is a need for design guidelines for non-human species. How such guidelines might be developed and the consequences of their application may be explored by using the ecological corridor/edge effect precepts drawn from biogeographical analysis. Consideration of the 'edge effect' can influence the resulting form of habitat-sensitive urban development in surprising ways.

Conventional design thinking is almost entirely based on aesthetic concerns. Many architects, planners and designers happily support the notion that development should respect the environment. Given a relatively untouched landscape and asked to design sensitively in response to that landscape, the most predictable, aesthetically-driven approach would be to scatter the proposed development across

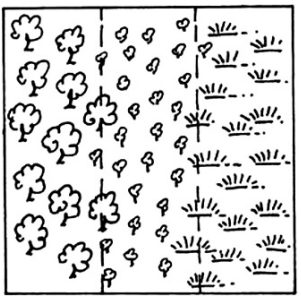


Figure 60: Ecotones and Edge Effects

Living system boundaries are not simple lines through the landscape, they constitute significant zones in themselves. The 'edge' is a place of transition which varies in extent according to the type of ecosystem it is associated with. These edge zones may be ecotones, where two vegetation associations join. There is an 'edge effect' when, instead of mutually evolved associations there is a boundary created by intrusion, e.g. when a housing development is set in cleared woodland

the landscape in order to diminish its visual impact. At the scale of small to medium sized developments, however, this results in a chopped up landscape with reduced ecological connectivity. A design that respects ecosystem function through minimisation of the edge effect *looks* less obviously organic but works better ecologically. Interestingly, it also turns out to be more efficient in terms of infrastructure deployment. When natural habitat is also recognised for its value as natural infrastructure, the difference between the two development forms in terms of ecological performance is pronounced.

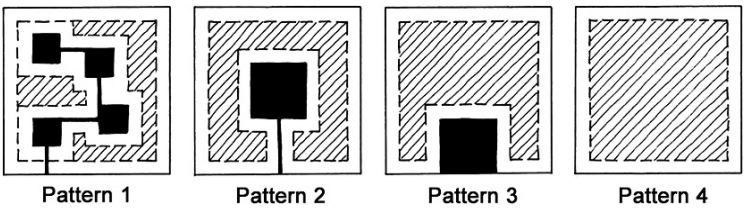
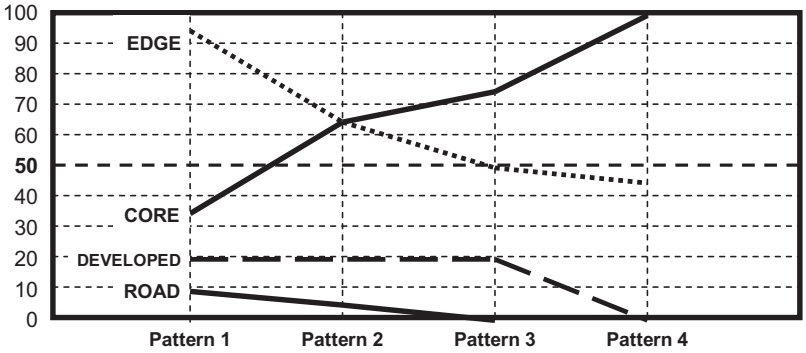


Figure 61: Diagrammatic comparison of development patterns in relation to environmental impact measured by ecosystem edge effects and maintenance of core natural areas

Pattern 1 shows a visually beguiling configuration in which developed areas are distributed and visually buffered by the natural landscape. This has a much greater functional ecological impact than the less visually imaginative Patterns 2 and 3.

Based on this kind of analysis, eco-villages such as Crystal Waters Permaculture Village – which adopt similar distributed/buffered site planning configurations – do not necessarily demonstrate landuse patterns most compatible with the preservation of ecosystem integrity and biodiversity. The graph and table below quantify the difference.

Table 14: Graphical and tabular comparison of development options



CORE	34	62	76	100
EDGE	94	66	52	44
DEVELOPED	16	16	16	0
ROAD	9	4	0	0

8.5 *Restore Degraded Land*[15] – Adaptive and Regenerative Urbanism

> Community can grow, embedded in restoration endeavor, galvanized by wilderness preservation struggles, fostered by concerted human action in service of the health of the land.
>
> (Mills 1995 p.27)

It is more appropriate to think in terms of 'adaptive' rather than 'sustainable' cities. Adaptation implies the capacity to achieve fitness for purpose, a capacity to evolve. For a city to be ecologically viable it must by necessity be adaptive. Adaptation can only arise if the conscious ecology of the city is sufficiently informed to know when adaptive action is necessary, and it requires that the population have effective means of initiating and maintaining that action.

Food Security

Typical adaptive responses would be to do with food production, maintenance of water supply, protection of sources for materials, energy conservation and capture, and macro-environmental adaptation to changing physical conditions, e.g. climate change.[16] As long ago as 2000, the IPCC Third Assessment Report released for

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[15] Ecopolis Development Principle 1.

[16] Climate change may itself bring on other changes in the physical environment, e.g. The loss of stability in certain slopes as sub-surface hydrological regimes are affected by increased rainfall or patterns of rainfall. Extreme examples of this kind of hazard are already evident with such 'natural' disasters as the catastrophic flooding in Central America in 1999.

comment early that year could be seen to support the idea that human settlements will be effected by climate change, set against a very dynamic background of other environmental and socioeconomic factors, and also that human settlements might be expected to be among the sectors most easily adapted to climate change given appropriate planning and foresight. There would seem to be a growing consensus that efforts made to reduce the impact of human settlements on the environment by pursuing ideas of sustainable communities hold the potential to reduce the vulnerability of settlements to global warming. But the most resilient settlement patterns would of necessity be generated by adaptive communities.

On the one hand, we seek to increase biodiversity or wildness, on the other hand, we aim to increase social interaction or civilisation. This apparent contradiction is resolved by the dynamic action of ecosystem function in which the human presence is integral to the whole environment and is understood to be contained within the same parameters as all other species (see Figure 62).

> Barn raisings made people feel good a century ago. Restorationists' salmon release and prairie burning provide new satisfaction today. Who knows what restorations of joy there might be a century hence?
>
> (Mills 1995 p.27)

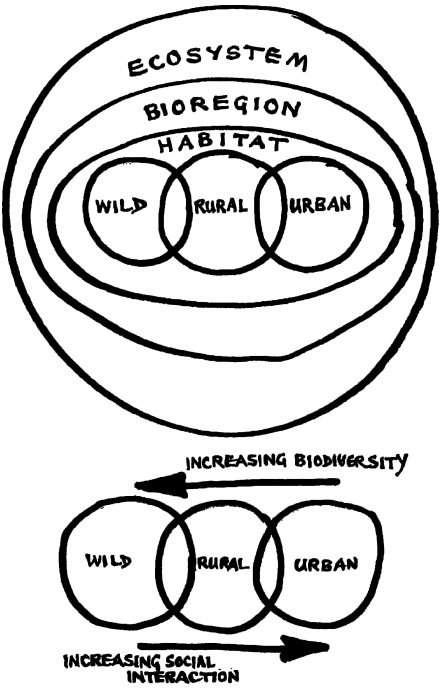

Figure 62: Human society is integral to the whole environment and exists within the same bio-geo-chemical physical parameters as all other species

Equity Corridors

If ecological corridors are a prerequisite for all land use planning, then the imperative for increasing social interaction may demand 'equity corridors' as a basis for city design[17].

There are issues of equity and biophilia in the idea that cities should be designed for people *and* nature. In Britain, 'The greening of the cities, in thousands of little local projects, is a genuinely popular movement.' (Ward 1989 p.101) Yet the love of greenery and natural landscapes and related experiences tends to be seen as a white middle class preoccupation by professional and politicians, whereas there is strong evidence that it is anything but (Ward 1989). Surveys by geographers at the University College of London showed that residents in inner-city areas of different classes and racial backgrounds all 'gained pleasure from the natural world' (Harrison and Burgess quoted by Ward 1989). The researchers found that green areas, even small, scrubby bits, and especially 'wild' bits, were highly valued as places that gave pleasure and provided places for children to have adventures, experience the beginnings of independence and discover the natural world. All in all, despite problems of management associated with open space in the inner-city (to do with racial abuse, sexual and physical harassment, vandalism and drug abuse) green spaces were seen in an overwhelmingly positive light, leading the researchers to refer to them as 'gateways to a better world.' (Ward 1989).

Human impact on the natural environment is profound whether or not it is conscious. Whitleock showed that although South Australia still has only a million and a half people, it took less than 200 years of European occupation for a massive area of land to be reshaped. 'Where the grain grows over the grave of the mallee' an ecosystem larger than England has been obliterated to make room for unsustainable agriculture. (Whitelock 1985) Over the rest of the state pastoralism has unleashed hoofed creatures in an environment in which their alien hoofs are destroying the soil. Until the release of the Calicivirus rabbits killed a billion seedlings every year preventing natural regeneration of the land. Numerous animals and plant species have become extinct. Conservation has come along too late to save them. The story of urbanising civilisation worldwide is encapsulated in the story of South Australia.

Wheater's earlier observations typify and underscore the growing understanding of a need to integrate nature into urban systems. Parks and greenbelts are as old as urban history and their functions have been seen in organic or biological terms at least since the French Revolution. The concept of biophilia is now extending that understanding so that the deeper levels of functionality in the human organism are being seen as so inter-related to evolutionary experience of nature that continued connectivity is regarded as essential to our long-term health. Any requirement for maintaining urban space for purposes other than building needs to be fully ensconced in the framework of civic understanding and management.

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[17] I first mooted the idea of equity corridors in a keynote presentation to the First International Ecological City Conference in Berkeley, 1990 (Canfield 1990 p.19).

Property values are generally higher near green areas in cities (this is one of the arguments advanced in favour of the biophilia hypothesis) and so there is an intrinsic imperative to maintain the areas in order to maintain those values. At the same time the lure of greenfield development sites is so strong that there are always putative developers ready to build on green belts and parklands. It also seems apparent that without an informed awareness of the larger context, then the perceived pressures on urban space are exacerbated when open space resides adjacent to densely built-up areas.

These imperatives, lures and pressures are strong in Adelaide where the existence of a largely intact green belt stands as a testament to both the relative weakness of the economy and the strength of the civic community. Both the Halifax EcoCity Project and Christie Walk were planned with the value of the nearby parkland green belt firmly in mind. The southern parklands are within just two city blocks of both sites, and both are within a short distance of one or another of the city's inner squares of parkland, all well inside a distance that enables urban dwellers to access the green areas with relative ease. Wheater reports that even large areas of urban parkland, at least in the UK experience, 'rarely recruit visitors from more than 1 km away' and that Harrison et al. recommend that there be at least 2 hectares of greenspace within half a kilometre of any home (Harrison 1999 p.108).

Productive Landscapes

The idea of including productive landscapes within the framework of urbanism has been popularised in recent years through the growing Permaculture movement which stresses that successful food production is best achieved by creating a mixed environment of both animal and plant species. There was a surge of interest in localised (and therefore of necessity, urban, or peri-urban) food production in 'western' democracies when environmentalism was boosted by the 'oil crisis' in the early 1970s evidenced by publications like 'Agriculture in the City' (El Mirasol 1976). Sir Albert Howard wrote about 'Nature's agriculture' in which 'Mixed farming is the rule: plants are always found with animals; many species of plants and animals all live together . . . mixed crops and mixed farming are the rule.' (quoted in El Mirasol 1976) Ted Trainer's vision (Trainer 1996 p.149) for transforming Australian cities sees them evolving from suburban street and lawn monocultures to places filled with vegetable gardens, and productive landscapes. In many ways these visions recreate the environment of small-scale, localised food production that has long been part of pre-industrial cultures.

City Farms

Ward tells us the city farm movement has spread 'not through any official body but from local enthusiasm, to every city in Britain.' There has also been a parallel

surge of interest in community gardens (an example of which is included in the Christie Walk development and a community garden occupies a central space in the Whyalla EcoCity Core Site proposal). Community gardens, historically known as 'allotments' in Britain, have been part of the urban scene for two centuries and Ward reports that the waiting list for obtaining an allotment in England and Wales went up by 1,600 per cent in 1979. (Ward 1989 p.100). Allotments embody ancient beliefs that every family has a right of access to land for food production and in Britain community action resulted in the creation of new community gardens of various sizes and descriptions (Ward 1989 p.100).

Green Roofs and Walls: Architecture, Habitat and Food

The integration of vegetation with built form can deliver many benefits, particularly in dense urban environments. Ecologically viable human settlement needs to achieve high, rather than low levels of density and must simultaneously contain and be integrated with substantial and effective vegetated landscapes. Instead of trees and decorative plantings in plazas, set away from buildings, vegetated cover needs to be close enough to buildings to generate microclimates that effect the buildings and their internal and external spaces and should also be part of the building envelopes[18]. Example of this approach can be found in many green roof and wall installations.

Green roofs and walls represent constructed ecosystems in microcosm and feature in many eco/green/sustainable city visions from Register's evocative sketches, which are distinguished by their depiction of riotous rooftop plantings, to the compendium of proposals in Chris Johnson's proposals for Sydney in which he put forward 'Eight ways to green cities' from the metropolitan scale to the individual house (Johnson 2004).

Green roofs are particularly effective in denser, more urban environments, where they can compensate for the loss of productive landscape at ground level and they can look like anything from a lawn to a forest. There are obvious aesthetic reasons for favouring abundant greenery as an iconic component of green buildings, but there are also a number of pragmatic and functional purposes to the substantial inclusion of rooftop greening in ecocity design. The reported benefits of rooftop greening include:

- improvements in human comfort levels and general air quality;
- reduction in greenhouse emissions;
- energy savings in heating and cooling through roof insulation;
- rooftop capture and productive use of stormwater;
- increased habitat for native plants and birds;
- job opportunities in plant production, design and construction;

[18] The most complete realisation of this approach might see the buildings or parts of the buildings themselves being literally grown in place.

- opportunities for urban food production, and
- access to private outdoor open space at home or at work[19].

Other established benefits of green roofs include:

- longer roof lifespan;
- improved sound insulation;
- reduced heating and cooling requirements;
- reduced stormwater run-off;
- trapping of gaseous and particulant pollutants;
- alleviation of urban heat islands;
- increased biodiversity.[20]

Many of these benefits also apply to green walls.

According to Monica Kuhn, rooftops are a city's 'greatest untapped resource' with limitless possibilities for urban greening, air cleaning, community building, and food production. Some of the advantages of rooftop greening she identifies include being able to:

- grow vegetables;
- increase urban food production;
- make your city beautiful;
- grow flowers, attract butterflies and 'Give the people next door a better view';
- increase public and private open space;
- create safe, private, outdoor spaces in the heart of the city;
- 'meet your neighbors 10 storeys above the street!'

Green roofs are sometimes referred to as the fifth façade. There are two kinds: 'intensive' and 'extensive', each appropriate for different purposes. The intensive roof is heavier, supports more substantial vegetation and is more expensive than extensive roofs that may be light enough to be retrofitted to existing buildings without the need for a structural upgrade. Green walls may be inside or outside of a building and are like vertical gardens. In their more elaborate form as living walls they may incorporate water elements including ponds and fish. They may also be incorporated into the cooling strategy of a building, as a kind of evaporative air conditioner, and can be designed into water treatment systems. Vegetation in urban areas filters out fine airborne particles which then wash off into the soil and foliage can absorb gaseous pollutants so it can be reasonably assumed that green roofs provide the same services. Studies have shown that green roofs can trap up to 95% of heavy metals in the local atmosphere.

There would seem to be great potential for food production on green roofs. This is being actively investigated in many countries including Australia where research

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[19] Research into these reported benefits was being undertaken by student researchers from the RMIT and Monash, Melbourne and Deakin Universities from mid 1998 onwards.

[20] Downton, Paul F. 'Green Roofs and Walls' in Your Home Technical Manual (ed. Downton) 2008 p.176.

led by Central Queensland University (CQU) includes using urban organic wastes via vermiculture for production of vegetables and development of urban rooftop 'microfarms'. Ford's truck factory in Dearborn, Michigan uses a four hectare green roof that helps to manage stormwater run-off and also supports a bee farm. The heat island effect is reduced by green roofs. Researchers at the Welsh School of Architecture recently concluded that green roofs and walls can cool the local climate around a building in a city by between 3.6 and 11.3°C and the hotter the climate, the greater the cooling effect. By lowering ambient roof temperatures, green roofs enable solar panels mounted over them to operate more efficiently, with energy outputs up to 15% more than from panels on asphalt or gravel covered roofs.

Green roofs are an accepted part of modern building in Europe where some city and even national governments have mandated their use. Linz, in Austria requires green roofs on all new residential and commercial buildings with rooftops larger than 100 sq.m., and German green roof building has been encouraged by the Federal Nature Protection Act, the Building Code and state-level nature protection statutes. A green roof movement has begun to gather momentum all around the world.

Christie Walk features an intensive green roof that replaces lost local vegetation and provides a much appreciated community amenity. Ecopolis objectives supported by green roofs and walls include stormwater management, climate change mitigation and adaptation, and conservation and enhancement of biodiversity by creating habitat that attracts wildlife including rare or migratory birds. Perhaps most importantly, green roofs and walls can be used to extend ecological corridors across and through our cities as part of maintaining the ecolinks of Frogstick 9 and the Lifelining in the landscape of SHED 4 (see Chapter 11).

8.6 Create Compact Cities[21]

> This is the first generation that has lived with both the achievement of affluence as a constant force in life, and the problem of what to do with it . . . . And it has no model from the generation that brought it into being, since the willful innocence of the suburbs does not seem to be a satisfying way to sustain a social life, seems in fact to be a voluntary servitude to unruffled ease
>
> (Sennett 1974 p.8)

Density and Disorder

Humans cooperate and live in groups in order to survive. They are not solitary creatures. Anything that can replicate or augment the capacities of collective action assists the organism's survival and potential to thrive. Our machines do this, our

[21] Ecopolis Development Principle 4.

buildings do this. The ecological city must contain and support internal diversity to maintain social health and sustain the evolution of civilisation.

Tielhardt de Chardin's ideas on evolution profoundly influenced Soleri, one of the most radical ecocity theorists. Soleri supposes a high density of population as almost a precondition of human evolution towards a spiritual end point. Developed countries have experienced huge levels of wealth creation and phenomenal production of goods; although their distribution has been less than equitable, the reality is that millions of people have lived in, and continue to live in, an environment without scarcity. On a more material, social and political level than Soleri, Sennett sees human diversity as a prerequisite for successful urbanism in a post-scarcity world. Just as Bookchin sees post-scarcity as a positive condition, liberating humanity from drudgery, so Sennett's 'Uses of Disorder' starts with the premise that 'communities of abundance open up new possibilities in men (sic) for self-imposed tyranny as well as for freedom.' and he suggest that 'To understand the community of people freed from scarcity requires a sounding of the darker desires of men, desires for safe and secure slavery that people bring into their social relations . . . which most men (sic) would be loathe to admit to themselves . . . ' (Sennett 1974 p.11). His thesis is that only by probing and confronting these feelings can people break through the historical patterns of self imposed slavery to achieve '. . . an adulthood whose freedom lies in its acceptance of disorder and painful dislocation' – the realisation of which '. . . depends on a structure of experience that can only take place in a dense, uncontrollable human settlement – in other words, in a city.' (Sennett 1974

Figure 63: DenseCity project for 10,000 people in Stoneyfell Quarry above Adelaide. Site 500 metres × 500 metres. Studio program by Paul F Downton. Design by Daryl Talbot

p. 11). He concludes his introduction with the proposition that '. . . it is in the building of purposely diverse cities that society can provide men (sic) the experience of breaking from self-slavery to freedom as adults.' (Sennett 1974 p. 12)

Sennett's call for dense cities as the means to encourage socially creative and responsible behaviour evokes Paolo Soleri's pleas for extreme urban densities as a virtual prerequisite for less violence. In his brief chapter 'Violence and the Urban Effect' (in a book of extremely brief chapters), Soleri maintains that

> . . . any eventful environ (a village for instance) is accompanied by some violence. An environ 10 times more eventful (a city for instance) should reasonably carry 10 times more violence. **The astonishing thing is that this is not so**. The fact is that, on average, the urban effect is **benevolent** (Soleri's emphases)
>
> (Soleri 1987 p. 93)

The city has long had its champions, and from diverse places and times. Apart from reducing violence (Soleri 1987), providing the creative chaos of diversity to encourage adult responsibility (Sennett 1974), and making safer places for children through the provision of passive surveillance (Jacobs 1962), cities have liberated women (Uitz 1994). Harley Sherlock states his case very completely in 'Cities Are Good For Us – The case for close-knit communities, local shops and public transport' and quotes approvingly from Aristotle's 'Politics' – 'Men came together in cities in order to live. They remain together in order to live the good life.' (Sherlock 1991 p.13).

There appears to be convergence on the view that one of the most energy and resource efficient building forms is 2–4 storey terrace housing and that: 'safe and largely traffic-free streets, parks, formal and informal education facilities for all ages, arts and cultural venues and healthcare facilities . . . can only be provided efficiently in the compact city form.' (McLaren et al. p.127).[22]

Compact, Ecological or Green?

Compact city theory draws from the same well of ideas as the burgeoning theoretical constructs of the 'green', 'sustainable' and 'eco' city. Related ideas range from the 'arcological' visions of Soleri and American 'design outlaws' like Fisk, to Europeans (especially in Denmark) and the Australian transport researchers Newman and Kenworthy (Soleri 1987; Zelov and Cousineau 1997; Newman, Kenworthy and Lyons 1990). Some models of the ecological city stress energy, some traffic, and some the development of healthy communities (Koskiaho 1994). The nesting of ideas varies so that 'green cities' may or may not include being compact

[22] 'Dissidents' include Patrick Troy, who has employed the debate on sustainability to present ingenuous arguments for maintaining low-rise suburban development as the norm for Australia, see for instance 'Rethinking Our Cities' in which he suggests that increased urban density is achievable only at the expense of 'sustainability objectives' (Troy 2001 p.8).

and compact cities may or may not be 'green'. Superficial theorists typically bring together a selection of characteristics to illustrate their preferred model of what a compact city is supposed to encompass. UK architect Richard Rogers, for instance, employs 'ecological city' and 'compact city' as subsets of an overall definition of a 'sustainable city' (Rogers 1997)[23].

The corollary of the compact city is decentralisation and urban self-government. As a living system a ecological city requires responsive governance related to the ecology of its bioregion.

Bulkeley and Betsill posit that '(the) emphasis on decentralization and the need to establish self-governing local communities in order to address environmental problems stems from three related arguments . . . The first is a rejection of state organisations, in part a reflection of the links between some aspects of green politics and thought and the anarchist movement . . . The second argument is founded on the belief that systems of governance should relate to ecosystems in their form and extent . . . The third argument . . . regards it as a necessity in order to establish the kind of direct democracy and participation which can resolve environmental problems.' They note that 'unsurprisingly, such utopian ideals have come in for a good deal of criticism . . . and . . . they are seen as naïve . . . ' (Bulkeley and Betsill 2003 p.19)

Ecopolis embraces these kinds of green, decentralist, self-government ideals that can be seen as 'naïve' but this is for a number of reasons that are not simply ideological conceits or garments of political convenience. In the concept of Ecopolis, ideas of direct democracy are bound up in the practicalities of communication and the established effectiveness of cybernetics. Community based action towards self-government has been tested as a means of achieving preliminary ecopolitan goals through projects such as Christie Walk. The science of cybernetics has demonstrated the importance of effective information systems based on networks rather than command-based hierarchies and the experience of the military tells us that decentralisation and autonomy are essential organisational forms for providing resilience and redundancy when dealing with unpredictable circumstances such as those encountered on the battlefield.

The compact city is emphatically not about squashing existing cities to make them fit preconceived notions of a proper size. There is no intrinsic value in merely being 'small'. 'For if 'small is beautiful', the whale is ugly and the mouse is beautiful . . . . Gigantism is the problem, not size as such.' (Soleri 1987 p.29). In Australia 'urban consolidation' is used to scare suburbanites away from what could be more space-conserving, efficient and convivial built form. In cities grown dysfunctionally large, their problems and prospects are a consequence of a number of inter-related factors. As Knowles points out in respect of architecture 'The right size, and notably the right size of building, is relative.' (Knowles 1996 p.135). His studies in Los

[23] The politically consummate Rogers is undoubtedly alert to the preferred terminology in the mainstream of political discourse where, particularly through UN usage, 'sustainable' has an established currency.

Angeles conclude that the best density of building is in a size range that is neither too great nor too small and one might conclude that the same applies to cities – neither too big, nor too small, but just right... Although we lack the evidence to discern that 'correct' size, and the scale of response has to be specific to place and circumstance to allow for a range of scale of responses from the neighbourhood to the region, there is little or no evidence that sprawling, low density urban morphologies can be justified in terms of energy, resource use or social functionality.

Compact human settlement is of particular interest because it is in such places that human culture has developed at an extraordinarily rapid pace. Once these settlements started to appear they became more and more common, a testament to their effectiveness at providing habitat which favoured the human organism. Evolving rapidly into cities, these settlements became places in which many individuals could escape the demands of chasing food and wandering around the countryside, enabling them to spend time doing what appears to be special to humans – which is thinking. In compact communities of this kind, more and more individuals had the opportunity to communicate and exchange ideas with each other. Communication was greatly enhanced and the exchange of knowledge and information was facilitated. Cities have been essential to the development of the kind of information-rich, rapidly changing culture that we now take for granted. And just as we arrive at the threshold of a situation in which we are threatening to completely undermine the conditions which support our existence, we desperately need an information-rich, rapidly responsive culture to deal with it.

The Killer Sprawl of Urbanoclasm

> Worse yet is the life negation constructed by suburbia, the ultra-segregation habitat. The social and cultural costs are indeed rebounding everywhere and on everyone
>
> (Soleri 1987 p.30)

Soleri identified the city as the key place for advancing the cultures of human society towards a specific goal. His focus was on the spiritual aspects of human striving, but his argument would seem to hold in any case, as it is fundamentally a recognition of the role of the city in providing a crucible for culture, a place in which lines of communication are short and effective, in which individual humans are supported by the collective and do not have to spend their time in survival mode wondering constantly where the next meal might come from. The suburbs are materially inefficient, with long distance between all the functions of daily life necessitating massive energy expenditure to do the simplest things, and they are socially debilitating for the same reason. Advocates of the compact city see this clearly enough, as did Soleri; urban sprawl is an evolutionary dead-end.

Sprawl kills in more ways than one. Spread out, pancake-shaped cities consume the landscape, ousting and destroying patterns of living material in places that had evolved over millennia. The manufacture of the built environment consumes even more landscape, sucking resources and energy from locations often half a world

away. The millions of tons of personal transport devices on which sprawl depends consume phenomenal amounts of extracted minerals in their making, then quickly burn up millions of years of geologic accumulation as they spew toxins into the atmosphere, release ancient captured carbon, and power the deadly process of climate change. Each poisonous missile, guided by the wavering consciousness of a stressed-out commuter, harassed parent or perception-altered adolescent, is a potential lethal weapon with a collective body count over every year that exceeds the total of every war on the planet. According to the UK charity 'RoadPeace', every year there are over 1 million road deaths and over 10 million people are permanently disabled, and every single day over 3,000 people die on the world's roads – equivalent to a daily 9/11 tragedy[24].

We tend towards cultural relativism when looking at other people's customs; we are astonished that the customs of some ancient civilisations included annual sacrifices of healthy young people to appease a particular god or gods. Imagine that you were a transport planner, or a designer of cities. If you were to ask the average American if they would be prepared to sacrifice ten healthy teenagers every day, at random, for the sake of running a transport system, your sanity would be called into question. If you were to go further and suggest that the random sacrifice should include anyone from young babies to senior citizens and that no-one would be exempt from inclusion in the sacrificial lottery, any credibility you might have had as a planner would evaporate. Looked at dispassionately, our present approaches to urban planning are being delivered on precisely this basis of random sacrifice. Sprawling cities and the automobile culture go hand-in-hand, they are integral to each other. Powering the millions of transport missiles with solar electricity instead of petroleum would reduce much of the at-a-distance impact of the system, but would do nothing to reduce its dependence on the bloody human sacrifice of the roads[25].

Register calls sprawl 'the 800 pound gorilla', sitting in the corner of the room whilst we pretend it is not there. City form is one of the most fundamental issues that must be addressed to achieve anything like a sustainable environment. It is not possible to reconcile the urban morphology of sprawl with the precepts of making and maintaining an Ecopolis, except for the purposes of rolling back sprawl to reshape mal-formed urban environments into compact cities. Proponents of suburban sprawl are promoting urbanoclasm – the deliberate destruction within an urban civilisation of the necessary forms and functions of urbanism. They are thus urbanoclasts, 'breakers of urbanism', deliberately seeking to destroy the attributes of urbanism that enable towns and cities to function. Their influence within urban society leads towards malurbanism.

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[24] http://www.roadpeace.org/pr/lecturer.html (accessed 13 March 2008).

[25] The first motor vehicle fatality in North America, in 1899, was Henry Bliss, killed by an electric taxi that crushed his head and chest; the world's first recorded fatality due to a motor vehicle was in Ireland in 1869 when scientist Mary Ward's neck was broken after she was run over by an experimental steam-powered car.

8.7 Provide Health and Security[26]

> We are the ultimate inheritors of a drive hundreds of millions of years old to build, and thus take charge of the immediate surroundings. For better or for worse, this architectural drive eventually created the kind of mind we now possess
>
> (Gould and Gould 2007 p.299)

One particularly powerful means of improving health and personal security would be to establish a transport system that minimised each individual's exposure to risk of death and injury. A first step towards that goal would be to recognise the murderous nature of the present transport system; there are signs that this recognition is beginning to register in the global consciousness since on 26 October 2005 the UN General Assembly adopted a resolution to recognise the third Sunday in November of every year as the World Day of Remembrance for Road Traffic Victims. This Day is now recognised globally.

There is no escaping the fact that we are not rational about cars and driving. Cars are seen, and felt, as extensions of people's personalities as every car advertisement demonstrates. We feel emotional attachments to our habitations that are at least as strong. Describing, or dismissing, a person's irrational attachment to their home as possessiveness does not explain it. The attachment can be very strong even when the home is decrepit and in need of maintenance and the occupants are being offered something new and supposedly better, so its superficial monetary value is not the issue. Conventional notions of ownership and real estate are of little help in explaining the sometimes extraordinary attachment people have to a particular home. The same applies to the equally, if not even more strongly held attachment many people feel to a particular place.

These attachments can, at least, be seen as logical if they are understood as manifestations of concern about maintaining the integrity of an extended physiology. For the purpose of this argument, if we define that extended physiology as the totality of the local environment and the constructed artifacts that are perceived as 'home', then the idea of home becomes understandable as a descriptor of that part of the environment which immediately contributes to maintaining the physiology of the organism, in this case a human. Its importance transcends sentimental attachment to become, literally, a vital part of being. It would be no less traumatic for a bird to lose its nest.

This idea of home must extend to the local community because humans are social creatures. The boundary of the home has to include the artifact that perhaps should be understood as a dwelling plus the territory it occupies and, nominally, controls. The same rule applies whether we consider the denizen of a penthouse in New York, loftily surveying their neighbourhood, or dweller in the favelas of Rio de Janeiro[27].

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[26] Ecopolis Development Principle 7.

[27] Although the woman in the favelas may feel more strongly attached to her place than the woman in her penthouse because her home has required proportionally more investment of time and energy and is much harder to replace than the penthouse is for its wealthy owner.

The Health of Cities: Holurbanism, Malurbanism and Vital Signs

> It is now clear that the fate of human settlements is inextricably bound up with the environmental crisis
>
> (White and Whitney in Stren 1992 p.48)

The environmental crisis is bound up with the fate of human settlements. The extraordinary wealth enjoyed by the urban citadels of the developed countries and other centres of wealth (e.g. Kuwait) is gained and sustained by out-sourcing the worst of the dirty work and displacing pollution off-shore. The massive, spreading metropolitan systems that appear to be replete with riches, rely on energy and resources sucked in from elsewhere, at the expense of wherever it comes from. The impacts of these modern citadels are buffered by distances of every kind: geographical, social, economic. Measured by the yardsticks of life: health, well-being, mortality, crime, safety and ecosystem vitality, these metropolitan sprawls of inconvenience do not deliver. The health of cities is the sum of the health of their citizens, they are inseparable. Anne Whiston Spirn was warning us nearly a quarter of a century ago, we persist in maintaining a fragmented view of the city and its environment despite the evidence of:

> . . . the increasing frequency of miscarriages, birth defects, and neurological damage caused by environmental contamination; the increased mortality of the elderly, the sick, and the very young; permanent brain damage among children; overall degraded health of city residents and workers; increasing magnitude of natural hazards; increasing energy demands; depletion of high-grade mineral resources; dwindling water supplies; and the inefficient use of space and resources
>
> (Spirn 1984 p.239)

Spirn was not decrying the city, but advising that the severe adverse effects of urbanisation be seen holistically and be treated with both caution and immediate attention and that we cease squandering ‘ever larger quantities of energy’ and carelessly disposing of wastes (Spirn 1984 p.239).

We have seen that there is a long, rich and varied history of writing, commentary and mythology that identifies the city as ‘bad’ and the rural/wilderness/non-city as ‘good’. But it would be as unrealistic to imagine that our species can leave cities behind us and escape to some utopia over the hill, as it would be to believe that we can forsake this planet in favour of a better one. The entire Ecopolis thesis is founded on the proposition that cities are the habitat of most of humanity and that we are bound to urban ecosystems as much as we are contained by the circumstances of our existence in this biosphere. From this position, therefore, the challenge is to establish what is ‘good’ about cities, what is ‘bad’, and how to fix it.

In the spirit of Lovelock’s ‘practical science of planetary medicine’ and his efforts to establish the science of geophysiology (1991 Lovelock p.24) and accepting that human settlements may legitimately be regarded as living systems, I propose that it is possible to identify ‘healthy’ and ‘sick’ cities and that their relative health can be determined from reading ‘vital signs’. There is some precedent for these

Table 15: Some basic characteristics of healthy cities – ***Holurbanism***, and of unhealthy, cancerous cities – ***Malurbanism***

	Holurbanism	Malurbanism
	Healthy Urb/Healthy City	*Cancerous Urb/City Cancer*
1. Vital Signs	See FROGSTICK	See FROGSTICK
2. Boundary	*Well defined boundary* – generally fixed	*Ill defined boundary* – mobile/mutable
3. Size	**Limited**	**Indeterminate**
4. Energy & Information	Open to energy & information	Open to energy & information
5. Nutrient & Resource Systems	*Closed systems* (closed loops)	*Open, damaged systems* (loose ends)
6. Environmental Relationships	**Symbiotic**	**Parasitic**
7. Status	*Resilient* – able to sustain all vital functions in stressful environments	*Fragile* – subject to collapse in response to very short-term events (mental experiment: turn off water and power . . .)
8. Metabolism	**Constrained**	**Unconstrained**
9. Organisational Coherence	*Self-organising* – Higher orders of organisation with increasing coherence – *integrative*	*Self-destructive* – Reducing orders of organisation with decreasing coherence – *reductionist*
10. Bio-Trajectory	*Lifewish* – sustains (nurtures, creates, maintains) conditions for its own existence and replication	*Deathwish* – destroys conditions for its own existence and undermines basis for replication
11. Public Realm	*Civic* – active citizens	*Consumerist* – passive consumers
12. Environmental & Social Limits	*Acceptance of limits* enables society to be sustained, thus to evolve – free citizens in an environment they can understand & manage	*Failure to accept limits* disables social frameworks – tyranny of state/bureaucracy (impersonal organisation) consumers in an environment they have difficulty understanding or affecting.

precepts. Healthy Cities is an international organisation that has been operating with some considerable success since the phrase was first used in 1985[28]. Especially since the advent of Local Agenda 21, city governments around the world have adopted the idea of identifying indicators to help measure their progress on the road to sustainability. Indicators are similar, in effect, to vital signs. They constitute performance assessment criteria. I introduced 'The Frogstick' (see Chapter 11) for this purpose in 1990, prompted by the need to demonstrate the difference in approach between the Ecopolis idea and the 'techno-fix' proposal for a Multi-Function Polis which was then current in South Australia (Downton 1991a p.54).

[28] International Healthy Cities Foundation website http://www.healthycommunities.org/facts/overview.htm accessed 5 May 2001.

The table above sets out some basic characteristics of healthy cities (Holurbanism) and unhealthy, cancerous cities (Malurbanism) in the sense intended in this book.

The Reproduction of Cities

Doxiadis (1968, 1975) proposed a determinedly rationalist systematic ranking of urban types based mostly on size, but the traditional/historical definitions of urban types are just that, and have evolved with the nature of their type descriptors over centuries. In terms of creating healthy urban ecosystems these age-old definitions retain relevance and value in much the same way that indigenous definitions of place retain value as descriptors of bioregions (e.g. Tandanya: place of the red kangaroos) – they are cultural creations that incorporate qualitative information as well as quantitative and, most importantly, reflect embedded knowledge of lived process and concomitant consequences that have accrued over time. This makes them repeatable, reproducible. Note that towns and villages are defined in relation to governance and community, as are cities and hamlets by extension ('a large town', a small village'). Urban systems can be organised into existence if their essential functional conditions are well enough understood. Thus a city is 'a large town'; a town is 'a large urban area with a name, defined boundaries, and local government, being larger than a village and usually not created a city'; a village is 'a group of houses and associated buildings, larger than a hamlet and smaller than a town' and 'the inhabitants of a village regarded as a community' and 'a self-contained district or community within a town or a city, regarded as having features characteristic of village life'; a hamlet is 'a small village, especially one without a church'. Neighbourhood is 'a district, especially one forming a community within a town or city' and 'the people of a district, especially one's neighbours'. (Australian Concise Oxford Dictionary 1992)

The most widely accepted definitions of 'life' usually include the ability to reproduce as an essential attribute (Lovelock 1991 p.31). Lovelock maintains that this is a category error and that what should define whether something is alive or not is whether it metabolizes and self-regulates (Lovelock 1991 p.31).

The capacity to reproduce is not an attribute of ecosystems, nevertheless ecosystems are about maintaining the conditions for their own existence. In the majority of living organisms the information required for the organism to replicate the conditions for its existence is communicated via DNA. Organisms like mammals also communicate vital 'survivalist' information via a teaching/learning process, particularly during the nurturing stages of a young organism's life.

In the present 'Phase 4' of human existence (Boyden 1981) humans spend much of their lives in social, culturally constructed environments, engaged either formally or informally in processes that teach them about appropriate behaviour for staying alive. Through culture, we transmit knowledge across generations that is vital to our continued existence and that is not encoded in our DNA. The built environment

is the most complete expression of human culture. Without a functioning built environment, most individuals in our specie's present evolutionary state would not survive. It is thus essential for our continued existence as 'Phase 4' humans that we reproduce successful built environments that provide the conditions for that existence, and allow for it to evolve. With Turner's argument regarding the extended organism (Turner 2000) it may be that culture and building are physiological extensions of the human animal whilst 'Laland even argues that human culture is just a special form of niche construction.' (Douglas 2000 p.33).

As living systems of inter-related organism that are continually seeking the means to reproduce, cities, through their populations, are constantly engaged in the process of reproduction, or at least, renewal.

Using the Holurbanism/Malurbanism model, the respective capacities for reproduction of healthy and unhealthy cities might read as follows:

Holurbanism (Urban Spawn)

> The process of decentralisation may therefore also be a process of nodal concentration. It might be appropriate, for instance, for smaller rural centres to become considerably larger in population. Larger cities could subdivided into several human-scale ones by coalescing population around established commercial and cultural centres, and re-establishing agriculture and natural eco-systems in the intervening spaces (the spaces where alienating, car-dependent suburbs presently blanket the landscape)
>
> (Fisher 1997 p.206)

- *Increases population by reproduction of the conditions necessary for continued existence of a healthy urban organism.*
- Achieves this through a process of spawning and colonisation.
- Successful colonisation recreates conditions of existence.
- Unsuccessful colonisation results in a failed city either in the short term (it does not 'take hold' in its environment) or long term (typically, failure to maintain conditions of existence by consuming its host environment).

Malurbanism (Urban Sprawl)

- *Increases population by unfettered growth (gigantism)*[29].
- Consumes new environments rather than colonises them.

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[29] Urban problems are not simply to do with increasing population. They are to do with how that population behaves, what it consumes, the land it occupies, the waste it generates. Sprawl is real. Cities are spreading faster than population is growing. In the 20 years between 1970 and 1990 Los Angeles grew in area by 300%, but its population only grew by 48% (Carl Anthony, International Global Forum presentation, Berkeley, 12 April 1997).

- Does not recreate the conditions of its existence but exploits existing conditions through destructive consumption of its host environment.
- The sickness of malurbanism is not a necessary consequence of colonising activity but a failure to colonise successfully.

Climate Change and the Inconvenient City

> . . . if the trend is one towards global warming, it will cost much more to redesign existing human settlements to ensure that they remain habitable for human beings. The inertial force in these major global adjustments means that thinking must be in terms of decades rather than annual budgets
>
> (White and Whitney in Stren et al. 1992 p.30)

Climate has always been a major determinant of cultural morphologies whether manifest through social structures or in the built environment. With anthropo-accelerated climate and ecological change the need to move from culturally unconscious reactions to environmental conditions to pre-emptive, long-range planning for change is essential to the survival of civilisation. This is an implicit part of ecocity design, development and maintenance, but is a recent consideration on the planning agenda for decision makers whether they be politicians or planners. When Stephen Schneider and Randi Londer proposed 'Some General Conclusions and Principles for Living with Climatic Change' in 1984, it was a novel idea (Schneider and Londer, 1984). In the latter part of the first decade of the 21st century it is still treated as a novel idea. We need to understand that in relation to the climate, 'rapid change' has normally meant something that happens within a few hundred years, yet we have seen changes within existing human lifetimes and we are now experiencing a rate of change in the climate that is happening so fast that it is unnerving the fashion industry!

> Prudent planners and managers should consider the implications of a rise in sea level . . . Generally, the larger the settlement and the closer it is to sea level, the more profound the changes will be
>
> (White and Whitney in Stren et al. 1992 p.31)

If the goals of sustainability are being taken seriously, then long-term thinking and scenario planning would seem, logically, to rule out the development of a place like Dongtan in its proposed location. That it is being built anyhow may be a testament to both the unstoppable commercial energy of China and its capacity to see opportunity in the face of danger by developing the technics for dealing with sea level rise. It will be interesting to see how it contributes to the practice of ecological city making.

The challenge of climate change and biospherical stress reinforces the point that 'the difference that makes a difference' is not simply to do with creating greener real estate but to do with long-term planning for the relationship between humans and the biosphere.

8.8 Optimise Energy and Resource Use[30]

We need to generate and use all energy and resources efficiently, mimicking nature's capabilities. Our cities must operate at low levels of energy and resource consumption, using efficient local energy production. All ecological development should seek to be energy self-sufficient and close the loops in resource use. The primary energy base for development must come from renewable sources whilst we minimise energy consumption and eliminate both fossil fuel consumption and nuclear power. We already know how to design buildings with solar access and natural ventilation and use effective insulation and thermal mass. Biomimicry offers a basis for optimal design in which all these techniques and technics evolve further to produce ever more effective design from the level of doorknobs to buildings to city-regions.

Biomimicry

> Your house is your larger body.
>
> It grows in the stillness of the night; and it is not dreamless. Does not your house dream? and dreaming, leave the city for grove or hilltop?
>
> (Gibran 1926/1979 p.38)

> Functionally, these mounds are devices for capturing wind energy to power active ventilation of the nest. They are *adaptive structures,* continually molded by the termites to maintain the nest atmosphere. This ability confers on the colony *emergent homeostasis*, the regulation of the nest environment by the collective activities of the inhabitants.[31]
>
> (Turner)

Even those of us who have worked in the realm of ecological design for years and who try to be true to the idea that we must fit human systems consciously into the rest of nature, rarely feel that we have gone far enough to achieve that goal at the profound level that is needed. The concept and insights of biomimicry promise to open the doors to the kind of understanding of design and construction demanded by the idea of an ecological culture.

One of the most ambitious attempts to employ the lessons of biomimicry is that of Project TERMES where they are 'exploring how termites can serve as models for adaptive construction in harsh environments (like Mars)'[32]. Project TERMES takes the insights of Scott J. Turner as the basis for investigating the detailed architecture of the termite mounds that inspired his musings on the nature of the extended organism.

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[30] Ecopolis Development Principle 5 (changed from its previous form as 'Optimise Energy Performance' in December 2007).

[31] http://www.esf.edu/EFB/turner/termite/construction.htm (accessed 29 Dec 07).

[32] http://www.esf.edu/EFB/turner/termite/construction.htm (accessed 29 Dec 07).

The conscious organism can not only invent (chimps can turn inanimate objects into tools too) and borrow (cuckoos directly 'borrow' the work of others), but also learn through processes of observation and investigation that are, almost by definition, unavailable to organisms without consciousness. Thus we learn from the world around us and, interestingly, a team of researchers[33] inspired by the author of *The Extended Organism* are trying to learn from the termites of South Africa exactly how they build their remarkable mounds so that the knowledge can be applied to making human structures. Describing the termites as 'like aliens on our own planet' and making the observation that 'No other organism on the earth is known to engineer the environment to this level', the research team see the potential for building structures able to self-regulate internal conditions in harsh environments not only on Earth, but on Mars.

As they say:

> . . . this is only part of the story. Not only are we revealing the mound structure to the world for the first time, we are also working towards building the machines which will allow us to 'print' these structures into our homes.'[34] 'Freeform Construction is about 'printing' buildings, as if you were printing this page. It's about combining the whole design, construction and maintenance process into a seamless operation to produce structures and components which meet the challenges of our changing world and which will allow us to build on any terrain, against any backdrop, anywhere on the Earth, the Moon or Mars. [35]

Closing the Loops

Every organism, individually and in concert with others, benefits from circumstances that maintain the conditions of its own existence. Coevolutionary processes seem to ensure that the relative impacts on the environment by all species within a given ecosystem tends towards a dynamic balance within that system. Thus, grazing herd animals move around and avoid destroying their food source, whilst the grasses evolve with their vigour sustained by regular cropping.

Prior to urbanisation and industrialisation, humans could be seen to fit the same patterns as other animals. Their nomadic, opportunistic exploitation of the environment was contained by the self-evident limitations of that environment (Berries all eaten? Move on!) whilst the other organisms in that environment coopted human activities and coevolved to work in a seamless cycle (the seeds of the berries were spread further by the wandering humans).

All organisms capture energy from their environment, using it to do work that helps maintain their function as organisms, and also maintaining or enhancing the

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[33] 'Project TERMES (Termite Emulation of Regulatory Mound Environments by Simulation) is a truly adventurous and far reaching project. Using new, cutting-edge technologies we are copying the complex internal structure of these mounds, so that we can build our own homes in the same way.' (http://www.sandkings.co.uk/index.html, accessed 29 December 2007).

[34] http://www.sandkings.co.uk/index.html, accessed 29 December 2007.

[35] http://www.freeformconstruction.co.uk/, accessed 29 December 2007.

environmental conditions that support the organism. All organisms act on the environment and unconsciously (or, in special cases, consciously) manipulate, i.e. do work on, that environment. Thus a bird may eat berries to sustain its energy needs, whilst it also takes twigs to build a nest that provides a controlled environment which contributes to the incubation of its eggs, maximising the return on the energy input that the roosting bird delivers by sitting on its eggs. The bird thus captures energy embodied in the environment (the berries and the twigs) to either directly fuel its metabolism or improve the efficiency of those parts of its physiology that are external to its conventionally defined boundaries as an organism.

Virtually all energy that powers living processes on Earth comes directly or indirectly from the sun. The energy that is burned within an organism pertains to the body and is thus somatic energy. Energy burned outside of living bodies is thus extra-somatic energy. For our bird, the berries provide somatic energy and a portion of the heat radiated from the burning of that energy escapes the boundaries of the bird organism to warm its progeny in their embryonic state as eggs. Somatic energy of the tree or bush that provided the twigs used by the bird in making its nest is embodied in the twigs. In effect, the bird organism is using stored somatic energy to assist it in sustaining the conditions necessary for its survival as a species.

When a chimpanzee picks up a stick and wields it as a weapon it is extending its reach into the environment and its power to act on and within that environment, particularly in regard to its impact on other chimps.

Humans do the same.

Humans are the only species we know that sets fires purposely, but not the only species that benefits from fire. Fire is a part of natural systems. It releases nutrients and precipitates processes that favour certain species so that they regenerate rapidly and enjoy an ascendency in the environment that is not available to them without fire. The energy released by fire has come from the sun and has been sequestered into living organisms, particularly plants. When a bird builds a nest it is using the embodied energy of plants to build a structure that improves the reproductive energy efficiency of the bird organism. Humans have built structures and burned fires since long before the advent of fossil fuels in order to make shelter which does just what the nest does for the bird. It can be shown that even the mud of the most basic human shelters would not exist without the burning of somatic energy, as all sedimentary rocks (from which soil is derived) are a result of processes that involve living organisms.

Human shelter usually appears in groups. It is a consequence of collective action. The social nature of humans is affected by the use of constructed shelter. As well as helping to minimise the amount of energy needed by individuals to maintain a steady body temperature (keeping in, or out, the heat and the cold of the unmodified environment), it tends to reinforce certain social relationships, e.g. the alpha male gets the biggest hut, etc. The interrelationships of social animals are fundamental to their survival, and this is clearly demonstrated in human behaviour.

When humans build, they reflect their interrelationships in the form and disposition of their buildings, no matter how rudimentary those structures may be. We have learned to progressively exploit more and more of our environment, employing

sequestered somatic energy first in structures made from plants, then in burning plants to cook mud into bricks, or smelt ores from rocks, then on to fossil fuel powered manufacture of building elements.

Fossil fuel is stored somatic energy and only exists because of life. Any use of this stored energy may be a short-circuiting of longer processes in time, but it is still using solar powered 'life energy'. The problem with fossil energy, as we know to our cost, is that burning it releases too much carbon too quickly for it to be reabsorbed in timescales that allow for gradual adaptation by the denizens of the biosphere.

All human settlement – be it village, town or city – is a continuation of this ancient drive to modify the environment in a manner that helps to sustain the continued existence of the organism. Although a sprawling megalopolis may not look much like a bird's nest, it is driven by the same evolutionary imperative.

8.9 Balance Development[36]

> We can hardly speak of boundaries to the city when all the constrictions on the urban dimension imposed by its own territory have been removed by technological surrogates and the importing of resources . . . Why do we need to repropose boundaries and limits in the planning visions? Simply because the technological surrogates have failed . . . '
>
> (Magnaghi 2000, transl. Kerr 2005 p.2–3)

Search for Limits

How do we find the places to draw the line in the making of human settlement? If the city is part of its region, then if its capacity to consume resources outstrips the capacity of the region to provide those resources, it will have to import them, or die. Ecopolis Proposition 1 states that for cities to live, they must fit the limits of their place, i.e. the region of which they are part. A regional approach to the making of built environments and supporting systems thus becomes an inescapable part of an Ecopolis program and ideas of bioregionalism obtain particular importance. Equally, the need to be able to measure and comprehend the impacts of urban entities is essential. Tools like Rees and Wackernagel's 'ecological footprint analysis' offer powerful means to quantify these impacts. The North American (Canadian) concept of the ecological footprint is paralleled by the European (Dutch) concept of 'environmental space' which 'describes the scope for human activities by defining environmental conditions . . . (It is) the share of the earth's resources that humanity can use without depriving future generations of the resources they will need.' (McLaren et al. 1998 p.6). As cultural activities, architecture and urban design contain strongly intuitive, non-quantified methodologies that depend on practitioners obtaining a clear sense of the parameters of the place for which they are designing.

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[36] Ecopolis Development Principle 3.

The process of the Seven Steps, the Ecopolis Development Principles and the performance measures of the Frogstick outlined in Chapter 11 are intended to assist practitioners in gaining and maintaining an intuitive feel for that deeper sense of the limits of place.

New Shores, New Edges, New Towns

> In many instances, climate conditions are too harsh for single dwelling units
>
> (Soleri 1973a p.58)

In searching for limits we have to understand the wider and deeper limits set by biological processes. These may go beyond what we think of historically as limits. In many ways we have transcended the immediate limits of place, using resources and strategies to breach boundaries that older technologies could not. Our cities have, in any case, been the microcosmic beginnings of a remaking of the planet's surface. In the presentation of his arcological vision, Soleri saw that the multicellular, multiple dwelling form of the city could occupy niches that individual dwellings could not. To deal with harsh climatic conditions humans long ago discovered that there were often benefits to building collective, rather than individual structures. Soleri proposes that arcologies, designed as 'vivified' extensions of the natural environment, provide 'the ideal way to counteract difficult climatic situations.' (Soleri 1973a p.58).

As the boundary conditions of all ecosystems shift and change in response to the impact of accelerating climate change, so there is a need to urgently consider how to build on those edges. As shorelines recede, do our cities retreat, or do they stand their ground by remaking it? Or do they become mobile, able to float away on the rising waters? Soleri's most prescient work may be in his proposals for floating 'Novanoah' arcologies, entire cities designed to roam the world's oceans. Although he did not propose such options as a response to climate change, his arcological responses to harsh edge conditions have an aptness that give his ideas the quality of prescience.

His dam site projects ('Veladiga', 'Arcodiga') suggested that the massive engineering redundancy of dam construction could be changed to a more efficient, cellular structure, and that 'To introduce living and working into the masonry of the dam means to transform a monolithic, noncellular system into one that is articulated and cellular . . . that can effectively and magnificently transform the blind mass into a singing environment.' (Soleri 1973a p.93). Intended to exploit an engineering and habitat niche that has been historically neglected, these projects can be seen as logical evolutions of the Ponte Vecchio in Florence, which inspired the Pulteney Bridge in Bath, England, where commerce inhabits the masonry that carries city life across the water. The prospect of rapidly rising sea levels offers many cities just three options: retreat, be flooded, or build sea walls to dam the rising waters. The new city of Dongtan (see 6.10 Ecocities in China) appears to be prototyping the kind of

sea defences that will be demanded by the new shores promised by climate change. Why not make those ocean dams themselves part of the new human habitat?

New Worlds?

All life processes make changes in the environment. Our climate is a consequence of biological activity. Limestone rock is a consequence of biological activity. The changes wrought by life have generally taken place over millennia, relatively slowly and gradually. Humans have found ways to make changes to the environment at a much quicker rate than other species by using the leverage of technology and conscious social organisation. We have evolved as powerful agents of accelerated environmental change. Now, as a species:

- We are agents of accelerated climate change.
- We are agents of accelerated ecosystem change.
- We are agents of accelerated geological change.

Compared with geological forces, the processes of life have provided an accelerated transformation of the biosphere. The evolution of a conscious organism has greatly amplified the capacity of life to effect that transformation. Humans, through their city-making, agriculture and industrialism have terraformed the Earth. We inhabit a new world, a quite different planet from the one even our grand-parents

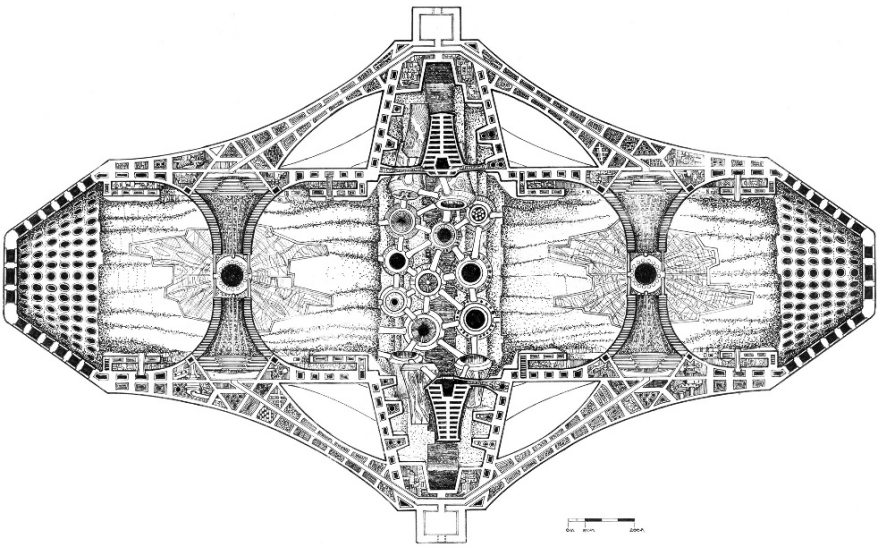

Figure 64: City in Space – Soleri's Asteromo: 70,000 people at 400 per hectare. Length 2,600 metres, diameter 1,400 metres

knew. We have breached the limits set by the biosphere and have begun to suffer the consequences.

Every human society has expanded to the limits of the territory it has been able to control. The extent of that control has been determined by the level and type of technology achieved, and the level and type of that technology has, in turn, been constrained by the characteristics of the territory – its resources, climate, and ecology. As technology has advanced, so it has progressively enabled societies to breach the immediate apparent limits of their place. This process of breaching has the appearance of a universal cultural imperative.

The imperative to break through into new territory is now pushing us into space. This would seem to be inevitable; our technology enables us to climb out of the gravity well, so we will keep on doing it. But the power of limits follows us. As we seek to maintain human life outside the benign protection of the atmosphere we find that we are revisiting the problems and the promise of the biosphere in miniature. In finding ways to stay alive whilst recycling every resource and material, including water, we are discovering, much more immediately than ever before, how to live within non-negotiable limits. The history of human hubris tells us that we will keep upping the ante, that we will push the on through to find new worlds, where we will breach limits again and again. To successfully breach limits and move into new territory requires a thorough understanding of what is being breached, and how, therefore, to compensate for it. If this can be achieved within the context of Ecopolis, we may be able to survive off-world. If not, there will be no new worlds.

Chapter 9
Synthesis II: EcoDevelopment

Extremely important among the forces which determine the ecological characteristics of human ecosystems is a series of factors that come under the general heading human culture. Consequently, if we wish to understand properly the ecology of a city or a region, it is imperative to take full account of the relevant cultural components as well as the physical, chemical and biotic aspects

(Boyden et al., 1981, p. 19)

The confusion between urbanization and citification is as obscurantist today as the confusion between society and State, collectivization and nationalization, or, for that matter, politics and parliamentarism

(Bookchin, 1986, p. 168)

9.1 The Power of Limits

Nature runs on sunlight.
Nature uses only the energy it needs.
Nature fits form to function.
Nature recycles everything.
Nature rewards cooperation.
Nature banks on diversity.
Nature demands local expertise.
Nature curbs excesses from within.
Nature taps the power of limits.

(Benyus 1997 p. 7)

In 'Biomimicry,' Benyus (1997) stresses the power of limits in nature. She suggests that the last canon in the above list of laws, strategies and principles is the hardest for humans to fathom because 'we regard limits as a universal dare, something to be overcome so we can continue our expansion.' (Benyus 1997 p. 7). As we have seen in the previous chapter, the concepts of the ecological footprint and environmental space identify physical resource limitations to human activity. Expansion or movement beyond the limits of any given environment invariably results in imposition upon and exploitation of another environment. To go to the stars requires that we understand the limits of planet Earth. This is the insight that provided the impetus

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to create Biosphere 2, which, in turn, proved our ignorance regarding many of those limits. If we leave the environment of Biosphere One we will inevitably affect the environment beyond; stiff flags and detritus on the moon stand in silent testimony to the likely truth of this. And when we travel over borders, whether they are made by humans or emerge from the interface of biomes, we carry cultural baggage with us, conditioned by experiential and mythic knowledge of our environment, determined to fly our flag.

Having recognised the imperative to work within biophysical boundaries, we must also recognise that humans are a species with an imperative to expand. For the next few generations, at least, we will inhabit a planet with a rapidly growing human population that will require healthy shelter and settlements that fit the imperative of limits. (This is reason enough to have a viable theory for the reproduction of cities). To address the extraordinary challenge this represents, we have to work on the deep structure of civilisation. We have to reset Brand's 'clock of the long now' to synchronise infrastructure provision, governance and culture with the pace of nature. We have to deal with the invisible structures on which the entire enterprise of civilisation is constructed. For development to proceed on the basis of principles that are derived from nature's own systemic functioning we need to understand our own, human ecology, and consider what there is in it that is worthy, and what is self-destructive.

Planning for the Long Now

> For the history of the city reveals a process of growth, decline, and transformation – a cycle of life, death and, sometimes, re-birth. . .
>
> (Cadman and Payne 1990, p. 7)

With the idea of developing the ecology, rather than seeing the environment merely as the resource base for sustaining 'development', we find new gateways through which we might pass. Ensuring the continuing health of ecosystems may require the death of cities. The history of Western civilisation is littered with dead cities, whilst the deeper aspects of its culture have remained, and nature, despite perturbations, remains fundamentally unchanged. The future is with us all the time, in the present. What we build now is the future. 80% of all housing stock in Australia in the year 2010 will have already been built by 1998 (AGO/Shipworth 1999).[1]

Long-range planning is typically reserved for scientific studies, e.g. climate modelling and the study of phenomena that take place across long periods of time relative to human affairs. These are almost invariably environmental or connected with the environment and the incentive to undertake the studies has come from the military

[1] NOTE 9, Residential Building Baseline Study, BDP Environment Design Guide, p. 13. 'This Note presents the Executive Summary of the Study of Greenhouse Gas Emissions from the Australian Residential Building Sector to 2010. The baseline study (and its counterpart, Australian Commercial Buildings Sector) was commissioned in late 1998 by the Australian Greenhouse Office as a basis on which to determine greenhouse gas emissions reduction targets for this sector.'

sector. The earliest long-range, systematic scientific investigations into environmental conditions were undertaken by the English Royal Navy in order to be able to predict the weather on which their vessels, and thus the might of the British Empire, were so dependent.

Climate studies are still primarily about security, although the scope of concern has developed from national to global security. Computers, and the discovery of the mathematics of chaos have made it possible to model complex long-term processes in a short period of time. Currently, the most developed long-range modelling other than for climate simulations is done for the military. At the Lawrence Livermore National Laboratory, in order to study the potential problems of storing nuclear waste in the Yucca Mountains of Nevada, the US Department of Environment commissioned geologists to model the changing structure of rocks and mountains over a 10,000 year time span using 1400 parallel microprocessors controlled by a supercomputer (O'Hanlon 2000). At present, the scale and scope of such modelling can only be sustained by defence-sized budgets but it is reasonable to speculate that effective city modelling with a similar level of sophistication may become affordable within a few years. At a more modest scale, computer simulation of city dynamics is already advancing with tools such as the 'dielectric breakdown model' (DBM[2]) developed by Batty and Longley to simulate urban growth (Ball 1999 p. 246–247). This kind of approach is being further refined by Makse et al. to produce convincing models of urban growth that quite closely match predicted behaviour with observed cities (Ball 1999 p. 251). Advocates of these models claim that 'The time is now ripe for the new approach to cities and urban form for which we have been waiting for more than a generation' (Batty quoted in Ball 1999 p. 251). The dynamics of urban management follow clearly discernible and predictable patterns of behaviour to the extent that a program for designing, developing and managing cities has been available for modest home computers for some years. SimCity (Haslam and Wright 1993) has been used for training planners and city managers and later versions have included Soleri-like 'arcology' options and 'ecocity' scenarios.

Extra Sensory Perception

Our ability to see and understand the world depends on what means we possess to perceive it. Advanced urban-industrial society has created some remarkable technologies that enable us to view planetary conditions with extraordinarily extended senses. Satellite sensing and mapping of the planet allows us to see in wavelengths our eyes cannot, to measure movements, like continental drift and mountain building, that we cannot see, and follow the breath of winds and flows of ocean currents that we cannot feel. Our eyes and ears have been given extended capabilities beyond any imaginings of magic that our ancestors may have had.

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[2] 'DBM' is supposedly a physically realistic model for urban growth, according to Ball (1999) because it mimics the way cities expand with their pressure of new development pushing outwards to colonise surrounding land.

The ubiquitous internet has massively multiplied the links between minds that was in the noosphere of just a handful of years ago, and there are already half as many mobile/cell phones as people. It is easy to imagine that without an almost continual mobile electronic communications link with their cohort most modern adolescents in the developed world would be socially dysfunctional!

We are an augmented species with extra sensory perception but we have barely begun to figure out what to do with our new superhuman abilities. To those of us troubled by the idea that there must be city-based solutions to our global city-induced problems, that 'the city can save the world', the answer is obvious – we have to use our ESP to support the operating systems of the world's cities so that they are integrated into the processes of the biosphere to optimise its functioning as a perfect environment for our species.

At least, now that we have the capacity to see the entire planet, it is getting easier to imagine that we are evolving a planetary mind.

Figure 65: Evolving Global Consciousness - Australian brothers with their part-Moldovan cousin Jasmine, born in the UK, check out the weather around the world by tapping into the internet with a hand-held iPod

9.2 Invisible structures

> It's not enough to change stuff on the design level. The way the whole fabric of the way communal action takes place – the way money flows in society and the way development goes on – needs to change. . . . You cannot produce life by the particular mechanism we have set in motion in the twentieth century to do development
>
> (Alexander in Zelov and Cousineau, 1997, p. 263)

> That its future is unforeseeable does not alter the fact that its development depends upon the growing consciousness of the people, not upon the growing power of the state – and how that consciousness, concretized in highly democratic institutions, will develop may be an open issue but it will surely be a political adventure
>
> (Bookchin 1995 p. 321)

Codification

Just as a city needs the highly visible infrastructure of roads and pathways for people and goods to travel on and walls to support loads or divide activities and spaces from one another, so cities need invisible structures.

These are every bit as important and powerful as visible structures. They can carry value, meaning and messages and they can divide or connect people with each other. Many of us are familiar with the invisible walls which keep us from affecting decisions made by multi-national companies or government. Invisible walls determine which people interact – who is wealthy, who is poor. In a city the invisible structures determine who owns and who controls the making, shaping and running of the city.[3] Urban morphology reflects civic and economic structures.

If the economic structures are distorted, or based on values that result in damage to natural systems if translated into real life, they will distort the urban structures that rely on them for exchange of goods and services. In Anglo-Saxon derived law, for instance, once a company had become confused with a person any amount of syllogistic reasoning can follow – as it has. By deeming a company to be a legal 'person' it becomes absurdly easy, albeit logically spurious, to grant a company the same rights and duties as an individual human being[4].

In each of the case studies of Chapter 7 the invisible structures were paramount. In the case of Christie Walk, the entire development took place on the basis of ethical investment and extensive participation by the community in the running of all aspects of the project. There are many aspects of the project that would have been eliminated had the financial control not been in the hands of people committed to principles before profit.

Invisible structures eventually become visible. Understanding what they are and the consequences of their revelation in built form has to be a cornerstone of ecocity planning but it is difficult to achieve because of the obfuscatory nature of development processes. The effects are very real however. In 'Welcome, Thinner City' Colin Ward maintains that land speculation has destroyed the functions for which

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[3] I am indebted to Shann Turnbull for introducing me to the concept of invisible structures. Shann is an activist for what one might call 'enlightened capitalism' and is author of a number of thoughtful texts based on the proposition that capitalism can be configured in socially responsible ways with structural equity, if the value of money were differently controlled – without the ubiquity of interest, for instance. The publication most pertinent to ecocity theorising is 'Building Sustainable Communities' (Benello, Swann and Turnbull, ed. Morehouse 1989).

[4] This may be the single biggest flaw in western capitalist ideology and epistemology.

cities arose in the first place with land prices and 'values' undermining the financial viability of businesses and the affordability of housing. (Ward 1989). In Whyalla, it was the hope of most of the original project protagonists that the community land status of the core site would ensure that conventional for-profit development did not undermine the ecological and social principles. This no longer seems to be the case.

Whilst researching with UEA ways to make the Halifax EcoCity Project financially viable and socially responsible, I met Shann Turnbull. Turnbull introduced such concepts as Community Land Trusts, an alternative to existing landholding practices 'based on ethical distribution and rational use of resources. . .(and). . . designed to hold natural resources like the land, which was created without human intervention, in trust by and for the community' (Benello, Swann and Turnbull 1989 p. 32).

Turnbull assisted UEA in its investigations of economic alternatives within the existing economic system and contributed to efforts at drafting appropriate business plans for the proposed HEP development. His major conceptual tool for achieving socially responsible economic development was the Cooperative Land Bank (CLB), and he hoped that the HEP might provide the first opportunity to test the concept in practice. The CLB concept provides:

> A means by which a community organisation (i.e. a non-profit or for profit corporation representing the entire neighbourhood section of a city with a population of 1,000–30,000 persons, or an entire town) can purchase all the land and property wihtin its territory for the benefit of the entire community virtually without the need for outside financing
>
> (Swann in Benello et al. 1989 p. 44)

The concept employs a dual system of tenure that separates community economic gain from private property gain to counter the 'grossly inequitable and economically inefficient' present system. Under the present single tenure system private landowners make money from the appreciation of their property that results from improvements made from community investments in infrastructure funded by taxpayers. Landowners get wealthier at the expense of non-landowners (Benello et al. 1989 p. 45).

The CLB is an intriguing and logically consistent idea that turned out to be too difficult to put into practice because 'the value of all private improvements are captured by a system of space leases over such property' (Benello et al. 1989 p. 45) and the issue of combining leases with private property seemed to be culturally, if not legally and technically, impracticable in an inner-city, present-day development project. The introduction of Community Title by the South Australian government has made the CLB more feasible because it makes it easier to disentangle private from public, or community owned, assets, but the full reach of Turnbull's ideas added a layer of innovation that, despite its merits, could not be accommodated by UEA for the HEP. In negotiations with conventional developers any attempts to introduce radically different programs of land ownership evaporated into a mist of either contrived confusion or genuine lack of understanding.

'Invisible structures' are taken here to include any human framework of belief that has the potential for physical manifestation in the built environment. Economic beliefs frame and condition transactions of material and physical resources as well

as ideas ('intellectual property' in economic reductionist parlance) and spiritual and quasi-spiritual beliefs have shaped entire landscapes through geomancy. Invisible structures are the connecting systems of human constructed thought and belief that link the mental, emotional and spiritual to the corporeal. The systems of belief codify and thus enable the expression of that connectivity. The following tabulates some invisible structures:

Table 16: Invisible Structures

	Connection	**Perceptual Basis**	**Physical Outcome**
Biophilia	Humans with nature	Scientific analysis of sensory perceptions	Designs that suit human predisposition to favour certain environments
Geomancy	Humans to planet and territory	Subjective perception and experience of place	Designs that respond to landscape form and energies, both real & imagined
Social Justice	Humans with each other	Emotional sense of what is fair and appropriate behaviour in a society	Designs that facilitate free and equal interaction between individuals regardless of their abilities

In a similar vein: science is a system of codified knowledge, economics is a system of codified transactions, religion is a system of codified belief, citizenship is a system of codified social exchange.

The process of codification is, arguably, what makes complex social behaviour possible. The effective use of any individual artifact depends on shared understanding of its acceptable use. Nothing can be employed in isolation without being dysfunctional. Mumford proposes that '. . .we may lay it down as an axiom that. . . every labor saving device, every modern material or utility, tends to become a nuisance until it is collectively controlled and integrated into a new pattern.' (Mumford 1976 p. 210).

Money is an invention, a cultural construct; although we tend to treat it as a 'real' thing it can be changed and manipulated with remarkable ease – just consider how the money value of companies, stocks, properties, paintings and memorabilia (how much is an Elvis T-shirt worth?) can change, often and easily. Property and land is valued within this same construct and there has been an increasing tendency to treat land and housing as commodities. This codification of value is a category error. Because we need to build to live and it is intrinsic to who and what we are as a species, housing should not be a commodity, land should not be a commodity, cities should not be treated as commodities – all of it is more important than that.

If our understanding of these deeper invisible structures could be better embedded in our culture then perhaps all those involved in developing the built environment could grasp the idea that what they do is fundamentally important to making and maintaining civilisation.

Sensible Places

Just as an ecosystem involving human artefacts is not alive until it is occupied, so a sense of place, arguably any 'place' registered as such by humans, needs to be perceived as such in order to exist. The observer of a place is part of its definition.

It is, in all probability, connected to definitions of territory that are independently established by many living creatures, and is about knowing the limits at which the human, or animal, has a degree of power over that territory.

The 'sense of place' understood by architects and planners can also be understood as a territorial definition. Places defined by that elusive 'sense' may be places of power or habitat that often goes deeply into mythic territory, but can be connected by reading them through the layers of time that Brand described in 'The Clock of the Long Now'. In the more immediate historical architectural perspective they can be thought of in terms of rates of change, which in turn are viewed against Brand's increasingly deep layers of time. Cathedrals provide some of the best examples, such as Chartres which is a formalised grove of stone 'trees' sited on a grove of trees that had defined an important place of pagan ritual and a centring of their powers. It is not hard to see how ritual places could be adopted by nascent cultures learning to define their territories for the purpose of command and control – to command the people within an established territory and to exclude others (providing defence against the largely same set of impulses and values of neighbouring tribes). As with animal 'kingdoms' this has worked since ancient times; occasional skirmishes maintain the boundaries whilst larger upsets, or 'wars', take place when the need arises to change boundaries. Changes of boundary are necessary when resources are threatened, one way or another.

The more tribal human society is, the easier it is to see that it responds to ecological limits. Sustained study should reveal the links that seem bound to exist between the pragmatic demands of the natural world and its very particular manifestations in human culture.

Geomancy and Feng Shui

In western tradition the relationship of body to architecture to spirit is, perhaps, exemplified in the concept of the body as temple, the 'church not made with hands', but cultural traditions from all parts of the world have related architectural expression to transcendent experience. There appear to be fundamental forms in architecture and design that evoke a spiritual response or a heightening of awareness which Lawlor (Lawlor 1994) relates to elemental patterns in human consciousness. Earth energies have been documented with more or less degrees of credibility in western cultures, with the contentious concept of ley lines attracting extensive study and apparently sincere advocates (Havelock Fidler 1988, Watkins 1974). Alfred Watkins claimed to have discovered ley lines and became convinced that they were part of an ancient system of planning. First published in 1925, his book records his observations and ideas, and, complete with numerous diagrams, maps and photographs, with its capacity for being field tested carries some conviction. The routes of ancient roads and the siting of towns and villages, churches and monuments appear to be related

back to 'the old straight track' (Watkins 1974). Often invisible to the modern eye, according to Watkins these ley lines have structured the landscape of the British islands since the beginning of civilization. If so, they may have contributed to the sense of place, and purpose, that is so strong in the old towns. The idea of invisible lines in the landscape is also part of Aboriginal Dreaming. One can speculate that ley lines may have some conceptual convergence with the effect and purpose of songlines.

Watkins maintained that 'A healthy primitive people do not advance far towards civilisation before they develop communal gatherings for special purposes.' (Watkins 1974 p. 143) The largest and most important buildings in cultures all over the world have, typically, been constructed for religious purposes. Whether they be ancient Greek temples, Gothic cathedrals or Buddhist temples, there has almost invariably been a canon of geometric instruction associated with their design and construction. Geometry is about 'earth measuring' and evidence of attempts to relate sacred construction to the dimensions of the planet and the movement of the heavens is found from the time of Stonehenge and the pyramids of Egypt onwards (Michell 1972).

In the present era the precepts of sacred geometry are still in use in scattered outposts within various cultures including the Buddhist, Christian and Moslem cultural milieus. In addition, there is revival of the idea that sacred, or spiritually significant space may be a legitimate part of daily life and even be incorporated in domestic architecture. This is manifest in the increasingly popular adoption by clients, architects and designers of the principles of Feng Shui to inform planning and design of domestic environments. Apparent in mainstream lifestyle journals, it is also documented as a significant and valuable contribution to design by gurus such as Papanek (1995 p. 133). It is worth noting that Papanek identifies Feng Shui within the context of vernacular architecture and argues against acceptance of simplistic aesthetic rationales for design in favour of a context of symbolic meaning because, as he says, 'Too often the study of vernacular buildings is used by the critical establishment to lend historical credibility to some other current fad or fashion' (Papanek 1995 p. 135).

In relation to ecological and urban design, Feng Shui can be seen as a way of understanding, or mapping, the energies that make up the life force of nature. According to John Michell it is about 'The art of perceiving the subtle energies that animate nature and the landscape, and the science of reconciling the best interests of the living earth with those of its inhabitants.' (in Eitel 1984 p. 78). And in a similar way the role of the Feng Shui expert is to '. . .intuit, decode and interpret our environment. They watch for patterns in nature and for the human reaction to it. They listen to the symphony of interrelated occurrences and to the unseen cosmic powers governing the universe and affecting our bodies, minds, and, ultimately, our fates.' (Rossbach 1984 p. 5).

Feng Shui is a system of knowledge. It is an empirical system in which methods that appear to work have survived have been maintained in practice. It holds some value as a means of understanding place and ecosystem function by a kind of guided intuition.

> Feng shui experts sought out chi'i, the earth's pulse, as though they were the earth's physicians, tapping into the vital energy of the universe. The Chinese. . . took great pains to avoid tampering with or unbalancing the earth's ch'i. . .
>
> (Rossbach 1987 p. 31)

Feng Shui provides a system of codified responses for fitting dwelling to place.

In Whyalla the placement of the Buddhist Meditation Centre was established by geomancy. A Buddhist monk from the Sakya sect circumabulated the ecocity core site and identified the most auspicious siting. The centre of the Gompa (temple) thus found was then marked[5] and an axis discerned running from the nearby hill of Mount Laura, through the centre of the Gompa to the sea. It was a classic Feng Shui siting between 'mountain' and water. A remarkable aspect of the story of the ecocity development in Whyalla was that the city community, through the city council, supported release of land for the use of the Meditation Centre and it became the first development on the site. Property boundaries and urban planning axes for the entire core site were developed from the initiating point of the geomantically derived Gompa centre. Thus Feng Shui and geomancy were actively and centrally employed in the Placing and Patterning of the built environment of this ecocity project.

Later, the position of the Gompa was marked more permanently by the burying of a wealth vase in the ground at the centre point in a Terbum (wealth vase) ceremony undertaken by His Holiness Sakya Trizin, second in protocol to the Dalai Lama. It was the first such ceremony in Australia and was the catalyst for an inter-faith blessing of the entire ecocity core site. This ecocity initiative, driven entirely by a non-profit community organisation, helped to encourage community and enrich culture and history.

Sacred Space

> When Chartres was being built, Robert of Torigni reported glowingly that 1,145 men and women, noble and common people, together dedicated all their physical resources and spiritual strength to the task of transporting in hand-drawn carts material for the building of the towers. Such accounts suggest that raising an edifice was an act of worship in which the feelings and senses of a people were deeply engaged
>
> (Tuan 1979 p. 106)

The two Anglican parishes in the City of Whyalla agreed to combine their resources to establish a new church and community outreach centre and endorsed the idea of an ecological church complex for the EcoCity core site. In the meantime, the idea of a church as the major landmark for the core site had been translated into initial sketch designs for the building based on the workshop sessions with the parishioners, and it provided the pivot of the urban design schema – a neo-traditional concept which the urban design workshops had indicated would be a popular proposal. The proposed centre of the church spire became the setting out point for surveying the axes and allotment locations for the entire site.

The links between architecture, urbanism, ecology and spirituality may range from the intense to the tenuous, but Cook suggests that 'Humans build to pre-

[5] The site for centre of the Gompa was marked by a thong placed on the ground amidst the salt bush. The thong was chosen because the group was convinced that no-one would bother to interfere with or move a thong, whereas a marker post would certainly have been vandalised. The thong stayed put.

serve themselves – at first in the physical sense, but ultimately in a spiritual sense.' (Cook1989 p. 13).

Ethics have been codified in laws (although not without compromise), but primarily in religion. Religious and spiritual belief systems are, arguably, emergent properties of social organisation, drawing from interactions between people and their environments to generate patterns of belief which enhance the prospect for survival. As a consequence, apart from addressing spiritual aspirations, religion is a means of structuring ethics that have a functional purpose, e.g., both Islam and Judaism evolved in environments where meat could not easily be safely stored and both religions include edicts not to eat pork.

Despite the centuries of deadly disagreements that have been fueled by competing interpretations of religious doctrines, none of the world's major religions seem to disagree in their fundamental purpose, which is to ensure the survival of the people who hold to their beliefs. Strip away the detail and all major religions, one way or another, exhort us to look after ourselves and avoid damaging each other. Basically they all say 'do not undermine the basis of civilisation because we'll all suffer the consequences if you do'. In that sense, the whole Earth is a sacred space.

Gendered Space and the Power of Form

For the purpose of this discourse, invisible structures are those patterns in behaviour and thought that are manifest in ways that do not create built form. To a certain extent, built form itself can determine behaviour – if you are surrounded by high walls your freedom of movement and capacity to communicate with others is obviously restricted. The invisible structures of society eventually find physical expression: wealthy people build bigger houses than poor people, fascist regimes build detention facilities for people with traits they consider undesirable, and so on. Winston Churchill is supposed to have said 'We shape our buildings, then our buildings shape us.'

According to Spain (1992) geographers have been particularly strong advocates of efforts to integrate spatial issues with social theories. Nevertheless:

> Geographers are the first to point out the folly of 'spatial fetishism,' or the idea that social structure is determined by spatial relations. Yet it is also true that once spatial forms are created, they tend to become institutionalized and in some ways influence future social processes. Although space is constructed by social behavior at a particular point in time, its legacy may persist (seemingly as an absolute) to shape the behavior of future generations
>
> (Spain 1992 p. 6)

Spain provides one of the best elucidations of the effect of gender in determining, or influencing, spatial arrangements in the built environment.

In the design, development and maintenance of ecocities there are innumerable opportunities to make deliberate or accidental determinations on the shape of behaviour of present and future generations. Ecological health and social health are intertwined because we are social creatures and cities are social constructs. If gender prejudices are not addressed overtly they will be dealt with, or cause problems,

covertly. Just as there is embodied energy in the making of the built environment, so there is embodied value in built form. The spatial structure of buildings is a result of the builders' knowledge of 'taken-for-granted rules that govern relations of individuals to each other and to society' (Spain 1992 p. 7). Buildings embody social relationships. In cities, historically 'Hierarchical social relations produced hierarchical space; egalitarian relations, egalitarian space'. (Bookchin 1986 p. 148).

An ecological society would contain certain social relations. In order for information flows to be maximised and to ensure that knowledge and responsibility for action are well distributed in society those relations would need to be open and largely equal, i.e. based on networks rather than top-down hierarchies. Social systems approach this model as they become more democratic in their organisational form. Bookchin tells us that spatial segregation '. . .is one of the mechanisms by which a group with greater power can maintain its advantage over a group with less power. By controlling access to knowledge and resources through the control of space, the dominant group's ability to retain and reinforce its position is enhanced.' (Bookchin 1986 p. 15–16). One can see this spatial expression of power historically very clearly in towns dominated by castles – or cathedrals. But whereas secret, or controlled, knowledge is about dominance, 'Shared knowledge can bind the members of society together.' (Bookchin 1986 p. 16). An ecologically responsive society would need to share information freely. The management structures of urban environments containing multiple networks of systems (water capture, storage, re-use and reticulation, power capture and distribution, waste-as-resource management) would need to have good effective two-way information channels to incorporate sufficient feedback to retain the responsiveness necessary to avoid systems failure. The requirement for sharing information as the basis of efficient resource management is also a primary precondition for truly democratic social systems.

In shaping the space of an ecological city, care needs to be taken to ensure that gender segregation is not unnecessarily reinforced by spatial segregation. Although there may be instances where it is deemed necessary, this should always be carefully considered against any relative access to knowledge that may be implied in any such segregation. When set in the context of indigenous and traditional cultures, such a precept can be challenging. Places of 'secret men's/women's knowledge' have become totemic items in Australian debates about indigenous land rights. Whilst respecting the value of such cultures, the positive, liberatory character of city life (Bookchin 1986, Kropotkin 1914) should be taken as the touchstone for decision making regarding gendered space or the creation of any places of restricted access or privileged knowledge. Historically, as Uitz (Uitz 1994) has shown for medieval Europe, city-making has a demonstrated capacity for liberating women.

9.3 *Encourage Community*[6] – Democracy and Citizenship

> Put bluntly and clearly, the municipality would become a theater in which life in its most meaningful public form is the plot, a political drama whose grandeur imparts nobility and

[6] Ecopolis Development Principle 8.

> grandeur to the citizenry that forms the cast. By contrast, our modern cities have become in large part agglomerations of bedroom apartments in which men and women spiritually whither away and their personalities become trivialized by the petty concerns of amusement, consumption, and small talk
>
> (Bookchin 1995 p. 232–233)

A kind of ecological politics is seen in the work of groups like Urban Ecology Australia in our advocacy for the Halifax EcoCity Project. In pursuing ways to bring the ecocity idea into being, we treated the city as a 'theater in which life in its most meaningful public form is the plot.'

Colonisation, Consumers and Citizenship

> 'Oh! Foxy Loxy!' said Chicken Licken. 'The sky is falling down and we are on our way to tell the king.'
> 'I know where to find the king,' said Foxy Loxy. 'You had better all follow me.'
> (Traditional)

It is tempting to blame modern, 'Western' society for our global detachment from the natural world as if, at some point in time, there was a 'decision to expand our use, or throughput, of resources with no thought of the consequences' (White 2002, p. 5), but it was, in some ways, an historical accident that industrialism began on an island just off the shore of Europe and wherever it had begun its consequences would have been similar. Japan also rapidly adopted and developed industrial production techniques and an associated consumerism whilst being firmly located, culturally and geographically, in the 'East'. Exploitation of the natural world is intrinsic to human behaviour and simply manifests in different ways, with those manifestations determined mostly by technological capacity and partly by cultural history. Modern Western society may have lost much of its capacity to connect with the natural world but its deeper cultural history displays as much awareness of that world as anything Eastern. To view the world's problems as somehow the fault of the 'West' is a continuation of the mindset that set the forces of cultural imperialism loose in the first place. The rise of China in recent years and its exploding industrialism and urbanism has been through methods as voracious, rapacious, economically exploitative and alienating of the natural world as anything ever produced in the West.

In this book I have attempted to deal with city making as an intrinsic part of what it means to be human. The ways in which we do things vary according to cultural norms but the environmental pressures come from the same kinds of place and the imperatives to build come from the same physiological make up.

Inherent in the proposition that a single set of principles can be universally applied to achieve place-specific, ecologically and socially appropriate human settlements is the proposition that there is an appropriate way to colonise a given environment so as to create the conditions for human settlement (with all that it contains and implies) that can be sustained in the long term. The logical extension of this is that if the principles are sufficiently fundamental and robust they could just as well guide the creation of star-ships and extra-terrestrial settlement.

Historically, people have often defined themselves by what they do, rather than who they are. This is reflected in the nomenclature that gives us Smith, Miller, Carpenter. Many cultures have adopted appellations that equate who they are with where they are (Williams 1978). Individuals, families and tribes have also defined themselves by where they come from. Whereas 'Smith' was a name capable of carrying its relevance into the industrial age through its engineered metallic resonance, it is of little more than quaint interest in the post-industrial era. The association of a person's sense of being with their occupation has been strongly linked to economic structures, so much so that at the societal level it was possible for Karl Marx to define entire classes of society in relation to the mode of production. This way of thinking remains dominant, even as we enter the post-industrial era. We see it reflected in the politics of economic warfare as trade unions continue to fight 21st century capitalist dynamics with theory and praxis developed in the 19th century. We see it in the urban sphere as planners relate their theories of what is desirable to the mode of doing. Instead of defining citizens in relation to the mode of production, however, they define them in relation to the mode of consumption instead. Planners do not plan anymore for citizens, they plan for consumers.

Figure 66: Citizens are becoming consumers of the urban environment, with a progressively reduced capacity to influence its making, shaping and maintenance (*Downton/Dumbleton 1977)*

By abandoning the powerful idea of citizen in favour of the concept of a consumer, one sees recognition, at least, of the loss of identity previously provided by place, community or productive occupation and its usurpation by a partly post-industrial concept. The idea of consumer allows for mobility, change, and endless variation in patterns of activity, including variants of political and cultural expression, without any threat to the status quo provided the activity of consumption is maintained. If a smith stopped smithing, it was hard to replace them, their skills were handed on through the family from generation to generation and it was no simple matter to find, locally, the same knowledge and ability. If a worker moved on, because their fundamental value to the production process was based on their unskilled labour, they were replaceable. Even as they moved on, however, they were likely to remain in their class precisely because they had no skills to do otherwise. Consumers are a more exploitable commodity because they can have any number of skills, move from place to place, change their voting patterns, develop hobbies, change their whole life's direction at the personal level, and yet be no threat at all to the prevailing economic order provided they continue to consume.[7] The capacity of consumers to switch their preferences and move on when they are dissatisfied is part of the social control system that creates the illusion of freedom which Corbett, the pioneering developer of Village Homes, described very neatly:

> One of the tactics of social control is to persuade people that they are free. In our culture, this is done by encouraging the myth that today's mobility, anonymity, and lack of roots in community and family constitute personal freedom. A closer look shows that this 'freedom' consists less of freedom to direct one's own life than of freedom to respond to the demands of the economic and technological system
>
> (Corbett 1981 p. 21)

By accepting the dominant economic paradigmatic definition of personal value, planners who plan for consumers favour the redundant definition derived from activity and deny the value of citizenship. They run the danger of planning on the basis of definition by opposition and vested interest. Just as the trade unionists fail to deal with the dynamics of contemporary capitalism by working with adversarial definitions of purpose provided by the context of factories and industrialism (the patterns of activism and negotiation adopted by trade unionism are almost always entirely framed by the context set by the employing capitalist interest) so acceptance of definitions based on consumption and its attendant values will serve the interest of that system primarily, and the people so defined secondarily. It is not in the interest of citizens to be defined as consumers by those that plan their urban environments.

Interestingly, the concept of citizen is, in a sense, place-specific, inasmuch as it determines the place of habitation as urban rather than rural. But whereas a consumer lacks rights other than those that relate to the purchase of product, a citizen

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[7] In a system that depends upon consumption, one wonders whether the antipathy towards the unemployed is not exacerbated because not only do they not produce, but their capacity to perform as good consumers is also reduced.

has rights that cover all aspects of daily existence. The fact of a city is a powerful expression of the inherent human need for interdependence. Cities contain differences, and are unlikely to work well as single issue or ideologically limited environments. Cities are remarkable for being successful because of internal diversity rather than in spite of it.

The political power of cities is undeniable, and history has proved its worth as a cockpit for confronting forces in social change, the demonstrations against globalisation in Seattle, Melbourne and elsewhere being relatively recent examples. Douglas (1983 p. 202) cites the observation of Cullen and Knox (who, he suggests, are commentating in a manner that sees planners as social regulators and 'middle-class social designers') that the construction of garden suburbs was a response to fears that the overcrowding of the proletariat in industrial cities would lead to insurrection. In more simply centralised societies it may be possible to rapidly initiate develop whole new cities, like Dongtan in China, but in the long term there is danger in the more brittle authoritarian approaches to urban change. There is some evidence that for long term (but not too rapid) change, democratic societies are engineered better – they know it is better to allow for movement rather than risk catastrophic breakages.

The Passively Educated

Nearly every year from 1995 to 2001 I conducted informal research into the nature of modern Australian citizenship by asking students in my Urban Ecology and Urbanity & Landscape classes how many considered themselves to be citizens? Out of a class of 30 or 40, only one or two would raise their hands, after then being asked what rights they had as citizens the typical, often the only answer was, 'the right to vote'. When asked how many considered themselves to be consumers, nearly all raised their hands – and when asked what rights they have as consumers the response was 'the right to choose what I buy.' Although these straw polls lack statistical significance, as snapshots of the knowledge base of Australia's better educated young people (generally aged 19–22) it does suggest that the civic realm is in a parlous state.

Industrialisation and Urbanisation

Urbanism is not invariably regarded as positive; there is a residual sense of there being an Orwellian refrain of 'rural good/urban bad' in the soundtrack of modern culture, epitomised in Australia by the myth of the bush and in the planning culture of the western world by the Garden City (Jacobs 1962). Dictionary definitions of 'urbanise' includes the destruction of 'rural quality' as if that were intrinsically a

bad thing[8]. Environmentalism, inasmuch as it is a coherent movement, has been guilty of seeing the environment as 'out there' rather than being inclusive of the human environments of cities (Doyle 2000 p. 215). But the promise and misery of urbanism have been variously understood and lovingly documented for centuries, and against a background of different times, cultures and locales, it is possible to discern the positive aspects of urbanism. Urbanism is generally associated with positive connotations such as the livability of cities (Crowhurst and Lennard 1995) whereas urbanisation is inextricably part of industrialisation and has to be understood as an historical process. Bookchin differentiates between urbanisation and city-making as an essential epistemological prerequisite for understanding the intrinsic merit of urban life (Bookchin 1992, 1995).

The Politics of the City

> Throughout history, from ancient Athens to the Italian city-states of the Renaissance to Rousseau's Geneva and the Paris Commune, urban life has been a crucible for democratic ideas and experiments. This remains true today. From Mexico City (where the power monopoly of the PRI has been broken) to London (where the Ken Livingstone campaign fights the whole party system), urban politics challenges the agenda of the political class
>
> (Swift, 2000, p. 12)

> Regional and town planning and urban design are emotive subjects as perhaps they should be, and cannot therefore be separated from politics. . . .
>
> (Hugh and Roberts, 1979, p. 16–17)

Historically, citification has created freedoms that are valuable because they are to do with power relations that are not mediated by the state, nor trammeled by traditional social prejudices. It has provided '. . .an image of a political realm that is neither parliamentary nor bureaucratic, centralized nor professionalized, social nor statist, but rather civic in its recognition of the city's role of transforming a folk or nomadic agglomeration of individuals into a citizenry based on ethical and rational modes of association.' (Bookchin 1986 p. 167–168).

'Urban Ecology' and 'Ecocity Builders' were both founded by Register on the basis of the idea 'that cities can be consciously designed for the health of natural and human-built environments'[9]. Register is certainly committed to direct democracy and social justice but has seen examples of actions by others and processes that have caused him to be wary. In a letter to Hoyle and the myself in 1992, for instance, he writes "I've seen some of the best of Urban Ecology shot down by some of the worst elements of the 'community' in open process. Democracy in my mind is far better

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[8] 'Urbanise: destroy the rural quality (of a district)' in The Australian Concise Oxford Dictionary 1992.

[9] Open letter from Richard Register 6 July 1999.

than its lack in public process, but it also has limits, contradictions, and is no better than the people employing it."[10]

From the Invisible to the Inspirational

It is not enough to deal merely with econometric issues. As with all political issues that reach beyond the hip pocket, ecocities must have a visionary quality and some degree of moral imperative in order to capture people's attention, more so, to attract people's engagement and commitment to the processes that might make such cities come to life. An important aspect of the HEP and other ecocity programs has been the idea that they are non-party political in their conceptualisation and realisation. Cities are places which *contain* political difference. Their great virtue as human institutions is that they are open to all. If ecological cities are to arise they cannot be so ideologically constrained as to exclude people on the basis of ideology.[11]

Environmentalism, when it is reduced to formulaic politics, can be as dreary and uninspiring as any other political issue.[12] Bookchin reminds us that mainstream politics is problematical in its dearth of purpose other than the mundane.

> Far more than the Right, which practices egoism and class war against the poor even as it emphasizes community virtues, the political middle ground and the Left take up the eminently practical issues of bread on the table and money in the bank, but offer few values that are socially inspirational
>
> (Bookchin 1995 p. 239)

One has to turn to the playful and challenging missives of Debord and the Situationists to find political programs that transcend the daily grind and offer urban visions which go beyond the rehashed consumerism we are used to being told are 'imaginative'.

Ecopolis programs offer the prospect of visions and purpose that can be addressed and understood at the level of individual citizenship. The city is readily understood as a place and as a home. Despite its ever-present mercantile aspect, the city is still seen as more than just a place for commerce. Just as people can be excited and motivated to build their own home, so they can be excited and motivated

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[10] Personal correspondence from Richard Register to Paul Downton and Chérie Hoyle 5 September 1992.

[11] This is not to say that ecocity development can proceed without paying heed to politics. When Wirranendi was seeking to engage a concretor to lay the slab for the 'Roman Hut' at Christie Walk I rejected the lowest tenderer despite his tendered price and technical qualifications to do the job because of his fondness for extremely bad language, propensity to indulge in racist vilification, and support for far-right extremist organisations. He was told this, in the interests of open and clear communication. The concretor that was engaged was slightly more expensive and less skilled, but the quality of the overall project was, arguably, improved by the exclusion of the first tenderer.

[12] This is superbly described in Doyle's exploration of party-political/environment-movement interfaces in 'Green Power'.

to address home-making at the neighbourhood and community scale, and at the scale of cities when they are not too large. This is one of the tenets of the Ecopolis theory and it is tested to various extents in the Australian Ecopolis projects. The experiences in Whyalla are of particular interest in respect of the relation between community politics and ethical action.

9.4 Promote Social Justice and Equity[13]

> The Greek word for city, polis, meant far more to an Athenian like Pericles than a place on the map; it meant the place where people achieved unity
>
> (Sennett 1996 p. 39)

An ecological city would encourage community values and community participation at every level of activity. How would this effect city form? Apart from obvious urban accoutrements like civic squares and meeting places it means that building codes should incorporate measures which encourage day-to-day social interaction. In Seaside, Florida, for instance, the developer enforced code requires all houses to have a porch and that those porches should not be further than a few feet from the street – so that house occupants can be within chatting distance of passersby (Duany et al. 1989).

Social interaction is a pre-requisite for all trade, education and entertainment. It is central to the achievement of a sustainable environment as it is through society that all exchanges take place which determine the impact of that society on the physical environment. In contemporary capitalist economies, human beings are regarded increasingly as consumers of products and services rather than citizens. In Adelaide, for instance, the Town Hall now has a 'Customer Service Desk'.[14] This limits the definition of a person to the relationship they have to the systems of consumption rather than the totality of their relationships with each other and the environment as a whole. The concept of a consumer in this sense is unecological.

Double Plus Ungood

The concept of a citizen defines a person in relation to civil society and thus to all other citizens and to the environment that supports and is affected by the urban constructs of civil society. The idea that a consumer is equivalent to a citizen is a denial of civic value and employs a perversion of language as corrosive as the 'double plus ungood' of Orwell's 'Nineteen Eighty-Four'.

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[13] Ecopolis Development Principle 9.

[14] The role of 'customer' is paralleled by the role of 'stakeholder'. Both are defined in relation to their mode of consumption rather than their status as citizens.

In considering the form and functions of urban environments so that social and economic equity are built into design strategies at every level, the issue of local control becomes pivotal. Local control reduces the extent to which external factors can hold a community in thrall. There are a number of levels at which this concept can be applied from the local neighbourhood to the bioregional scale (the Murray-Darling River Basin, for instance). Having people live where they work is a key element in obtaining effective and meaningful levels of local control, reduction of commuting is important in obtaining better energy efficiencies and both measures lead logically to concepts of 'proximity planning' (putting workplaces near to habitations) and 'proximity hiring' (favouring local people for employment, all other things being equal). This was put into effect with the building of Christie Walk.

Expropriation of the Public Domain

> The *urbs* in Roman usage were the physical facts of the city, its buildings, squares, streets, as distinguished from the *civitas*, the union of citizens or body politic. That the two words were not interchangeable until late imperial times when the very concept of 'citizenship' had declined, indeed to be replaced by caste-oriented names and subjects of the Roman imperium, tells us a very poignant and highly relevant fact
>
> (Bookchin 1986 p. 168)

Civic society requires public space for social exchange. The fluidity of social interaction is conditioned by issues of safety and control of space. Certain preoccupations with safety can lead to expropriation of the public domain by particular economic interests. Expropriation of public space for private use is exemplified in the shopping mall culture in which indoor/outdoor relationships become mediated by control over access and where young people with minimal purchasing power are discouraged from 'loitering' in malls because they are seen as a threat and as poor customers with low disposable incomes. These places became social gathering spaces after the displacement from streets and markets of what had been public domain. Temporal constraints and economic imposts changed the nature of the space from public to privately controlled pseudo-public space. The result has been an environment in which young people are only catered for as consumers, their freedom of movement is restricted and they may even suffer from being seen as threatening to public safety and security.[15]

The social role of streets and public spaces in cities is widely recognised in urban design literature (Gehl 1987, Sherlock 1991, Crowhurst and Crowhurst 1995, Ben-Joseph and Southworth 1997, Webb 1990), their central place in community has been understood by the most acute urban observers since the 1960s (Jacobs 1962), and Engwicht identified their crucial distinction as 'exchange space' (Engwicht 1992). The knowledge that streets are important is embedded in popular culture;

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[15] Safety is being increasingly defined legalistically, in relation to liability, rather than in respect of human response to the experience of being in the environment.

typically it is the critique of non-streets and bewilderment of being in 'modernist' space that flavour the perception – although the idea of 'dancing in the street' is something of a cultural touchstone.

As emphasis on individual property and space has increased, the public environment has suffered a concomitant decline in quality and distinction through the neglect visited upon the commons. Ecological architect Van der Ryn and new urbanist Calthorpe describe how privatisation of the public realm has diminished both private and public space, and '. . .private space is strained by the physical need to provide for many activities which were once shared, and is further burdened by needs to create some identity in a surrounding sea of monotony.' (Van der Ryn and Calthorpe in Engwicht 1992 p. 134–135). The reality of life for the modern consumer/citizen is often one of alienation and spatial arrangements that erode any sense of society at the same time they demand more consumption:

> The buildings along the eerily empty sidewalks are devoid of ads, because there's nobody on the streets to advertise to. The citizenry are indoors, it turns out, plodding between muzak-haunted car parks and climate-controlled office blocks on a network of enclosed above-street bridges called the Skyway. In an instructive illustration of the way that inner-cities all over America have out-sourced themselves to circulating strip malls, doing something as prosaic as buying a notepad to chronicle one's ennui necessitates 30 bucks' worth of taxi-rides to the nearest Wal-Mart
>
> (Mueller 2008 p. 63)

The privatisation of space is dependent on the concept of ownership and with it, relationships are increasingly reduced to, and defined by, economic exchange. Debord (1970) warned that this is part of a process in which culture is transformed into commodity, and in such a scenario then architecture, even as it represents culture, would be destined to become entirely defined by its value as commodity. This, in turn, presages an urban environment in which the privatisation of all built space and form leads to and supports the commodification of all relationships. City design at micro and macro level is both a result of, and as a means of defining economic and social exchange and there are values embedded in design decisions that are nominally 'functional'.

Built form embodies values. Sennett tracks the built form of prejudice. He explains and describes, for instance, the social and cultural mores that led to the creation and maintenance, through centuries, of Jewish ghettos (particularly that in the Venetian middle ages). Having identified some of the historical and current sicknesses of societies and their refraction into urban form, Sennett goes on to ask, nonetheless, '. . .if there is any chance in a multi-cultural city, against all the odds of history, that the differences between people racially, ethnically, sexually might become points of contact rather then grounds for withdrawal?' (Sennett 1996 p. 257).

Patterns of Space

> Medieval Cairo and medieval Paris formed a telling contrast, though to the modern eye they might have seen equally jumbled. The Koran lays down precise instructions for the

> placement of doors and the spatial relationship of doors to windows. In medieval Cairo, land owned by a Muslim had to be built to these instructions, which were enforced by charitable foundations in the city. Such buildings, moreover, had to relate in form to one another, had to be aware of one another; could not, for instance, block a neighbour's door. Religion decreed contextual architecture, though the context was not one of linear streets
>
> (Sennett 1996 p. 191–193)

Apart from its large public buildings, the traditional city developed as a series of small sites and even the grid-iron new world cities of the USA developed on the basis of small lots (Ward 1989 p. 22). Ward argues that this fine grain was part of what made the city legible – understandable by ordinary people without the need for signs to tell them where everything is. 'The functions and functioning of the city were apparent from its built form.' (Ward 1989 p. 22). It is important to realise that simplicity does not equal legibility when it is to do with the urban fabric. Not only was fine-grain development 'transparent' to the user, it assisted in establishing the sense of place (Ward 1989 p. 22). The build up of many smaller experiences and their intrinsic patterning of relationships through a process of evolved use through time gave a structure to the environment more subtle, pervasive and accessible than that found in modern master plans.

Boundaries, Edges and Connections

There are no hard boundaries in nature, all edges are permeable and realms of connection, be they skin or the transition zone between ecosystem biomes. In human relationships we do not grow a carapace or harden our hearts unless we are in conflict or at war. Thus instead of defining places and spaces primarily in terms of their separation, we should define them by their *degree of connection*.

Special places are not then defined by their difference from other places but more by the way certain characteristics of a place connect it to particular qualities, characteristics or experiences that have special value, meaning or practical application.

The functionality of urban environments depends on the successful articulation of the relationship of connection and separation between private and public realms. The private/public space relationship often corresponds to inside/outside spaces and to degrees of enclosure. Just as natural boundaries do not have hard edges but are zones of transition between one condition and another, so the transition from one type of space to another in the design of human space should not be regarded as passing through a 'hard' boundary, but be seen as passage through a threshold of intermediate space which can be understood as corresponding to an ecotone within the urban ecosystem. Being the place of interaction, transaction and transition, this interface, edge, boundary zone or urban ecotone is a critical area for consideration, analysis and management.

In urban design, these places of transition may be more, or less expressed with boundary markers. Gateways and thresholds create a sense of arrival, or leaving, and alert people moving through them that the nature of the place/space is changing. An

effective gateway controls access by providing appropriate information about movement between different zones of space. Aspects of moving through, experiencing and comprehending space include:

- nodes
- landmarks
- inner and outer realms
- gateways and openings
- pathways
- courtyards
- labyrinths and spirals
- centres and gathering spaces

These can be used as formal, or intentional, planning devices to define the quality and perceived dimensions of urban space (see Chapter 7 for a description of urban design workshops as part of the Whyalla EcoCity Development program). In the long term ecological planning and design has to address the capacity of places to function through time by having sufficient inherent flexibility to adapt to changing circumstances, because as Brand showed, even with the built environment the only certainty is change (Brand 1997).

Planning and design for ecologically sustaining environments should reflect the awareness of transitional space and urban ecotones at the macro and micro level as a means of demonstrating environmental and experiential sensitivity and environmental fact. (Ecopolis 1998 p. 55). In the following matrix I have identified six boundary conditions that derive from consideration of the relationship between public and private domains in urban environments and which thus require particular attention in design as places of interface and exchange, i.e. between areas of

1. Private/private.
2. Private/semi-private.
3. Private/public.
4. Semi-private/semi-private.
5. Semi-private/public.
6. Public/public space (see table – adapted from Ecopolis 1998 p.).

Table 17: The Public-Private Interface

1	**private**	boundary zone of transition	**private**
2	**private**	boundary zone of transition	semi-private
3	**private**	boundary zone of transition	**public**
4	semi-private	boundary zone of transition	semi-private
5	semi-private	boundary zone of transition	**public**
6	**public**	boundary zone of transition	**public**

It is in these zones that the built environment can either facilitate or mitigate social interaction. For instance, windows that open enable human interactions that sealed windows cannot. If the planning of the built environment forces people to

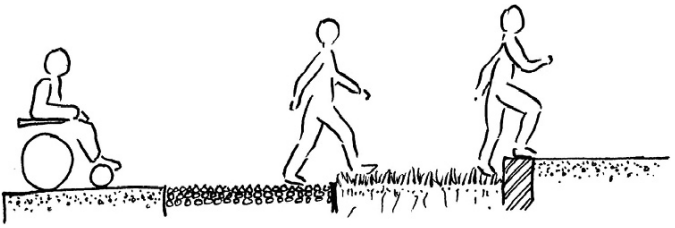

Figure 67: One person's barrier is another person's tactile sensation and may be a visual amenity to both

use cars to travel between all their required destinations (e.g. home, school, office, park, shops etc.) their capacity for spontaneous interaction is greatly diminished compared with planning designed around pedestrian traffic. Engwicht's 'exchange space' is a zone of transition, or ecotone, in this model. The design of boundary environments is intimately linked to ideas of regionalism and environmental responsiveness (see Frampton Chapter 4.3). The 'establishment of bounded domains and tactile presences' (Frampton 1987 p. 22) can mediate social interaction in both obvious and subtle ways. A visual amenity may be a barrier for one person and simply a tactile sensation for another, as in the above illustration.

The Communal Eye

The character of public spaces is crucial in cities. The perception of space and place in urban environments, as well as being something an individual experiences, is also a collective vision.

> Through public discourse we need to develop again this 'communal eye', this vision of the characteristics of the buildings and places that are valued, that give a sense of place, identity and meaning to the city. And to facilitate this, of course, we need to create public spaces, streets and squares that are hospitable to social contact, connection and civic dialogue
>
> (Crowhurst and Crowhurst 1995 p. 9)

This visual amenity is integral to the creation of built environments as places of social interaction, and thus the human ecology of the city. Any attempt to achieve ecologically sustaining built environments has to support the concept of aesthetic values being generated and informed by an active citizenry, in effect, making the establishment of cultural values a conscious enterprise. We see the world with a cultural eye (see the discussion on aesthetics in Chapter 5 and the reported observation that 'It is only a century ago that mountains were looked upon as hideous.'). Part of that cultural seeing is done with 'mental maps'.

Cognitive mapping is intimately related to the perception of place. Mental maps represent the world as we see it through the filters of experience, with a hierarchy of representation so that the things most important to us loom large in our vision and memory and the less important things assume smaller proportions (Gould and White

1974). Mental maps also distort distance on the same basis of importance relative to the experiential observer. Cognitive mapping may be a useful tool in community participation and education programs, for instance during site identification, analysis and planning processes, and in establishing functional (i.e. socially and culturally relevant) bioregional boundaries (as was done in the Bioregion Workshops for the Whyalla EcoCity Development).

The following diagrams indicate how the concept of cognitive mapping might represent a change in perception of place according to an individual's level of environmental awareness.

A. The 'real' map of a place

B. How it might appear to an 'industrial/suburban' consciousness

C. How it might be mapped by someone with an 'ecological' consciousness

Figure 68: Perceptions of place

In B and C key environmental elements are drawn with a size and emphasis related to their perceived importance. Neither are 'correct' and both are 'true'. This hints at some of the potential difficulties inherent in trying to balance the complex, inter-related, socio-environmental issues associated with the perception and understanding of place in relation to city-making and ecology.

Access and Movement

Vehicle movements can sever or damage other social interactions by making foot traffic difficult or dangerous. This has been well documented by Appleyard and others (Engwicht 1992). Access issues are integral to planning all built environments. Pedestrian movement should be paramount, and integrated with other transport systems. If ecologically sustaining built environments are defined as low energy use, community oriented environments then they have to integrate access and movement such that energy use is minimised and social interaction is maximised. Appropriate strategies for achieving such human-oriented integrated planning are well documented, e.g. Topp presented Ten Simple Rules of Transportation Planning at the 1st International Making Cities Livable Conference (Crowhurst and Crowhurst 1995 p. 77) that spell out the key issues of access and movement and address integration, and in 1988 the European Parliament adopted a Charter of Pedestrians' Rights (Engwicht 1992 p. 165–166).

Access issues are integral to planning all built environments. If sustainable built environments are defined as being low energy use, community orientated environments, then they have to be the result of integrating access so that energy use is minimised and social interaction is maximised.

A number of studies have supported this approach. Sustainable urban environments can also be characterised as 'livable cities'. The following is from a presentation by Hartmut Topp (Crowhurst and Crowhurst 1995 p. 77):

Ten Simple Rules of Transportation Planning (abridged)

1. . . .accommodate the real needs of people. Do not forget the children, the elderly and the disabled. Prepare your plans and programs in cooperation with the public. . . Urban planning and transportation planning is a social, psychological, ecological, economic, architectural, and engineering job.
2. The prosperity of a city does not depend on private car traffic, but on accessibility in general, on the amenity of its streets and open spaces and. . . on its genius.
3. Transportation and land use must be balanced. Mixed land use must be achieved to reduce journey distances. High density with mixed land use is effective from the transportation point of view.
4. Mathematical modelling of traffic behaviour and traffic volumes is an important preparation for decision making. But don't stretch it. . .
5. Observe the environmental ranking of transportation modes: walking is preferable to cycling, cycling is preferable to public transit, transit is preferable to private car traffic.
6. Urban streets are open spaces for the general public. Consider all functions of a street – social life, strolling around, providing access to buildings, being a transportation facility. . .
7. With increasing density the need for traffic regulations and their enforcement grows rapidly.
8. Most important, especially in high density areas, is urban design and architecture according to human scale.
9. The ground level of streets has to belong primarily to pedestrians and cyclists, including wide sidewalks, bike lanes and crossways over the driving lanes.
10. Provide more plantings and trees within the streets, including facade and roof planting. . .

9.5 Contribute to the Economy[16]

> Howard's truly original achievement, however, was to associate the new type of city with common ownership of land, not solely as a way of controlling its initial plan and future growth, but equally as a means of securing for the inhabitants the source of wealth and distributing its future benefits for the well-being of all
>
> (Beevers 1988 p. 183)

[16] Ecopolis Development Principle 6.

Society constructs money economies as a convenience for facilitating the exchange of goods and services. Cities are constructed to provide for that same purpose, but that is by no means their only purpose. An economy is not a city, neither is it a society. The Ecopolis proposition regarding the economic role of land ownership and development is, at root, not dissimilar to Ebenezer Howard's. It enjoys some of the same problems, prospects and contradictions that derive from trying to work within the prevailing economic order in order to change that order. It is driven by the same concern to precipitate change and produce practical examples because of, and in spite of, the extant conditions of the latter-day economy and society in which it has been conceived.

Just as Howard's Garden City concept, in its full realisation, involved shifting patterns of ownership, so the full realisation of Ecopolis ultimately requires moving from an exploitative economy to a more holistic and inclusive set of symbols and systems for exchanging value. Sketching a similar scenario to Magnaghi with his ecopolitan urban villages and resurrected landscape in which there are 'activities such as providing accommodation for farm and educational tourism and the construction of local economic systems' (Magnaghi 2000, transl. Kerr 2005 p. 131), Fisher suggests that 'The visible face of the holistic economic foundation is the human-scale city and an associated rural hinterland of organic farming and restored or protected natural eco-systems.' (Fisher 1997 p. 206).

In the prevailing view of society 'the economy' is not holistic, yet it is taken to be the primary force behind all things. The idea that everything can be reduced to econometrics is a form of reductionism. It is only rational inasmuch as it constructs mathematically logical paths for transactions within a framework that excludes more than it includes. Whilst environmentalists are correct to point out that the economic system fails to take account of any number of externalities, they should be cautioned that putting a price on nature in this fashion is a way of accepting the dominant paradigm that may play into the hands of those who would reduce the measure of everything to monetary values. In arguing the economic base for any social system or means of valuing nature, the costing of externalities, for instance, should only be seen as a partial and tactical response to giving appropriate value to that which is not otherwise explicitly valued in the economy – lest we fall into the old trap of knowing the price of everything and the value of nothing.

The market does not regulate itself, except inasmuch as it responds to given set of conditions. Those conditions are set by socio-cultural constructs, i.e. human inventions, not by 'natural' external conditions. 'There is no feedback mechanism between money, as a mechanism of allocating resources, and the environment.' (Turnbull 1993 p. 15). Those human inventions include regulation and when regulation is carefully constructed to address real issues it can provide considered, sensible constraints to human behaviour in the market place. Without such regulation markets neglect the interests of the public good and do only what they are best at, which is maximising financial return to the owners of the means of production. Without regulation, children would still be eating sweets flavoured with lead.

Society and nature possess inherent worth that need not be quantified in an economic system in order to be valued. Society constructs money economies as a convenience for facilitating the exchange of goods and services. Cities are constructed to provide for that same purpose, but that is by no means their only purpose. Even city marketplaces have historically served as more than just spaces for economic exchange, as Mumford points out 'Not indeed until the automatism and the impersonality of the supermarkets were introduced in the United States in the mid-twentieth century were the functions of the market as a centre of personal transactions and social entertainment entirely lost'. (Mumford 1991 p. 176). In more dispassionate analyses "A general view shows that what 'drives' environmental change tends to be economic pressure, and what 'drives' economic activity tends to be social needs and demands." (Ravetz 2000 p. 3) The proper place of an economy is in the service of society.

The Development Process

The table below was published in academic papers and included in the booklet prepared by Urban Ecology Australia documenting the Halifax EcoCity Project. It was compiled in order to draw attention to some of the invisible structures associated with creating built environments and spell out some essential parts of the theoretical basis of the Project. It may be an overstatement of the differences between approaches to development and is value-laden, but it *is* intended to be provocative. The two columns do not present a pro- or anti-business perspective but show the polarities of the spectrum of values that can be applied to a commercial process. The best of modern business tends to operate at the right-hand end of the spectrum. In a similar vein, the Ecopolis Development Principles (described in their later

Table 18: The Development Process *(PFD 1994)*

	Conventional (Greed Driven)	**Ecological (Community Driven)**
Goal	Merely to make a large profit	To meet community needs and aspirations
Means	Land speculation & community exploitation	Land nurturing and community empowerment
Financial resources	Borrowing from anywhere – mostly banks with profits exported	Ethical investment & LETS – returning resources to the community
Material resources	Anything 'convenient' –Market driven, expedient, capital intensive	Carefully selected – Healthy, environmentally responsible, region specific, labour intensive
Politics	Exclusive, sometimes corrupt, expedient, ego-centric	Inclusive, ethical, open-process, ecocentric
	Nature & people treated as the fuel of economic activity	The economy in the service of the community & the ecology

form in Chapter 11) were designed to make explicit a set of ideas for ecological, community-driven development.

Regardless of ethical concerns about the use or abuse of financial power, there are sound, economically pragmatic reasons for investing in ecocity development that, hopefully, can encourage governments and other developers of the built environment to head down the ecopolitan track. Making a city from scratch costs a huge amount in infrastructure and if the decision is made to build an ecocity then it is more about directing financial resources towards different ends rather than requiring more money. For instance, a conventional new city requires many kilometres of roads, which are very, very expensive to build, if the same money is put into a compact city form, it can go towards pedestrian friendly environments and good transit. Compact, walkable cities have intrinsic economy in them with the shorter runs of pipes and wires. The total amount of energy used by conventional, car-dependent sprawl cities is much greater than that used by more compact cities. An Ecopolis costs less to run.

Retrofitting existing cities and redeveloping them as ecological cities is the real challenge, one that noone has really taken on board yet. Existing cities require many changes that cannot happen all at once and which also have to be accommodated by an existing population. Things like inappropriate sprawling road infrastructure have to be remodelled and so forth but as our imaginary, invisible structures of value have to confront the evermore inescapable reality of ecological dysfunction and climate change the economics also change. Already, we are seeing that as energy from fossil fuels gets more and more expensive the use of renewables is becoming financially sensible as an investment for the future.

LETS

> And given a fundamental level of economic self-reliance in the human scale it is far more likely that people can, to a greater degree, sustain the basic elements of life by their own direct efforts. None of this need be incompatible with the functioning of a sophisticated wider economy and culture. It is more about changing priorities and restoring an underpinning foundation of social cohesion
>
> (Fisher 2000 p. 33)

The Local Exchange and Trading System (LETS) runs parallel with, not instead of, the mainstream economy and has an as yet unrealised potential to transform economic exchange at the local level. Michael Linton invented the LETS system. He advised the Halifax EcoCity Project on ways that LETS might be used to effectively reduce the amount of conventional money (what Shann Turnbull calls ‘funny money’) required to fund the development. As a first step in this process, Urban Ecology Australia initiated Urban EcoLETS in July 1993; it joined hundreds of successful LETS systems operating worldwide. LETS not only provides an economic framework parallel with mainstream economics, it assists in cohering a community of mutual interests.

Ecological Capitalism

> Can we imagine a market system that. . .creates, increases, nourishes and enhances life on earth? can we imagine competition between businesses that improves living and cultural systems? Can we construct a public-private partnership in the economy that reverses the incentives so that economic success is tantamount to biological success? I believe we can
>
> (Hawken 1993 p. 81)

All economic systems, whether they call themselves 'capitalist' or 'socialist' rely on the accretion of capital and manipulable systems of establishing value for the purpose of exchange. In a sense, all economic systems are fundamentally capitalist, but its variants range from corporate capitalism to state capitalism and natural capitalism. We are already in the thrall of a multi-facetted, global environmental emergency and in an emergency one works with the given conditions to maximise the prospects of survival. Realistically, we have no choice but to work with the given conditions of the global capitalist economy to achieve the immediate ends of human survival. Along the way we may find that achieving those ends requires that we look towards the right hand column of the Development Process diagram. Sustaining effective solutions into the medium and long term almost certainly requires consideration of equity, community empowerment, ethical decision-making and the primacy of biological processes. Pioneers like Anita Roddick with the Body Shop and Richard Branson with Virgin have demonstrated that this direction of business development can be viable and effective. The core issues are not to do with being pro- or anti-capitalist but whether business incorporates life-affirming values and turns those values into practice.

One of the most eloquent voices in support of socially and ecologically responsible commercial processes and practices is Paul Hawken.

9.6 Enrich History and Culture[17]

> Loose systems last longer and function better
>
> (Gall 1975 p. 93)

Empowerment in the Built Environment

Colin Ward reinforces the observation that when poor city dwellers have been able to 'control their own housing destiny' the results have been positive, not just in terms of providing affordable housing but also for the transformative experiences that self-building provides. It empowers people, promotes collective effort by members of the community and generates self-confidence in individuals. (Ward 1989 p. 84–85). Every attempt has been made to factor in self-build opportunities with the case study

[17] Ecopolis Development Principle 10.

Ecopolis projects. The Buddhist building on the Whyalla EcoCity core site stands as an example of a successful application of this aspect of ecocity making, and most of the structure of the Roman Hut at Christie Walk was constructed by volunteers and through workshops.

Critical Regionalism and the Place of Architecture

Ecopolis is about creating an evolving architecture in a living place, a celebration of what it means to be human, clearly set in the context bounded by the rigorous limits of the biosphere. Nature doesn't negotiate. Architecture has to comply with the demands of natural science in respect to the operation of ecosystems just as much as it has to respond to the physics of construction and the laws of gravity. The approach to architecting that is congruent with these aims, and which is not a movement or style, is 'critical regionalism'.

In its concern to respond to context, climate and human patterns of use, the 'marginal practice' of critical regionalism reflects an ecological sensitivity and understanding of the role of boundary zones as places which mediate, filter and transmute experience, so that 'It tends to treat all openings as delicate transitional zones with a capacity to respond to the specific conditions imposed by the site, the climate and the light.' (Frampton 1996 p. 327).

Frampton tells us that 'Critical regionalism begs the question as to what are the true limits of a region and its institutional status.' (Frampton 1987 p. 24) This question arises time and again in relation to defining the city-region and is central to the idea of ecocity design and development. Steps 1 and 2, 'Shedding' and 'Placing' in Chapter 11 are informed by critical regionalist, as well as ecological analysis.

Frampton attempts to eschew the style wars of architectural 'isms' in favour of regional-ism. His concept of regionalism is subtle and connects concerns about the 'ever-expanding power of the multinational corporations' which seeks the elimination of regional differentiation (Frampton 1987 p. 20) with the comfort of individual humans in built environments. In his 1987 essay Frampton identifies ten points of critical regionalism as a 'speculative manifesto' to form

> . . .a critical basis from which to evolve a contemporary architecture of resistance – that is, a culture of dissent free from fashionable stylistic conventions. . .
>
> (Frampton 1987 p. 27)

An 'architecture of resistance' is a counter to the 'society of the spectacle' in which buildings are presented as a series of scenographic images rather than places of experience. It is about working with and understanding the rich history and culture of a place in order to embrace, reinterpret and further enrich it.

Frampton's program is perhaps best summarised in the following passage by Speck (1987), which speaks of an architecture that is simultaneously ancient and informed by history, and modern in its philosophically challenging and questioning approach. It also effectively describes the intention of the design thinking underpinning the architecture and urban design of the three case studies.

> Invention that comes from abstract models is particularly vulnerable to irrelevance or misdirection, whereas invention based in tangible realities is more likely to provide true service. Regionalism, as a source for invention, represents a return to basics in architecture – a return to what is primal and elemental. Because it is rooted in physical and cultural investigation, it is de facto a critical and responsive approach. It offers hope for a responsible and eloquent architecture, constantly renewing itself in service to society
>
> (Speck 1987 p. 19)

Regionalism and Perception

Kenneth Frampton's precepts regarding Critical Regionalism, being to do with 'establishment of bounded domains and tactile presences. . .' (Frampton 1987 p. 22) relate strongly to the perception and definition of place and occupied space and thus the relationships of people to those places and to one another in those contexts. Frampton articulates an approach to architecture and the making of buildings which can be seen as particularly relevant to an environmentally responsive design philosophy, e.g. in the use of natural light in preference to artificial light, not to save energy, but to model space better and relate the artificiality of constructed environments to the reality of diurnal, seasonal and annual cycles.

Frampton summarises the Critical Regionalist approach as capable of producing '. . .an architecture of place rather than space, and a way of building sensitive to the viscissitudes of time and climate. Above all, it is a concept of the environment where the body as a whole is seen as being essential to the manner in which it is experienced.' (Frampton 1987 p. 27). And it builds on the history of place. Everything we do builds on what has been done before. There is no tabula rasa, no blank slate. All human history is piled onto the people, places and events that preceded it. Even the age of oil is lubricated by the myriad actions of billions of ancient plankton. It has been a conceit of modernism to imagine that the world can sensibly be managed or designed without taking account of what humans have achieved, and have tried to achieve, in the past. It is absurd to suggest, like the creationists, that the present world can somehow be explained and made sense of without the long and deep miracle of history that science has unveiled in the very bones of the earth. These bones have been made, as often as not, by the power of living things. The chalks, shales and limestones were all a product of life. This is in every conceivable way a living planet and we need to respect that history both in its deepest temporal sense and in acknowledging the much more recent history delivered through culture.

9.7 Fit the Bioregion[18]

> Nor is 'consistency' an appropriate way to relate architecture to a democratic political process; a democratic architecture would search for forms that could evolve from a complexity of design interests rather than submerge them into 'unified', 'consistent' themes
>
> (Goodman 1972 p. 139)

[18] Ecopolis Development Principle 2.

In the Ecopolis concept of architecture and the built environment, the making of ecological architecture and urbanism requires that the environments are inhabited – it is the *occupied* state of the built environment that defines it as ecologically alive. The idea that only the praxis of architecture can be regional holds some congruencies to this concept. It holds internal logical preventative measures against seeing objects as critiques. Notwithstanding the capacity of a regionalist building to imply the conditions of its place, the occupation of any building can define it from the critical perspective of those who occupy it. Brand might say that this is 'how buildings learn' (Brand 1997). This fits activity and occupation of place with the definition of the critique and the critique itself and suggests that any built environment may be regional or ecological, This, in turn sits well with the need to re-make, re-cast, and comprehend our built environments in an ecological manner.

The Basic Regional Relationships

The process of creating shelter and human settlement is, of necessity, affected by such things as resource availability, climatic conditions and the effectiveness of social organisation. In tackling the practicalities of construction it is logical to assume that where there are plenty of trees then the use of timber is an obvious option, where there is a dry climate the use of flat roofs is quite logical, and if society is large and well organised then more complex constructions can be attempted. Fewer, or smaller trees would make extensive timber constructions less feasible, a wetter climate would make flat roofs less desirable, and smaller, less well organised populations would be less able to erect elaborate buildings. In addition, the topography may exert a strong influence on what can reasonably be built – flat sites being generally less difficult than steep slopes, for instance.

It should be plain that regionalism is about a difference in emphasis rather than a major change in architectural style. The differences may be greatly varied but only in limited directions and on a limited number of themes. The superficial differences between domestic doorways in a street may be greater than between doorways in different cities, and certainly less than those between the doorways of a dwelling and city hall, but the regional differences may be a reflection of factors other than those associated with the fundamental purpose of the building.

The structure of the forelimbs in humans, dogs, birds and whales are essentially of the same basic design. These are known as homologous organs because of their shared structural design configuration and descent.[19] Just as in nature so too in architecture we find fundamentally similar components and forms logically adapted to particular circumstance and different emphasis of purpose. Walls, floors, doors, windows, etc are bound to perform essentially similar tasks, but they will vary from building to building and place to place. This variation, when it relates to the overall function of a building, is the difference between building types, when it derives

[19] Koestler, Arthur; The Ghost In the Machine; Pan Books; London 1975; p. 136.

from the difference in emphasis due to climate or other place-related conditions it is a regionalist difference.

Bioregionalism and the Search for Limits

> The urban bioregion of Ecopolis is a large network city studded with small centres connected up in dense constellations... The urban region of Ecopolis is not a 'garden city', it is a compact city with gardens... The urban bioregion is as 'large and powerful' as a metropolis...
>
> (Magnaghi 2000, transl. Kerr 2005 p. 145–146)

In the face of the global corporate models of urban development there have been continuing attempts to realise a different form of city. The difference that makes a difference in this case is concern with the life of place, manifest in the daily relations of its human inhabitants and the biological activity of the region. This bioregionalism has an illustrious history in the de facto organicism of traditional, pre-industrial urbanism, and in the musings of Geddes, Mumford and their philosophical cohorts. This bioregional tendency gained energy and impetus from the work of Alberto Magnaghi and the Italian 'Territorialist School' at the turn of this century. Eschewing the purely technical approaches to sustainability, the 'Territorialists' emphasised the need to balance and combine three objectives 'as the strategic keys for the sustainability of development':

- development directed towards fundamental human requirements (which cannot be reduced to material needs alone);
- self-reliance and the development of self-government by local society; and
- enhancing environmental quality (Magnaghi 2000, transl. Kerr 2005 p. ix–x)

Magnaghi's vision of self-sustaining regional urbanism is explicit about adopting clear sets of rules to enable and support that development within the context of defined territory, His rules support responsive actions on the basis of feedback with the proposal, for instance, that 'Respecting the supply capacity of territory means setting quantitative, typological and morphological limits according to the capacity of a place to sustain transformations without destroying its capacity to reproduce its own identity and without reducing its value.' (Magnaghi 2000, transl. Kerr 2005 pp. 105–106). The 'socio-territorial scenarios' in Magnaghi describe "...the possible futures for the 'city of villages', the rural territory producing public goods, caring networks in the city, a non-hierarchical polycentric regional geography, and the 'new municipums' self-governed by participatory democracy." (Magnaghi 2000, transl. Kerr 2005 p. 2–3).

The quest for renewal of the regional is a search for ecological limits. The search for those limits is an exercise in cybernetics, a continual seeking of information and feedback. Bioregionalism offers a way of finding those limits from the perspective of both the physical environment and human cultural history. It includes finding out what the actual limitations are – what the limits are on resource use and availability, what limits the climate provides, how the terrain and geology affect what can be

achieved, how the social organisations provide the parameters for design, development and on-going maintenance of human settlement.

Criteria for bioregions (Dodge 1998 p. 7–8):

- *Biotic shift* a percentage change in plant/animal species composition from one place to another – that is, if 15–25% of the species are different, then the biological regions are deemed to be different. Gradual change – vague and permeable boundaries.
- *Watershed,* large watersheds may require intradrainage distinctions or sub-divisions eg: headwaters, west/east/north/south slopes etc.
- *Landform*, closely related to watersheds, almost interchangeable.
- *Cultural/Phenomenological*, an anthropocentric and essentially romantic criterion – 'you are what you perceive you are'.
- *Spirit Places,* presences, definition by 'predominant psychophysical influences'.
- *Altitude,* hill regions having more in common with other hill regions than with lowlands.

As the human species has spread around the biosphere and societies have tended to develop greater sophistication and complexity, so the links of cause and effect have tended to become less clear. In the largest of our modern cities the relationships of shelter and the built form of human settlement with the resource base, climate, terrain and social structure can appear to be so obscure and complex as to be unintelligible. Nevertheless, those relationships are still there.

The Same Word for a Place and the People Who Live in It

Regionalism celebrates a capacity to provide a range of approaches to the solution of similarly perceived problems, it suggests an approach to design more akin to jazz than classical composition (Speck 1987). There is an apparent internal tension, a contradiction within the concept of architectural regionalism which seems to deny the very essence of the idea of regionalism itself, for it seeks solutions which create specific, place-sensitive responses to problems which are *universally* expressed.

With any voluntary architectural surrender to the dictates of the local environment, the idea of 'place' has to be consciously addressed. Whether or not it is experienced as a sixth sense, it does seem to necessarily take us into the realm of ecological thinking as it requires an integration of the elements of both nature and of culture (Relph 1976); there is no 'place' there without the human capacity to engage with it, whether literally or figuratively (Margarey 1996). In discussing the concept of 'authentically created places', Relph (1976 p. 67) reiterates Norberg-Schulz's observation that human life requires a system of places that have structure form and meaning. Relph maintains that the identity of place is derived from '. . .three interrelated components, each irreducible to the other – physical features or appearances, observable activities and functions, and meanings or symbols.' There are 'numberless ways in which they can combine', there is no limit to the resulting 'diversity of

identities of places, and every identifiable place has unique content and patterns of relationship that are expressed and endure in the spirit of that place.' (Relph 1976 p. 61).

Research seems to point to the likelihood that humans have at least some degree of hard wiring for directional sense (Phillips 1999). The degree of sensory stimulation and deprivation and their proportional impacts define our entire experience of the world. Our sensing of our place in the environment informs our language and our language informs our thinking about what we perceive.

> The Valleys are as committed to the *patria chica* as any *pueblo* of those Spaniards who use the same word for a place and the people who live in it, a practice common in Welsh
>
> (Williams 1978 p. 11)

Regions

The concept of the region is malleable. One or another version of it can be defined to suit use and circumstance; as with the concept of an ecosystem, it is important to establish which view is holding sway in any discussion or analysis. Dickinson notes that the term region is used to refer to any geographical unit that suits the user but that in the scientific sense 'it refers to an area in which all places have certain common characteristics by virtue of which it is distinct from the areas around.' (Dickinson 1970 p. 41). Regions may be defined in many ways, none of which are mutually exclusive; a region may contain, overlap, or be contained by one or more other regions; and the built environment may display many regional characteristics at different levels of intensity, in space and in time.

Regions are not simply spatial entities. They have fuzzy edges or boundaries which may change in response to all sorts of factors. Regions are not strictly natural phenomena. They are the consequence of human action in and on the environment, and of the human perception of that environment. If city-regions are to be the basis of ecocity design, development and maintenance, then regional definitions are essential.

Bioregionalism vs. Balkanisation

Bioregionalism plays an important and supportive role in the Ecopolis theory but needs to be considered from a critical viewpoint, particularly in the light of 'Balkanisation' and the problems that seem to flow from an exaggerated sense of having a place belong to any given cultural group. It seems that a sense of place can give way to social pathology when allied to propertarianism and authoritarian power structures. The capacity of an ecological worldview to counter this must be critically considered. The idea of region taken as territory plus the inclusion of the 'life and organization of human communities' was given impetus by German geographer Friedrich Ratzel at the end of the 19th century (Dickinson 1970 p. 41). He coined the concept and term 'Lebensraum' which gained notoriety through its abuse in Nazi

Germany as an instrument of national policy (Dickinson 1970 p. 41). It is difficult not to detect residual concern regarding the use of cultural regional concepts as the basis for planning, something that is inherent in bioregionalism.

Addressing the role of movements like Welsh Nationalism and the vexed issue of nationalism in relation to reactionary politics and regionalism, Berg maintains 'It only takes a slight shift of Global Monoculture's lens to see that these movements stand for more than regressive provincialism. Rather, they embody the ideals of decentralism and biospheric responsibility associated with extremely progressive change.' (Berg 1981 p. 27).

Writing about the perception of place and region in literature Magarey warns that 'Like nationality or race, place can be given too much value or too little.' (Magarey 1986 p. 113).

Finding the Place of Cities

Winikoff et al. write of 'Placemaking' as a broadly based community process that involves multiple stakeholders in collectively realising a sense of place.

> The best planning, occurs when we all share a vision of a common future which inextricably links us as a community with one another and with our local places. Placemaking is a means to develop such a vision which informs the development and use of a place
>
> (Winikoff 1995 p. 82)

What is a sense of place? Taylor suggests 'It is often the difficult-to-describe quality that pervades a space – like the difference between a home, which supports, nurtures, and challenges those who go there – and a house.' (in Winikoff 1995 p. 24) This parallels the distinction I make which proposes that people and other organisms are integral to the *ecological* description of any architecture or urban construct. In which case, it might be argued that a sense of place comes from being-in-place and may be an intuitive spatial cognisance of the existence of a coherent living system.

Landscape architect Kevin Taylor proposes that, in the making of a 'place', 'The emerging place results from the interaction of these three elements: designers, community and environment.' (Taylor in Winikoff 1995 p. 24). He maintains that 'The result is the birth of a new entity, a new place, which has a life of its own and a sense of rightness that is clearly felt.'

Arguably, without the action of people on the environment, there is no 'place'. That action may be cerebral as well as physical. As observers of our universe, we can only define (or 'make') the universe in response to our experience of it. In the quantum theory of sub-atomic physics the observer is part of the equation, an integral component of the perceived reality; and the nature of the reality depends on the observer. In the more immediate, physical reality provided by our senses, there is no place until we see it to know it (or someone reports it to us). Ours is ultimately an anthropocentric universe of human experience. If our definition of the 'place' is one of, say, an ecological city, then it really cannot exist as such unless it is inhabited.

Chapter 10
Synthesis III: Education, Advocacy and Activism

The benefits of the ecological view seem patent to me. . .But it is in education that the greatest benefits lie. Here separatism rules, yet integration is the quest. This ecology offers: the science of the relations of organism and the environment, integrative of the sciences, humanities and the arts – a context for studies of man (sic) and the environment

(McHarg 1971)

The urban ecosystem is the most elaborate geographical control-system or integrated resource-management system in human experience. For those who work in any one sector of the system to avoid evaluating the impact of their sector's operation on the rest of the system is unwise. . ..To learn about or to teach about cities without considering both the biophysical environment and the social environment is downright unscholarly

(Douglas 1983 p.206)

10.1 Agents of Change

The conscious, systemic cultural change required to create an ecological civilisation can only come about if people become familiar with the fundamental ideas that underpin the need to change. This chapter explores cultural 'change agents' and looks at a number of specific approaches to education for an ecological culture. I have laid emphasis on learning by doing, on the need to eschew commanding hieracrchies and to maintain a free flow of information within open networks, and on the importance of music and popular culture. I hope that the reader will be able to tolerate the occasional personal tone of this chapter, which draws on my experiences as an advocate and activist trying to get ecocity ideas into the public realm.

Culture and Sacrifice

The western view of culture tends to be historicist, and ideas of modern culture tend to be media-oriented, and all is trivialised by '. . .the petty concerns of amusement, consumption, and small talk.' (Bookchin 1995). Culture is, amongst other things,

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about embodying social values in collective action. We do well to review some of our own cultural values before embarking on any critique of it.

Deriving his typologies from an historical review of city development, Lynch shows that what he calls the 'Celestial' city relates to the movement of the heavens through geometric mapping of solar and stellar movement on the ground and how a culture of heavenly worship results. Human sacrifice was often placed at the centre of the ritualistic frameworks which were essential to the continued existence of such civilisations. With the comfortable distance of time between us, we are apt to dismiss such sacrifices as inhuman, cruel and unnecessary. Why sacrifice the youngest and finest of your people in the name of some powerful god? Yet such sacrifice was central to the shaping of some of those cities. It is a lesson in cultural humility to realise that our modern cities owe their form, and are entirely dependent for their continued function on the continual random sacrifice of our youngest and finest to the implacable god of the automobile. We often undertake activities without consciously reflecting on how the values we hold are connected with the things we do.

Something as concrete as city-making needs to be tested in practice before it can have any verity. As all theory-in-action is ultimately mediated by the individual, no matter how collective or abstract its genesis, a fundamental premise is that the theory of Ecopolis requires its practice, and that personal enactment of Ecopolis principles is an essential requirement of those principles. I have made an effort to abide by this premise.

Capturing the Transmitters[1]

> Unlike the knowledge that comes from discoveries in other fields of knowledge, ecological understanding cannot be made available in the market-place. It must be built, by general understanding, into the wisdom of the race
>
> (Sears 1962 p.23)

New Urbanist Andreas Duany concentrated on capturing the points of dissemination of the codes and rule books. This is an effective strategy that focuses on the patterns of consumption of key players in the manufacture of the built environment. This can be posited against the need for a more deeply systemic change in the culture as a whole. In the modern, globalised world most information and knowledge is received by non-experts via popular and mass-media[2]. Consumers must become citizens lest human life be held in the thrall of economic reductionism. Citizens need to be able to connect with effective communication and city government systems with high levels of responsiveness.

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[1] A phrase used by Dwany reported in Kunstler (1998).

[2] Although the internet is changing the method of delivery of information and knowledge and is more interactive than 'traditional' media, it is still conditioned by, and is intrinsic to, popular culture and mass-media – much of cyberspace is occupied with the provision of services that reinforce passions and fashions created in other, broadly cast mass-media.

Greater than War

The experience of World War 2 demonstrated the effectiveness of small, interdisciplinary teams in which conventional 'silo thinking' and hierarchic separation was jettisoned in favour of open-ness and communication that facilitated a free flow of information. The most rapid cultural change in recent history in modern democracies was achieved by the counter-culture, which used the same techniques of openness and freedom of information flows, documented in Turner (2006). The rates of change confronting us with global warming, unprecedented technological progress and a burgeoning global population are setting challenges that are even greater than war. Once again, we need the freedom, flat structure and information flow that the most effective research teams enjoyed during WW2. Reconfiguring the shape and management of our cities with sufficient alacrity to combat climate crisis is unlikely to be achieved by existing institutional arrangements. That is not to say the institutions cannot achieve the necessary results, but that they must themselves embrace and adopt changes to become effective at the level and speed which circumstances demand.

The modern approach to liability and insurance provides a major barrier to achieving the fluidity of information flow and rate of change and innovation needed. In the building industry throughout the western world litigious attitudes and excessive concern with liability is overtaking the capacity to innovate and progress. Even the simplest buildings are more expensive and slower to build because of the fear of failure and its collateral concerns to lay blame and avoid responsibility. Such attitudes are not conducive to supporting the type and rate of change demanded by adaptation to rapid climate change. Perhaps the insurance industry should reconsider its approach to risk so that its historical concerns do not impede its capacity to deal with these new conditions. The cost of failing to rapidly innovate as a response to climate change threatens to exceed the cost of accepting the liabilities that come with rapid progressive adaptation.

10.2 Media: Getting the Message Out

> I've never needed an intellectual or academic to tell me what cities are about! – particularly the poor parts, I've spent most of my life in them
>
> (Anson 1996 p.189)

Education

There is a long history of writing and research in relation to cities, but little evidence of any sort of urban study being part of an educational curriculum outside of specialist courses in universities. Biology has fared better and been part of many school general education programs since the mid 20th Century. It has not been

until very recently that issues of the environment and cities have been explicitly linked in educational institutions, but changes are happening. One example that has derived directly from one of the Ecopolis projects is based on material drawn from the Christie Walk project – Urban Ecology Australia in association with South Australia's non-profit Global Education Centre has published an education resource for middle and secondary schools called 'Moving Towards Urban Sustainability' that is now being used in school curricula (Baldock et al. 2007).

If the core ideas in ecological city-making are to have influence and provenance in the wider community then the means of getting the message out are important and have to embrace all media and learning environments. The basic terms and concepts that these ideas are based on are presently poorly disseminated and understood, although it should be recognised that the ideas have a relatively short history. The science of the study of organisms and their relationship to their environment and to each other did not have a name until Ernst Haeckel coined the term 'ecology' in 1869, and a hundred years was to pass before the first publication to explicitly link architecture and ecology was published with Soleri's 'Arcology: The City in the Image of Man' (Soleri 1969). The first published use of the term 'ecocity' appears to have been in Register's 'Ecocity Berkeley' in 1987. In 1859, ten years before 'ecology' entered the lexicon, Darwin's theory 'On the Origin of Species' introduced the use of the word 'evolution' in the sense that we now understand it. It was not until 1915 that Geddes produced the first publication to explicitly link evolution with urbanism in 'Cities in Evolution'.

The beginning of my own attempts to communicate ideas regarding the linkage between ecology and the built environment to a broader public can be found in a short Workers' Education Association course run in Cardiff, Cymru (Wales) in the Northern Hemisphere autumn and winter of 1977. With Ken Shaw (later to be very active in setting up the Cardiff City Farm), I constructed[3] an eleven week course entitled 'Ecological Building (Ecology & the Building Process)' organised in three parts: A. The Social and Environmental Context of Building, B. Energy Economics, and C. Zero Energy Building. It was ambitious in scope, asking for exercises in working out energy costs of various buildings, for instance, something that is still difficult to do over 30 years later through lack of readily available information. The 'Zero Energy Building' concept was quite original then but has recently emerged in research from the UK as a goal for ecological design. There was very little literature at the time (1976–1977) regarding ecological design at the urban scale although some academics in England were working on related ideas (Liddell 1976). An article I drafted in support of the course makes interesting reading three decades years later for its apparent parallels with the *present* developmental state of ecological design and development:

> In the early seventies the ecofreaks were the lunatic fringe. By 1975 their basic premises were conventional wisdom. Now it's 1977 and oil companies are investing in solar energy research and diversifying their interests to maintain their control over primary energy

[3] Ken Shaw did most of the actual work of presenting the course.

> sources for when the oil runs out. The eco-house in Britain has seen the light of the sun as an anarchist experiment (Street Farmhouse), as an academic experiment (Cambridge Autonomous House) and as a speculative builder's experiment (Wate's house at the Centre for Alternative Technology). Solar heater companies number over two dozen, have become booming cowboy businesses and are a new growth area for consumer watchdogs. 50% government grants have been proposed for installing solar heaters. Domestic insulation standards have increased slightly and fuel costs a great deal. In short, change is afoot.[4]

10.3 Exhibitionism: Ecopolis Now!

> The cities own everything, govern everything, consume everything. Their pipe-lines and electrical power-grids cross mountains, jungles, tundra; their satellites patrol the frontiers of empty space. The subtle web of their communications wraps the planet in an electronic skin
>
> (Roszak 1993 p.212)

An early effort at getting the message out about the idea of ecocities as 'Ecopolis' was the exhibition 'Ecopolis Now! Escape from the Cities of Boiling Frogs' held at the Old Parliament House in Adelaide at the invitation of the then-director Susan Tonkin in January and February of 1991. The invitation came after the publication of an interview with journalist Joanne Painter that was published as 'City of the Future is Green and Clean' in *The Sunday Herald* Melbourne, 14 January, 1990 and republished as 'Future Utopia' in *The Adelaide Advertiser* on the 27 January 1990. This exhibition gave me an opportunity to give an aesthetic dimension to the Ecopolis proposition (to answer the oft-repeated question 'what would it look like?') and to put into practice ideas on how to communicate the concepts of ecocity design and development in a graphic form in a public venue (see Plates 24 to 33). Supported by the Gas Company as sponsor and launched by John Schumann, the exhibition attracted a significant amount of attention in South Australia[5]. It was an important step on the path towards the formation of UEA and the creation of the HEP (it was through interest in the exhibition, for instance, that I met Emilis Prelgauskas, who was to play an important role in the creation of UEA and in the initial history of the HEP).

At the time of the exhibition, conceived in mid-late 1990, the idea of ecocities was barely in the public or professional domain. At least one observer traces the rise of the modern ecocity movement to the First International Ecocity Conference in Berkeley held in March 1990 when over 700 people attended from around the world to hear how 'The city can save the world' (Slack 1994 p.27). It was not until 1995 the 'shocking revelation . . . that the world's environmental crisis is being driven by our cities' (Rogers 1995 Lecture 1) was also being met with the realisation that cities were the key to turning the situation around and that 'Equitable cities that are beautiful, safe and exciting are quite within our grasp.' (Rogers 1995 Lecture 5).

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[4] 1977, from my own papers.

[5] "One of our most successful displays ever." (Tonkin, private communication 4 March 1991).

The Power of the Image

For a period of about two years, I did not illustrate my presentations of Ecopolis ideas with images. This was a deliberate policy on my part as I was determined that the ideas and principles of ecocity development should make the primary impact and that Ecopolis should not be seen simply as stylistic posturing by an architect. After the success of the 'Ecopolis Now!' exhibition and the favourable reception given to the architectural style represented therein, the strategy changed to one in which I tried to exploit the power of the image as a means of disseminating the principles that shaped them. The first HEP image, like all the drawings of ecocity concepts I have prepared, was designed to be readily reproduced. This has facilitated its dissemination as has been proven by its reproduction with and without permission, in a number of publications (see, for instance, the frontispiece of 'Sustainable Cities', Arkin et al. 1992, Ecocity Cleveland p.11, etc). The policy of making images media-friendly is important. Easily reproducible images are the visual equivalent to media sound bites.

Mass-media hegemony makes it a challenge to get ideas into the public domain without them being distorted or obscured. It becomes important to reduce ideas to their essentials and present them in formats suited to sound bites. Recognising that the media is important and the role of journalists as vital, we learned in UEA to view journalists as individual members of the community open to education rather than merely representatives of impersonal organisations. This contributed to a history of mostly positive and accurate media coverage.

10.4 Running Barefoot

> The recent history of architecture and planning has created the false impression that architects and planners are the only people who know how to lay out buildings. The evidence from the last two or three thousand years of human history tells the opposite story
>
> (Alexander et al. 1975 p.45)

Participation

UEA and Ecopolis Architects have run a number of workshops in support of ecocity projects. Through the 'Barefoot Architecture' program a determined (but under-resourced) effort was made to involve people in the evolving designs for complex urban environments. The idea that community participation is integral to ideas of urban sustainability is reflected in European, North and South American and Australasian texts. UK Friends of the Earth researchers note that:

> Direct community involvement in the planning and management of the locality can develop into a commitment to sustainability, starting at the local level but visible in a number of dimensions
>
> (Elkin, McLaren and Hillman 1991 p.216)

The editors of Sun Dial are also referring to the UK experience, but it is one that appears to be universal in modern civilisation:

> The planning system is very poor at giving people a say in decisions which affect the places where they live, work and shop. The resulting sense of powerlessness is inked to a widespread view that urban areas have been damaged by planners, engineers and architects
>
> (Sun Dial 1998 p.1)

Architects are notoriously ego-driven and have pandered to the demands of capital and fashion rather than popular concerns (Wolfe 1981). There is a tendency for the architectural sub-culture to regard the involvement of non-architects in design as a threat to creativity or a prescription for mediocrity.

Successful Examples of Participation

Examples of participation in architecture are not unknown but neither are they usual. In the design of Ton Albert's NMB Bank in Holland there was a legal requirement to include participatory processes and they were a successful part of creating an original and effective architecture which has transcended its original role as a bank to become a cultural icon and community resource. In Bremen, Germany, one architect known for his participatory (and ecological) approach to architecture is Peter Hübner, whose architecture 'is most obviously green in its grass-roofs, untreated timber, and passive solar heating, but it is also green at a deeper level in terms of social and psychological engagement.' (Blundell Jones 1999 p.40). His projects include a school in Frankfurt, a youth club in Möglingen, a kindergarten in Stuttgart and a crèche in Bremen. Each project involved working with organisers, parents or students and building users, working with elemental, even atavistic architectural imagery and conscious myth-making on the one hand and advanced computer aided design on the other, Hübner has produced architecture that is evocative, organic and successful, built to conventional budgets. His oeuvre demonstrates the potential of participatory, ecological design and stands as an example of what might be achievable at the wider scale of neighbourhood and city-making given the necessary release of constraints that, as his work proves, are mostly in the mind (Blundell Jones 1996, 1998, 1999).

The Urban Design Workshops in Whyalla

Planning streets and infrastructure can engage the community as much as architecture; given the chance people are quite prepared to work on the size, disposition, extent and type of roads, for instance, that are used in shaping the built environment. This was evidenced in the Urban Design Workshops during the Whyalla EcoCity Development program with UEA and Ecopolis Architects.

The results of the Urban Design Workshops were interesting. On Thursday 3 October at the Ramsay Street Community Center I gave participants a crash course in urban design, illustrated by slides of urban spaces from around the world, showing how squares, fountains, gateways and other urban features contribute to shaping the built environment. Urban design principles for arid regions were introduced. Then the workshop attendees were split into three to look at how each of the fundamental city designs might apply to the core site of Whyalla. A 1:400 scale map of the site was provided along with model materials to represent buildings and trees, and each group worked together to shape an urban space, discussing ideas and options under the guidance of myself and three facilitators[6].

Typologies

On the basis of Kevin Lynch's analyses it is possible to discern three normative types of city plan: the 'celestial' or 'Classical', 'Mechanical' and 'Organic' (Lynch 1981). These typologies were used to introduce concepts of urban form to the workshop participants and formed the basis of the workshopping program with three groups being set up under the normative type rubrics. Similarly, workshop participants were presented with the idea, drawn from my research, that there are just three basic street or road layouts: radial, grid and hammerhead. From this it follows that all designed movement patterns employ one or more of these layout typologies. The reduction of urban design principles to such simplified typological bases proved to be a resilient means of informing workshop participants and did not seem to stultify their creativity.

In just an hour and a half, the subject was introduced, key concepts were presented and demonstrated, and groups of ordinary citizens became urban designers – with surprising success. By avoiding the extremes of being either patronising or making things simple to the point of being simplistic it was possible to get people quickly and effectively engaged in designing their future built environment. The fundamental principle was that everyone knows a lot about architecture and urban design because they are compelled to inhabit a predominantly built environment which they learn about by long and deep experience. The role of education is, as the Latin root of the suggests, to 'draw out' that knowledge in a structured, supportive and interesting way so that that stored experience can be released, employed and enjoyed. The urban design workshops were so much fun for the participants that those running the workshops had trouble getting people to leave!

The workshop participants showed a clear preference for the 'organic' city type and many of their observations and ideas were later incorporated into the core site design.

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[6] 'Classical' Facilitator: Angela Hazebroek, 'Mechanical' Facilitator: Sophia van Ruth, 'Organic' Facilitator: Digby Hall.

Figure 69: The first ten minutes of one of the Urban Design Workshops

Design Is About Performance, Not Appearance

> 'Most people make the mistake of thinking design is what it looks like,' says Steve Jobs, Apple's C.E.O. 'People think it's this veneer – that the designers are handed this box and told, 'Make it look good!' That's not what we think design is. It's not just what it looks like and feels like. Design is how it works.'
>
> (Walker 2003)

Job's edict applies almost unreservedly to buildings, although there are occasional instances of buildings that don't work very well but present such a powerful presence or exhibit such an aesthetic attraction that their functional inadequacies are forgiven. It applies unreservedly to cities. It really is optional whether a city looks good or not, its essential defining characteristic of success is how it works. The Barrios and Flavelas and sundry spontaneous, unplanned settlements around the world prove this point time and time again.

Steve Jobs' interpretation of his precept has taken the design of Apple electronic devices further and further down the path of invisibility, where the object is refined to little more than smooth, almost featureless tablet. Once activated, the device reveals a bewildering array of abilities that are added to and continually evolved – whilst the appearance of the object remains unchanged.

Figure 70: The next ten minutes of one of the Urban Design Workshops

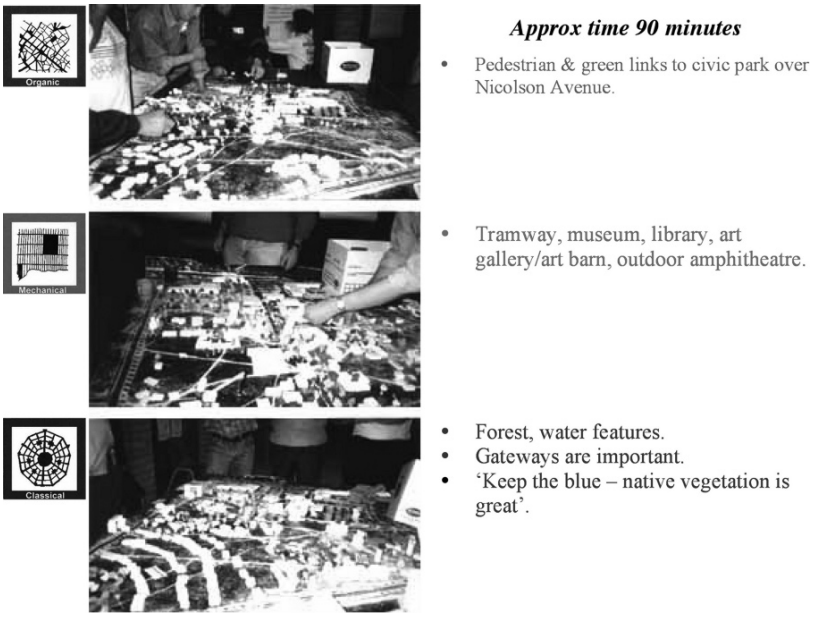

Figure 71: An hour-and-a-half into the Urban Design Workshop

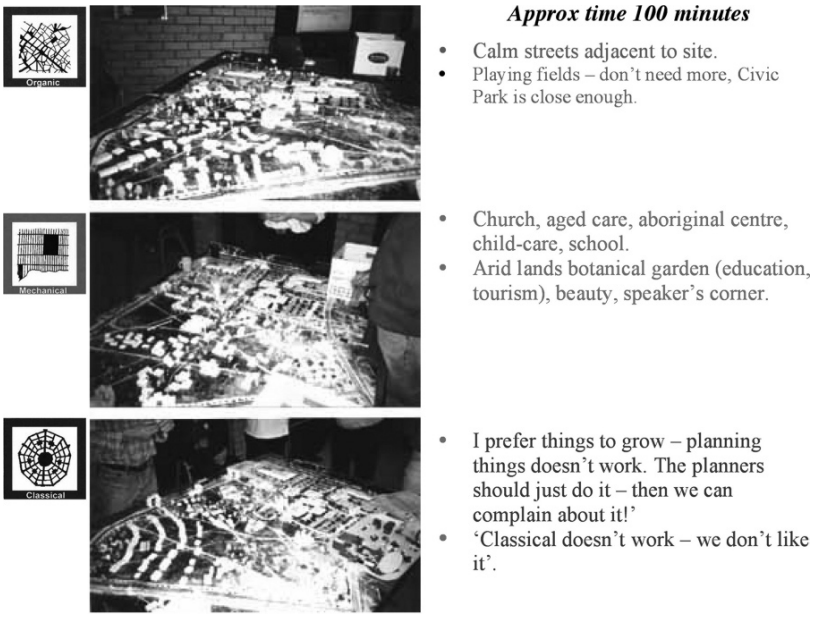

Figure 72: By the end of the Workshop each group had created distinctive designs for the 15 hectare site – but none of them wanted to finish!

Virtually

The virtual world can be used to model the appearance of buildings and cities, and this is an increasingly useful aspect of the information technology revolution, but perhaps more importantly, the virtual world can model the multitude of human transactions that take place in a city – the barter and exchange of information, ideas and material goods, and so on. The concerns and confusions that surround the idea of virtual communities and 'second lives' suggest that the virtual world is a separation away from the actual world of corporeal presence and behaviour. The history of the cyberculture has also tended to stress the idea of escape and separation even as it explored ideas of community (Turner 2006, pp.162–174). But the real strength of the increasingly sophisticated on-line environment is that it can be used to model and test ways of interacting, modes of exchange, and ways of living prior to the making of the material form and space of an urban environment. To some extent this can be seen in the rediscovery of community and village-like environments that are starting to be seen in real estate developments in the developed world. As people have found ways to connect freely on the net, so they have sought a similar freedom in their corporeal daily lives. Just as we can model the physical structure and performance of built environments in virtual computer worlds, so can we model the social environment of a putative city or neighbourhood prior to its physical creation. There is enormous potential in this to explore different scenarios

for future constructed environments, notwithstanding the socio-spatial prejudices that any participants might bring to the exercise. To a limited extent this kind of modelling takes place in design charettes of the kind favoured by New Urbanists and was employed with some success in the Whyalla urban design workshops. But whereas this has been about physical modelling with implied social interaction in a compressed timeframe, the powerful addition and fundamental difference brought to the participatory modelling process by on-line virtuality is that it tests the environment of transactions and social interaction, for which the built environment is merely a prop or support system. Furthermore, it effects a closer relationship to real-time behaviour in which people stop, think, reconsider, talk to the neighbour, get interrupted by the kids, pop out to buy some bread, and so on.

At a less radical level, Newman and Kenworthy note that 'To be successful, traffic calming requires widespread community consultation.' and that 'It can even provide a focal point around which communities can mobilise to fight for more sustainable and socially acceptable solutions to traffic problems' (Newman, Kenworthy and Robinson 1992 p.17) – as happened in Brisbane with the 'Route 20' freeway proposal that precipitated Engwicht into the ecocity fray (Engwicht 1992).

Participation is a key strategy for involving citizens in the making of cities. One might even venture that without a participatory role in the civic environment with real consequences in its urban expression, then a citizen is not a citizen at all but merely a 'worker', 'consumer', or other kind of 'end-user'.

Within living organisms, blocked or disrupted lines of communication can cause inappropriate or pathological behaviours by the organism. If we understand human society and cities as cybernetic organisms, then it is not hard to see that open and effective channels of communication are essential to their effective operation and healthy behaviour.

Franklin observes that there are two key premises to ecological design, one is that it is based on an holistic view with the second, related premise, being that product and process are one (Franklin 1999). Ends do not justify the means because they are essentially inextricably interlinked. This recalls Alexander's early 'Notes on the Synthesis of Form' and the idea of design being about the ensemble of object and context. By extending the field of action in this way, all potential participants in the outcomes of a design become potential participants in the process by which it is achieved. There appears to be a strong trans-disciplinary consensus on the intrinsic need for participatory processes in models of ecological design. Although she lapses back into the use of the 's' word,[7] this is succinctly expressed by this landscape architect in terms that fit that design:

> The ecological design process is inclusive and basically democratic, a relationship of consenting equals that builds consensus as a project proceeds. In traditional design relationships, we successfully divorce many of the obvious partners from the design process. Redefining the players and their roles, breaking down old boundaries, and empowering

[7] That is 'sustainability' which she earlier condemned for its implication that "if we just develop carefully and responsibly we can continue to over-populate the earth and to build what we like."

> new parties in new partnerships is critical to a sustainable design process, which is inherently representative, interactive, and consensual. (Requiring). . .new and unexpected partnerships, where all concerned parties are empowered to advocate for their needs and desires
>
> (Franklin 1999 p.18)

This change from a 'traditional' to 'inclusive democratic' approach was integral to the ecocity work of Ecopolis Architects and UEA from the outset.

The Barefoot Architecture Program

> By enabling people to be involved in the development process and participate in the 'barefoot architecture' design of their own homes, the Halifax EcoCity Project is leading the struggle to democratize the built environment. Public art will be part of the fabric of the Project but, unlike the ubiquitous bureaucratically-dictated chrome pretzel, it will speak to and for the residents because they will have a hand in its creation. Like a kind of architectural Mandelbrot set, the basically simple structure of the architecture will generate a cohesive pattern, within which an abundance of artistic detail can flourish in the many public spaces, created with the assistance of experienced community artists
>
> (Munn 1995 p.61)

In the case study projects, the idea of integrating inclusive democratic design processes was tried by way of what became called 'barefoot architecture'. The term was inspired by Manfred Max-Neef's phrase 'barefoot economists' which was in turn inspired by the 'barefoot doctors' of Mao's revolutionary China. A similar sensibility is reflected in Engwicht's observation that the training of engineers and town planners 'must take on a life-experience orientation.' (Engwicht 1992 p.81).

The HEP was breaking ground in Australia, taking concerns about the quality and purpose of the built environment into broader public arenas, rather than keeping it within the portals of the professions. Whereas in 1992 the non-professional, community-based organisation of UEA was convening the Second International Ecocity Conference, by the mid 1990s the architectural mainstream was so much enmeshed in debates on aesthetics, to the exclusion of much else, that the indifference to other issues was 'striking' (Ghirardo 1996 p.30). 'With some notable exceptions, architects and most of their publications ignored the consequences of downtown skyscraper development, suburban growth, shanty constructions on the peripheries of major international cities, office park construction and matters such as ecology, toxic materials and environmental degradation that conditioned the transformation of the landscape throughout the world.' (1996 Ghirardo p.30). Bucking the global trends of the time, the architectural practices that challenged this complacency were typically 'small, serious and local firms concerned about their communities' (1996 Ghirardo p.30). Ghirardo cites, as an example, the work of Alberts and van Huut for the NMB (ING) Bank in Amsterdam with its ecological concerns, varied street facades and creation of a 'pleasant plaza', and notes that 'All too often the major

protagonists in the architectural debates actively disparaged those who raised concerns about such matters.' (Ghirardo 1996 p.31).

Attempts to integrate the processes of planning, designing and building have invariably addressed the need for public education. There are many models for this ranging from Workers' Education Association lecture series to on-site training. Architectural and planning educational programs have traditionally adopted an élitist attitude in which skills have been imparted to professionals only.

The HEP proposal built on the experience of pioneers such as Christopher Alexander, Walter Segal, and architect Ivo Waldhör who successfully involved people directly with the process of planning, designing and building in urban environments (Miles 1992). Participatory design approaches vary from the high profile of Renzo Piano's workshop based design studio (Buchanan 1992) to Lucien Kroll's low key planning 'guided by ecological concerns and the wishes of the local people' (Blundell Jones 1992). The housing development process adopted by Ivo Waldhör at Malmö, Sweden, for instance, resulted in the creation of a 'living school' which involved tenants in study of the local infrastructure, history, nature, planning and administration as well as design studies for their individual apartments (Miles 1992). Such examples of architecture connected to urban ecological processes and lent credence to the processes proposed for the HEP which included the creation of a future 'School of Urban Ecology' as an outcome of the development and educational process.

Part of the strategy for engaging people in the design and development process was the Ecopolis 'Barefoot Architecture Program' which dealt primarily with the individual needs of households, and 'Potential Residents Meetings' organised by UEA and Ecopolis which brought people together for discussing shared concerns about managerial and social issues regarding the Project as well as its physical design. Dozens of households engaged in the Program. It was a two-way process which was intended to enable people to participate in the design of their dwellings and gain a sense of ownership and understanding of the process that leads to the creation of their living space whilst learning about the demands of construction, planning and ecology

By mid-1994 the people who had registered an interest in living in the HEP had a range of skills and backgrounds that included accountants, architects, artists, child carers, drafters, electricians, engineers, gardeners, herbalists, labourers, landscapers, managers, metalworkers, rammed earth and mud brick builders, nurses, plumbers, students, teachers, woodworkers and yoga teachers (Catalyst 1994 p.4).

Resources

After several years of trying to make the principles of barefoot architecture a means of practice it became clear that, at the Centre for Urban Ecology, even with the support of a number of energetic volunteers, the exercise was hopelessly

under-resourced and lacked enough people with sufficient architectural skills to provide the kind of enabling and educational service demanded by the concept. There was, nevertheless, a period of high creative energy and a sense of accomplishment that gave people who might otherwise never have worked with an architect an opportunity to learn a considerable amount about design generally and ecological design in particular. For the volunteer 'experts' there was the benefit of unusual and valuable experience with long-term value.

Digby Hall, member of the Project Design Team, commented on the BAP at one of the on-going public meetings about the Project convened in Adelaide in December 1994:

> The BA (Barefoot Architecture) program has now become an integral part of the drawing office and is a constant source of interest and inspiration for all of us. The development of a BA client Database has enabled us to keep up to date with the growing number of clients who have had at least one Barefoot meeting.

And Design Team member Glenn Versteegen[8] describes the Program thus:

> The development of the city as we are now familiar with it in Australia has led to the segregation of individual households and the removal of the opportunity for people to express themselves. Our communities have been fragmented and the making of our dwellings has been removed from us in every possible way. The EcoCity provides its inhabitants the opportunity to live in an ecologically sustainable manner. Of equal significance, however, is that the EcoCity gives people the chance to express themselves through their dwellings.
>
> . . .This is the significance of the Barefoot Architecture Program – it returns the ability to be a part of the making of a dwelling to the people to whom it matters most – the occupants. The dwellings will suit the occupants but this is a small matter, every dwelling should do this. The dwellings in the EcoCity will be crafted things, each one expressly unique and uniquely expressive of those who live in it.
>
> Essentially the difference between the EcoCity and a conventional development is not as vast as it might seem. Developers make decisions regarding a development purely for their own benefit. The inhabitants of the EcoCity also make decisions regarding the development for their own benefit.

The Potential Residents Meetings which were the preamble to entry into the BAP also prompted the creation of the future community of Project in an embryonic way as people met some of their potential neighbours. This outcome reinforced the idea that 'community' comes before the buildings in the Ecopolis approach to development and contributed to the resilience of the whole UEA organisation in the face of disappointments with the eventual fate of the HEP. A number of the residents of Christie Walk are 'ex future residents' of the Halifax EcoCity Project.

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[8] Glenn Versteegen and Digby Hall were both with UEA and the Ecopolis design team for over 3 years. Glenn joined the team after making a trip from Victoria and finding that the HEP fitted his sense of social purpose in architecture.

Popular Communication Methods

Part of making multi-faceted concepts like ecocities understandable is the use of communication to which people can easily relate. Architectural models and drawings, for instance, are all too often deliberately complex, arcane, or obtuse in their meaning. Ecocity drawings and models should be understood by non-professionals.

In the Halifax EcoCity Project and Whyalla EcoCity Development some drawings and many models were created by non-professionals working with the Ecopolis Design Team. The aim was always to use techniques which inform rather than tantalise. At the same time there was always attention given to aesthetics which was continually tested through being developed in an open, semi-collective working environment.

Getting the Numbers Right

In the attempts made by UEA and Ecopolis Pty Ltd to achieve a participatory design approach the number of people involved was never great. In a related exercise with the members of the Kooringa CoHousing Cooperative designing a permaculture cohousing development in Burra, the group size of 8–10 seems about the maximum that could be dealt with coherently. This observation is reflected by Alexander in The Oregon Experiment where he says that 'no group of more than about 10 people working together can comfortably undertake a building project.' (Alexander et al. 1975 p.64).

I agree with Alexander's claim that although people can successfully participate in small projects, they cannot be properly involved in the design of large projects such as building complexes and redevelopment projects. In his third reason supporting this view, Alexander says that people 'will take part only if they feel responsible for their environment; and they feel responsible only if they can identify the parts of the environment which belong to them. Large building projects do much to rob people of this feeling.' (Alexander et al. 1975 p.65). Without the benefit of having read Alexander at the time, I concluded that a large project, in particular the Halifax EcoCity Project, should be designed overall in such as way as to enable its development and design in 'bite-size chunks' that could be comprehended by relatively small groups of people so that each chunk had a character and sense of place which could be finally defined by the involvement of future residents with its development. This approach was carried through in the detailed design of Christie Walk.

Healthy Builders

> Building is a complex activity. It makes people aware and take heed at different levels: at the level of having to make pragmatic decisions; of envisioning architectural spaces in the mind and on paper; and of committing one's whole being, mind and body, to the creation of an ideal
>
> (Tuan 1979 p.106)

From the builder's point of view there is more consideration and work required to produce a given floor area of housing when ecological material choices are combined with individualised design, but there is potential for much greater job satisfaction. There is less of the stress associated with doing endlessly repeated construction operations with identical components.

A construction site is often something of a battlefield, with the needs of construction workers set against the needs of capital-intensive industry and where the only antidote to the pressure of that industry, and maybe the only way to ensure a fair slice of the cake, is to go slow. The proposition behind the Ecopolis approach is that the time spent on site may be the same as with currently normal approaches to building, but the time will be spent in more varied and creative tasks. The theory is that rather than be merely the extension of a machine fulfilling the plans for maximising the investment of distant capital, the building worker is put back into the picture as an integral part of the creative process, liaising with occupants, clients, architects and others as part of a team. With the whole project also set up to create a healthy environment, the building process itself becomes closer to life-enhancing exercise with the elimination of toxins and pollution contributing directly to the physical health of all concerned.

In the Christie Walk project, UEA and Wirranendi were initially compelled to create a building company because none could be found that would satisfy the client's goals. In the event, this provided a very thorough engagement with the construction process and brought the concept of a genuine team approach much closer to realisation. Although there were still problems with the occasional recalcitrant sub-contractor[9], the overall result was that the work site had a co-operative and positive ambience. Some workers were able to return to the construction industry because of the absence of toxic materials and finishes in the buildings, others were able to enter the industry for the first time.

10.5 Education and Community

> Not industry but education will be the centre of their (citizens) activities; and every process and function will be evaluated and approved just to the extent that it furthers human development, whilst the city itself provides a vivid theatre for the spontaneous encounters and challenges and embraces of daily life
>
> (Mumford, 1961/1991 City in History, p.653)

> There is no question that at present the university offers a unique combination of circumstances which allows some of its members to criticize the whole of society. It provides time, mobility, access to peers and information and a certain impunity – privileges not equally available to other segments of the population. But the university provides this freedom only to those who have already been deeply initiated into the need for some kind of obligatory public schooling
>
> (Illich 1973b p.43)

[9] There were teething troubles with site management too, attributable to inexperience on the part of all concerned.

Streets and Schooling

Education regarding the making of ecological cities has to become part of the culture in a way that is not élitist or separate from the daily life and concerns of ordinary citizens.

It is only when environmental education in school has been the basis of everyone's learning experience that we can expect to see environmentally responsible behaviour as the norm. Illich contends that the school is 'the reproductive organ of a consumer society' (Illich 1973b p.77) but fails, or chooses not to recognise, that if we rely on schools to educate people there will always be a tendency for the adult population outside of formal learning institutions to be ignorant relative to the current state of knowledge. The internet has provided one means by which this adult ignorance can be, and perhaps has been, countered to some extent and Illich presages this in his 1973 Deschooling Society in his chapter on 'Learning Webs' (Illich 1973). He calls for what amounts to direct democracy in learning without coercion and institutional control – encouraging spontaneous communication supported by 'liberated' access to skills and knowledge. This is similar to the concept of urbanism discernible in the work of Alexander, Jacobs and Engwicht in which well-designed or successful city environments are those that support multiple levels of communication, where zoning and hierarchic design has not diminished or prevented the potential for people to trade, exchange and meet in spontaneous rather than predetermined patterns. In this scenario, to accelerate the increase in the level of knowledge in the wider community, ecocity ideas need to be exchanged and promulgated through non-formal, non-institutional means rather than formal mechanisms in schools and universities. Urban Ecology Australia and Ecocity Builders have worked predominantly in the non-institutional community sector. At the same time, UEA has been responsible for many presentations to schools and tertiary institutions and case studies have been adopted in various forms in curriculum material. Christie Walk has received thousands of visitors, many of whom have been children on visits organised by their schools.

Although there has been much published material on various aspects of ecocities and urban ecology since the early 1990s, there are relatively few texts that condense the topic in a manner that makes it quick and easy to digest. Some of the best work has been done, ostensibly, for children. Nancy Bruning's (1992) entry in the Children's Press' Saving Planet Earth series, aimed at young people, puts many adult books on the subject to shame. To quote the Urban Ecology Bibliography co-editor David Munn 'The book begins with an appealing vision of what it would be like to live in a clean, safe city where we could walk or cycle to school, work or shops. It then gives a grim account of why our cities are not like that and how they waste resources, harm our health and destroy nature. The solutions to these problems are then outlined with practical examples of people in various countries working to make their cities ecological.' (Downton and Munn 1996).

Unfortunately, books and other publications, even intensely active and exciting public meetings, can do little more than stimulate the imagination. The problematic is inherent in the process. As Illich said in regard to 'Celebration of Awareness' 'We

can only live these changes: we cannot think our way to humanity. Every one of us, and every group with which we live and work, must become the model of the era which we desire to create.' (Illich 1971 p.17). Part of the contention here and the primary rationale behind Urban Ecology Australia's efforts to move from the realm of theory into practice, has been that building 'a piece of ecocity' would provide the best means of demonstrating and promulgating ecocity ideas. The Ecopolis projects described in Chapter 7 were all intended to have educational processes and results integral to their design, construction and maintenance.

10.6 Thinking Machines

There are many and diverse aspects to ecocity design, development and maintenance including: water management, energy systems, air quality, waste and resource management, construction materials selection and use, food security, biological systems design, habitats for non-human species, disease vectors and amelioration, aesthetics, urban design, place making, bioregionalism, geomancy, spirituality, the role of professionals, gender, education, civil liberties, civics, competition, cooperation, and the role of community. In order to make sense of the complexity and diversity of human affairs we are compelled to employ simplified versions of reality, to model the inter-relationships of society and thus, for the purpose of ecocity theory, the links between the various activities of city design, making and maintenance as the basis for reviewing the type and extent of changes in both those activities, and their relationship to one another.

We live in a world awash with information. It is everywhere, it is all around us, it *is* us. It is the world of which everything is made. There is so much information that our sensory apparatus has had to evolve powerful filters to prevent us from being overwhelmed with all the sensations that the ordinary world provides. And this is without turning on TVs or computers or reading a paper, this is without any human technology whatsoever – the information is embedded in the natural world and all of our efforts to understand that world are to do with learning how to translate senses into data.

Simplistically, every city consists of sites and buildings and one of the most marked failures of Modernism in architecture and planning has been to regard building sites as tabula rasa, empty space waiting to be filled by the heroic creative genius of design. In reality any site is a place, full of information waiting to be read and understood. And because every context is invariably and inevitably part of the human universe, so all of that information ultimately relates to the living systems within which our lives are contained. Human settlements are complex.

Patrick Geddes sought ways of expressing complex concepts regarding human settlement by reducing them to diagrammatic essentials. Geddes used 'Folk', 'Land' and 'Work' as convenient ports from which to launch his exploration of the many relationships that conspire to make up human settlement. Independently, I have found that there seem to be three irreducible parts to the human settlement equation

that can be called 'People', 'Place' and 'Work'. They might also be thought of as 'Community', 'Ecology', 'Activity'. The inter-relationship between these elements may be regarded diagrammatically as shown in Figure 73:

> Here the study of Place grows into Geography; that of Work into Economics; that of Folk into Anthropology. But these are commonly studied apart. . .here we have to bring them into a living unison. Place studied without Work or Folk is a matter of atlases and maps. Folk without Place and Work are dead. . .So too for economics, the study of Work, when apart from definite Folk, comes down to mere abstractions
>
> (Geddes in Kitchen 1975 pp.323–325)

The intent of the Ecopolis Development Principles is to find ways of addressing the essentials of human settlement while at the same time reinforcing their interactive and interdependent nature. Taking Geddes' 'Notation of Life' diagrams (one of his thinking machines) and discourses, it is readily possible to see correspondence between the development principles and his 'Place/Work/Folk' (Chord of Simple Practical Life) continuum. Development principles 1 to 3 relate to Place, 4 to 6 relate to Work, and the remainder relate to Folk.

The Outlook Tower

> 'On which point, 'Outlook Tower' is a pretty ordinary name isn't it?
>
> 'Maybe. But it's actually a tribute to a bloke called Patrick Geddes who, in many ways, started this whole idea of holistic planning and ecological development. He created an Outlook Tower in Edinburgh as a sort of educational tool to show people that their city was not just a 'thing' all on its own but a hive of human activity and culture in the middle of a living landscape. We think that he'd like what's happening here.'

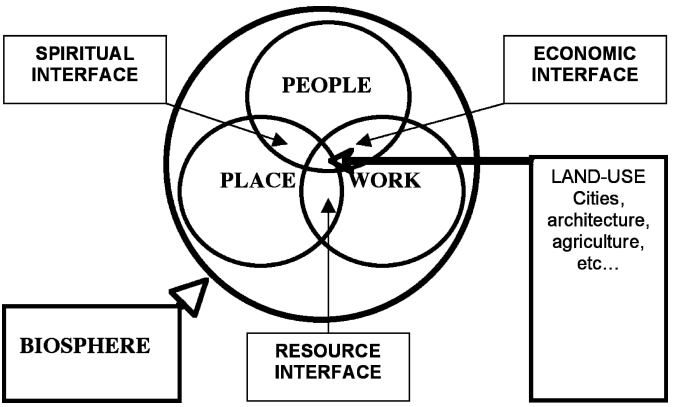

Figure 73: 'People Place Work' A diagram deriving inspiration from Geddes that identifies the main interfaces of human activity which determine land use

> 'Where can I find him?'
> Sunny laughed.
> 'I think he's been dead for over a hundred years!'
>
> (Downton 1996 pp.16–17)

After discovering the work of Geddes and both its parallels and relevance to Ecopolis ideas, I incorporated an 'Outlook Tower' in the Halifax EcoCity Project proposal intending it to have a similar function to the Geddes original. In the short story, 'Whyalla Why Not?', published by UEA as a means of introducing the ecocity consultancy and community participation program for the Whyalla EcoCity Development, I used the device of an imaginary Outlook Tower to introduce an overview of Whyalla as an ecological city in the year 2021 (see above, and Chapter 7). The Tower is an educational device. It may appear quaint now that we have computer imagery, databases and an internet that enable ready access to massive amounts of data and images from local to global scales. Nevertheless, physical models of the environment possess a beguiling attraction.

Fiction as Education

As noted in the commentary on Morris and Callenbach in Chapter 4, utopian novels can be effective vehicles for presenting ideas. By allowing the author to present ideas about society, culture, etc, in an integrated, fictional manner, more complex propositions can be made about the nature of those ideas. For instance, the description of the merits of solar energy may be presented as a factual list, or as a story designed to engage the reader in a process of imagining the use of solar energy in a realistic situation. Although the list may be more formally and objectively accurate, a moderately well written fictional narrative can convey more information and be more expressive about the relevance of that information to the reader.

I have used the fictional narrative form to communicate ecocity ideas on four occasions[10] with some success (gauged by immediate and subsequent responses from listeners and readers) and consider it to be a valuable educational tool. In the case of Whyalla the story was written with the deliberately provocative ending 'The first part of this story is true. The rest depends on you. What would you see from the Outlook Tower?', and a request for readers to send their view from the Tower to the Centre for Urban Ecology. This prompted local teachers to run a successful competition for school students in which they had to continue the story.

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[10] 1. 'Letter from Kangaroo Avenue', presented as an informal paper on a couple of occasions in 1989 and subsequently published in an abridged form as the exhibition brochure *for 'Ecopolis Now!* in January 1991, also later published in *'Raise the Stakes – The Planet Drum*, no. 23, Summer 1994 (Northern Hemisphere); 2. 'Frogs Fight Back: A Future History of the Ecopolis Project' presented at *Ecopolitics V* in April 1991 and published in the Proceedings the following year; 3. 'The Art of Living', p. 6–8, *Artlink* – Special issue on Art, Architecture and Environment, Vol. 11, no. 4, Summer 1991/92; 4. *Whyalla Why Not?* Published in 1996 by the Centre for Urban Ecology, Adelaide, in support of the Whyalla EcoCity Development community participation process.

Amongst the direct outcomes that have come from the UEA promotion of ecocity projects and ideas, there have been self-publishing exercises which use fiction for educational purposes. After EcoCity 2 Garth Dutton was inspired to publish a book of environmental short stories (Dutton 1992). Emilis Prelgauskas produced a book of short stories sketching various scenarios based in and around the hypothetical future existence of the Halifax EcoCity Project (Prelgauskas 1994). There is limitless scope for using fiction as an educational tool and 'imaginative scenario planning' is essentially a formal way of using fictional constructs to explore the scope of future planning needs.

Urban Ecology in Academia

Historically, architectural design and urban planning have been able to exist very separately from ecological subjects. Within the academic environment, although a university may evoke concepts of integration and a bringing together of knowledge, the reality is a kind of divide and rule, with the separation of things being more important than their integration. In my experience there are few linkages between subjects within a course, let alone between courses.

I introduced the subject of Urban Ecology to the undergraduate programs at the University of South Australia in 1992 and after a couple of years succeeded in getting it into the core of the syllabus. My work with UEA, Ecopolis Architects and the case study projects profoundly informed my teaching and research activities[11]. The concept of urban ecology I adopted for the development of the urban ecology syllabus was borrowed, in the first instance, from American ecocity activists, and I subsequently used it as the focus for developing a theoretical framework that attempted to accommodate the essentially pluralistic nature of a growing eco-city movement. This book is partly a result of that approach.

It is no longer unusual to find courses on urban ecology, although the emphasis of the courses varies and none that I know of fully integrate architecture and planning into their curricula, and vice versa, although there are encouraging signs of some architecture and planning courses incorporating urban ecology into their scope, as has been the case with the introduction of 'Natural and Urban Systems' into the architecture and landscape architecture courses at the University of Adelaide in recent years.

International Outreach and Education

Since 1993 UEA and Ecopolis Architects have hosted interns from overseas. These young people have come to work at the Centre for Urban Ecology or in the prac-

[11] In the 2001 academic year Urban Ecology and other environmental subjects which I had introduced and had run successfully for a number of years, were deleted from the syllabus in a move which subsumed 'environment' in broader, less specific course material.

tice office as volunteers. They have come from countries as diverse as Denmark, Malaysia, India and the USA and have made important and useful contributions to the life and work of the Centre. Until 2001 their topics of study were generally directed by UEA in consultation with each student. I have usually been the primary supervisor. Some of the students had expectations regarding their studies set by their home institutions, others had no institutional allegiances and were pursuing personal growth and adventure. Each intern has produced a report.[12] In particular, the work of Thomas Jensen (1994), Norbert Schulz (1995), Neils Lautsen (1998), Wilko Kannenberg (1998), and Nina Creedman (2000) have contributed directly to material cited in this book.

10.7 Shadow Plans

> Take time you earth fullas.
> Let the spirit of this mighty
> Land touch you as it
> Touches my people.
> (Noonuccal and Noonuccal 1988)

Ecocity Mapping and the Birth of Shadow Planning

> So far, to the best of my knowledge, Ecocity Builders in Berkeley and Urban Ecology Australia in Adelaide are the only organisations to have produced such maps
>
> (Register 2006 p.258)

Richard Register first explained the ideas of what he later came to call Shadow Plans in his chapter on 'Mapping Out an Ecocity Strategy for Berkeley' in Ecocity Berkeley (Register 1987 pp.119–130 – see diagrams below). In the 1987 book he refers to 'ecocity zoning'.

The term Shadow Plan came after Register visited Adelaide as guest keynote speaker in 1991 for the Second National Greenhouse Conference, organised by UEA. At the conference he met a shadow minister (Hon David Wotton) and became intrigued by the idea of 'shadow' power structures – the American political system does not have a direct analogue. By the time of the EcoCity 2 Conference he had taken to the terminology of 'shadow planning' or 'shadow zoning'. In his proposal for redeveloping the Alameda Naval Air Station, Register describes how the term was derived and, broadly speaking how it is applied. It is quoted at length because it gives an insight to the thinking behind the ecocity zoning concept, the American view of parliamentary democracy, and how the Shadow Plan of Adelaide might be regarded or used.

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[12] Some of which are listed in the Bibliography.

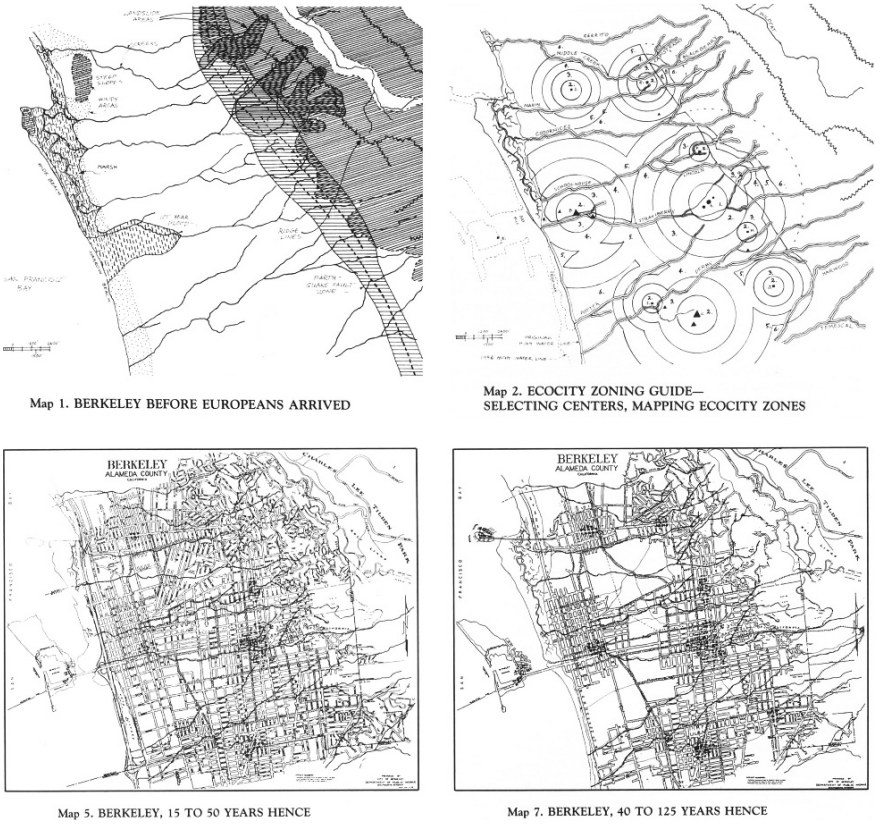

Figure 74: 'An Ecocity Strategy for Berkeley' (*Register*)

Shadow ministers belong to the party that is not in power at a particular time. These people are those most likely to assume the ministry positions should a new government be formed . . . The shadow ministers have great influence and are sought out by the media as key critics of the present administration and are a channel for new ideas into the system.

So too for Ecocity Zoning, and therefore the occasionally-used term 'Shadow Zoning'. The term is a nod to the fact that at this early stage there are no city-approved and functioning Ecocity Zoning Maps in existence, though some exist and function to give guidance to environmental activists and planners. . .What needs to be done in relation to declining biodiversity and resources, and increasing human population, and regional and global pollution *is* confronted by Ecocity zoning. Thus its tremendous legitimacy.

Ecocity Zoning is 'Shadow Zoning' in another sense too: it does not need to be officially accepted and functioning before it can be used by environmentalists, community activists, developers, business promoters, city planning departments, and military conversion planners[13] in their work. It can be used as a 'zoning overlay' dropped down on top of the

[13] UEA, particularly through Chérie Hoyle, was heavily involved in assisting the community in the neighbourhood of the CSIRO property of Glenthorne Estate, O'Halloran Hill. The community was keen to maintain open space options rather than see the property developed for more housing

> existing zoning plan to influence its gradual change over time. Or, it could virtually replace the conventional zoning quickly should communities decide they want to choose a speedier route to ecological health and economic vitality
>
> (Register 1997 pp.12–13)

Register is familiar with the shadow plans described in this chapter and uses slides of the panels in presentations around the USA and overseas. Details of three of the panels (1996, 2076 and 2136) are published with his article on Ecocity Mapping in the proceedings of the Ecocity 3 Conference (held in Senegal in 1996) illustrating 'concentrated island cities, towns and villages surrounded by restored rivers and natural and agricultural lands.' (Register 1997 p.63).

Shadow Plans of the River Torrens Catchment Tandanya Bioregion

The idea of using physical models of a region to assist in planning and conceptualising the perception of place led me to experiment with models as a way of visualising and communicating the kind of planning that Register outlined. I took these concerns into a university school of architecture design studio in 1994 and the Adelaide 'Shadow Plans' were born. They span some 300 years, from the day before Europeans came along and started altering the landscape (1836) to Adelaide's 300th anniversary in the year 2136. The plans are snapshots along the timeline and the dates have been chosen to best describe the process that might take place in the Tandanya Bioregion under a shadow planning approach.

The design studio for third year architecture students was called 'City As Organism'. Students were asked to look at the city as if it was a living organism and they began by investigating the creeks of Adelaide. The watercourses of any environment are like the veins and arteries in a body, and the health of these watercourses greatly reflects the health of the surrounding catchment. After investigating the creeks the students began constructing scale relief models of the River Torrens Catchment, extending from the coast all the way to the source of the Torrens near Mt Pleasant. This was inspired by Register's proposition that creeks should be restored, and informed by the fine photographic and historical study, edited by Warburton, of the five creeks which drain into the River Torrens (Warburton 1977)[14]. The aim was

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(it is the only major green space break in Adelaide's southern metropolitan sprawl). Ecopolis Pty Ltd, with the support of UEA, was commissioned by the CSIRO to prepare a report on 'Urban Ecological Issues'. The exercise of undertaking the report was instructive in itself – there was no mention in the major consultant's report of climate, an aspect of the urban ecosystem that Hough claims is the means to make connections between all other parts of the system. The community was successful in stopping further tract housing development of the site.

[14] Most of the creeks have suffered badly since city making began and the damage continues, with a private boys' school building its sports hall, as recently as 1992, right over one of the few

to build six identically configured relief panels upon which a progression of the shadow planning process would be shown.

Constructing the panels proved to be a huge task and by the end of the first term they were still incomplete. The second term saw students involved in their own visions of what a part of Adelaide might look like after many years of shadow planning. Some students took to the hills and designed hill top cities with soaring walls and tall spires, others stayed on the plains and transformed the suburbs into compact and vibrant ecocities. The end result was a wide range of interesting and diverse ecocities and settlements that all existed within the same water catchment.

Since that time the panels have been completed by volunteers, trainees and interns at the Centre for Urban Ecology. The ideas begun in 1994 have been applied to the model bases and there is a clear progression from the first panel to the last.

The Shadow Plans are focussed on the River Torrens Catchment using principles that can be applied to any bioregion in the world. While the catchments of the Sturt River and the Little Para River can be seen at the edge of the panels, the focus of the panels remains on the River Torrens, which runs through the City of Adelaide.

How the Process Takes Place

Watercourses become the armatures of future green corridors. Existing urban centres become future ecocities. In many cases these urban centres have grown from the original villages around the Adelaide Plains and so the progression from village to ecocity is a natural evolution. Selected main roads within the existing city are marked as future multi-transit corridors. In the shadow planned future the main roads that once carried trams throughout Adelaide now carry light and heavy rail, and a main road. These multi-transit corridors link the ecocities; people can walk to their local train station and catch a train to any other city. Each city may also be served by its own tram system. The physical footprint of many of the cities is influenced by the transit lines running through them; hence a linear arrangement. The plan shape for each city has been designed to show individuality, the shape does not indicate a specific function.

Each city has its own particular climate and microclimates, its own soil types, water availability and solar aspect. Hence each city would have its own particular industries, e.g. cities around the foothills might specialise in orchards, valley cities might have many vineyards, hills cities might produce building timber and coastal cities might farm seafood and marine products. Trade between cities and other bioregions would be through the highly efficient multi-transit systems (see Plate 1-4).

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remaining bits of First Creek that had not been culverted. Nature fought back later that same year and a flood tore away at the foundations as the creek reasserted itself.

Indicator Species

Animal graphics were planned for every panel, with simple drawings of indicator species. Indicator species are those whose presence shows the health of their habitat. If an indicator species is absent then it its habitat may be in poor health, e.g. if the creek is polluted and unhealthy for a frog to live in then the frog will leave or die.

The text accompanying the scanned photographs of the Shadow Plans (see Plates 1-4) was prepared by Nina Creedman[15] during her internship 1999–2000 under my direction, based on the earlier work of Digby Hall et al. The vegetation mapping was derived from interpretation of the excellent studies by Kraehenbuehl of the pre-European flora of the Adelaide Plains (Kraehenbuehl 1996).

Figure 75: Intern Creedman and one of the Shadow Plan panels

Shadow Plans – Enabling Vision or Hopeless Fantasy?

> The assumption that what currently exists must necessarily exist is the acid that corrodes all visionary thinking . . .
>
> (Bookchin 1995 p.248)

Shadow Plans are intended to provide vehicles for enabling visionary thinking at a grassroots level. They could be dismissed as mere fantasies rather than workable future possibilities. They have not been sufficiently tested as yet. The fundamental idea behind shadow planning as envisaged here, is essentially the same as Register's

[15] Nina met an untimely death from a rockfall whilst hiking in the mountains of New Zealand on 24 March 2007. She made a tremendous contribution to UEA during her internship and was one of core volunteers in the construction of the 'Roman Hut', the first building erected at Christie Walk. She was an extraordinarily energetic and positive personality who left a powerful impression on everyone who met her. There is a website dedicated to her memory – http://ninacreedman.tama.co.nz/

original proposition of Ecocity Zoning Maps – the conceptual framework for ecocity design.

The context of an ecological city is the region of which it is a part. An ecological city is defined by the city-region as an entity rather than as a discrete urban structure unconnected with the landscape. The shadow planning process supports the designing of ecopolitan fractals by setting out the context for their future incorporation in a city-region whole.

Kannenberg

In his study undertaken as an intern with UEA, Kannenberg makes the observation that 'The regional level used to be the most neglected of all planning levels. Even the common slogan 'Think globally – act locally' excludes the regional level, which – on the other hand – is essential to hold both levels (global and local) together.' (Kannenberg 1998 p.27). He goes on to note that in South Australia there is no government for the metropolitan area other than the state government and thus there is no environmental management plan for the region nor any comprehensive development strategy that provides a model or goals for metropolitan Adelaide with particular reference to sustainability and ecological principles. Kannenberg observes that 'ecologically sustainable development' only merited half a page in the 1992 planning strategy for metropolitan Adelaide released by the Department of Environment and Planning (Kannenberg 1998 p.27).

Kannenberg maintains that the only way in which the shadow plans could be effective as practical planning tools would be as goal setting mechanisms in a structure that used the Agenda 21 process to achieve the goals and a metropolitan planning authority to ensure that all the scales of action could be successfully coordinated and integrated (Kannenberg 1998 p.34).

> The main visions of how the future view of the city could look like could be provided by single ECOCITY proposals which would be able to play a similar role to the SHADOW PLANS on regional level. This would mean that the ECOCITY proposals and the ways to achieve them, as explained in the LOCAL AGENDAS 21 . . . would complement one another
>
> (Kannenberg 1998 p.35)

In comparing the South Australian and German experiences, Kannenberg concludes that the German model of 'democratically legitimated self-governing bodies consisting of elected deputies of each involved municipality' would be a prerequisite for the implementation of regional planning that coordinated inter-local landuse in the entire area, to make possible 'the creation of really sustainable and ecological sound urban patterns and human environments.' (Kannenberg 1998 p.36). His proposed structure for South Australia is reproduced in tabular form below – the shading indicates priority; no shading indicates that a current plan exists, light grey indicates some existing plans (in some towns, for some sites. . .), dark grey means a lot of work has to be done, and black indicates the presently non-existent regional level.

Table 19: Proposed new structure for an integrated system of general development planning and environmental planning *(Kannenberg)*

Level	Vision	Way	Report
Global Level	Rio Declaration on Environment & Development	Global Agenda 21 (International Action Plan for Sustainable Development)	Global State of the Environment Report (periodical)
National Level	Declarations on Sustainability & Development	National Agendas 21 (National Action Plans for Sustainable Development)	National State of the Environment Report (periodical)
State Level	Plans for a sustainable development of the entire human environment	State Agendas 21 (State Action Plans for Sustainable Development)	State of the Environment Report (biennial)
Regional Level	Shadow Plans	Regional Agendas 21 (Comprehensive Regional Development Programs)	Regional State of the Environment Report (annual)
Local Level	EcoCity proposals	Local Agendas 21 (Local Environmental Management Plans)	Local State of the Environment Report (annual)

The clear implication is that ecocity projects are ultimately useless unless they become integral to the entire planning process. Kannenberg's proposition for a revised planning system integrates ecocity proposals and introduces 'Ecocity Zones' as areas in which there are 'strict building regulations' (Kannenberg 1998 p.54). Whyalla later created just such a zoning for the ecocity core site described in Chapter 7 – but has not followed through with a strict regulatory environment.

In Chapter 3 the influence of Robert Goodman as a advocacy planner was noted. Unlike Goodman, most planners are far from being advocates, and are more typically soothsayers of informed complacency, explaining why things cannot change. Reiterating the conventional wisdom of extrapolatory planning does little more than second-guess the future on the basis of a partial view of past trends. The Shadow Plan process directly confronts this approach. By showing images and mappings of the city as it might be were particular goals to be pursued, it challenges the more comfortable idea that things will continue to be much the same.

10.8 The City as the Basis of Social Action

The use of computers and cybernetics enables complex inter-relationships and urban ecologies to be modelled virtually and to improve management of urban systems. But no matter how virtuous the virtual, there is a need to get hands dirty in the reality of stuff. The avatars of virtual reality, flying in cyberspace and dreaming of freedom, only exist by being connected to the real machinery of computers, with material inputs that typically require sweatshop labour and the production of massive pollution in the third world. A more direct and honest connection with the stuff of cities is needed for making healthy human futures. Face-to-face meetings in the flesh are essential but also the realisation that the most arcane and cerebral of ideas, if they are to relate to the reality of creating and managing cities, must finally be delivered as material objects and placed in the context of human society and biological systems.

Red Flag

Myth-making is at the heart of culture. Symbolic action provides images around which the myths accrete. The first red flag of revolutionism was raised on 2 June 1831 above the massed uprising of thousands of working people protesting against the iron rule and exploitation of English mine and ironworks owners. According to Welsh historian Gwyn A. Williams, as part of 'a full ritual of vengeance', at Hirwaun near Merthyr Tydfil, angry and determined men '. . .sacrificed a calf and bathed a flag in its blood.' (Williams, 1978, p.142). Popular legend tells that the origin of the flag was when, after English troops had shot at the protesting workers and their families, a woman bathed her white petticoat in the blood of the wounded and waved it in protest. The red flag remains a potent symbol of cultural change. On 11 September 2000 in Seattle the street protests against globalisation received massive media coverage and that 'S11' protest gained mythic power for people, symbolising far more than it achieved. The events on 11 September one year later in New York City undid that mythology and erected another – maybe many others. Nevertheless, the anti-globalisation protests remain significant for the Ecopolis idea because they showed the modern city being used as a primary arena for precipitating social change. The city as a cockpit for change can be seen in American cities adopting Kyoto Protocol targets despite the failure of national government to do so, and in initiatives like the Mayors for Peace 'Cities are not Targets' Campaign to eliminate nuclear weapons[16] and the call to renounce weapons of mass destruction by the Union of Cities and Local Governments.[17]

To sustain the systemic level of change needed to shift from the current exploitative ethos of city-making to the Ecopolis model, it is important to get every citizen involved as completely as they are in the present scheme of things. That means

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[16] *Cities Are Not Targets*

Mayors to the defense of cities! Cities, the heart of modern civilization and home to half of humanity, are under threat: – Cities are not safe in a world where there are weapons of mass destruction. – Cities are not safe in a world in which the rules of war are inadequate and disrespected. Mayors for Peace demands that the nuclear-armed states of the world each publicly acknowledge that it would be a war crime of the highest order to attack a city with a nuclear weapon or to expose populated areas to radioactive fallout, and to rule out immediately such actions by its armed forces under any circumstances. To be doubly sure that a Hiroshima or a Nagasaki never reoccurs: – nuclear weapons must be banned; – cities must be protected from the scourge of war. http://2020visioncampaign.org/pages/112/Cities_Are_Not_Targets

[17] Paragraph 12 of the Jeju Declaration states: "We recall that the use of conventional armaments is at present the cause of unbearable suffering for civil populations. We support, moreover the initiative of the Mayors for Peace campaign, which lobbies the international community to renounce weapons of mass destruction. We call on all nation states and armed groups to cease considering cities as military objectives – 'cities are not targets'."

Over 1,800 participants united for the 2nd global meeting of cities and local governments under the theme 'Changing Cities are driving our world". The UCLG was founded in 2004 and has works in an advisory capacity on local government issues for the United Nations. http://2020visioncampaign.org/pages/314/World_Congress_of_Cities_supports_Mayors_for_Peace_campaign (accessed 26 March 2008).

including people who do not vote, people who are too old or are too young, those who do not have any power. The situation in regard to the potential power of the city is analogous to the time of social revolution associated with the early industrial era of Victorian capitalism and Marxism. Capitalism brought people together into factories to create armies of workers to service the new machines of mass-production. Never before had such large groups of people been brought together for one purpose other than for war. The response of the workers was to turn that disadvantage of having to come together in these horrible places to work and to use it as the basis to organise for their own benefit. In bringing together workers in factories as servants to machinery, the forces of capital inadvertently created agents for change. Thus the workforce, having been turned into an army to 'man' the factories, became a massive force for social change. The great traditions of unionism arose from those conditions as an entirely reasonable and effective means of capitalising on an historic moment. It was a means for the disenfranchised to gain sufficient power to resist the excesses and brutalities that were part of the factory system.

We need to do the same for the city. The factory floor in developed countries is practically redundant as a basis for generating social change, there are simply not enough people there to constitute a strong power base. The unemployed are almost completely disenfranchised. But almost everybody lives in the city and it is through the city that we can really do those things necessary for change.[18]

Cities have brought together much larger groups of people than factories ever did for the purpose of creating a place to live (and to fulfill the demands of consumerism) and this provides the means, potentially, to effect social change just as unionism did.[19] This became a central tenet of the strategy for developing the Halifax EcoCity Project and has remained at the core of the Ecopolis idea. In the HEP, the didactic qualities of the project were seen as fundamental in two ways: 1. As built form (reflecting a little architectural determinism in the tradition of people like Howard) and 2. As a process of education and empowerment for social change. Geddes had implied such an approach and although Howard's vision was reformist rather than radical, he tried to precipitate change using Garden Cities as the means of improving the physical and social conditions of the time.

Such ideas operate in the cultural realm too. In 2000, Peter Sellars surprised the South Australian public by proposing a program for the Adelaide Festival of the Arts that was based on a long-term program of community workshopping and an ethos that was clearly intended to catalyse change in the conceptualisation and consequent development of the City of Adelaide. Although his program was relatively ineffectual, by basing his approach on principles of equity and access in relation to artistic endeavour and with the view that the city is, in effect, a living canvas for collective, creative action, Sellars was using that same idea of the city as the basis of social action.

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[18] An idea I first presented at the Students, Science and Sustainability Conference at Griffith University, Brisbane, 16 July 1992.

[19] Bookchin's 'confederal municipalism' seems to reflect a similar view of the potential of cities for undertaking progressive social change and is discussed in Chapter 8.

The idea that ecological city-making as a *process* may be even more important than as a *product* has evolved into the central tenet of the Ecopolis thesis. The Seven Steps of the SHED in Chapter 11 may be seen as the basis for an educational program structured around the processes of making ecological human settlement, and as a framework for social action.

Taking It to the Streets

The military in the UK and Australia have a strategic approach that enables small groups to act autonomously when cut off from central command. This acknowledgment of the effectiveness and efficiency of decentralised, autonomous structure helps to substantiate the preference for similar structures in planning towns and cities.

Secret knowledge is the key to power, not to good governance. As the climate crisis has become more widely acknowledged so there has been increasing pressure on governments to release information and increasing resentment of those in power who have manipulated information or attempted to ration the truth. The more difficult and threatening things have become, the more obvious it has become that a full and free flow of information is vital to dealing with the crisis. This has been exemplified in Al Gore's efforts to inform the public about not only the problem of climate change as a physical phenomenon, but also about the politics of manipulated information and special interests. It is also evident in the rising flood of internet groups dedicated to disseminating not only information about global warming, but strategies and actions to combat it in the realm of both the public and the personal.

There have always been groups and individuals struggling to preserve the truth, or set it free, and these interesting times have made their work more visible and pertinent than ever before. Historically, the only remotely equivalent threat to the wider public order, peace of mind and confidence in the future, have been times of war. Historically, the universal response of all warring states has been to clamp down on dissent and prevent the free flow of information whilst continuing to gain, or seek to gain, secret knowledge, and control its use with often draconian measures. The climate crisis was treated in a similar fashion initially (notably by the US administration under George W Bush) but there has been a rapid shift towards information open-ness as it has become more and more obvious that *everyone* is affected by the crisis to the point where only a more or less universal understanding of the problem can lead to effective responses from all parts and types of society.

10.9 The Ecopolitan iPod

Under the cities lies a heart made of ground
But the humans will give no love
(*Horse With No Name* by Dewey Bunnell 1971)

Don't it always seem to go
That you don't know what you've got
Till it's gone
They paved paradise
And put up a parking lot
(*Big Yellow Taxi* by Joni Mitchell)

They Paved Paradise – California Dreaming and Popular Culture

Popular culture reflects many of the prejudices and contradictory attitudes displayed towards the city by intellectuals and professional pundits. Modern American pop culture does it best, with both its insidious and overt manifestations of what are now globalised values and perceptions. With an economy ranked number six in the world California is the epicentre for the post-industrial mass-cultural earthquake (and its counter-cultural antidotes)[20]. The California Dream is almost synonymous with the American Dream. Because of the pre-eminent position of the USA in the global consumerist economy, California's dreams have been at the cultural core of modern myth-making around the world for more than half a century.

Arguably, no one band has done more to evoke, evolve and engender that myth than The Beach Boys. The ultimate irony is that The Beach Boys premier song-smith and consummate mythmaker, Brian Wilson, has never been able to live out the dream.

> Now, as a result of the cocky outbursts of his brother Dennis, he was something called a Beach Boy. But Brian wasn't into surfing, didn't care about the sport, didn't know a thing about it. He was scared, and *really* scared of the ocean. Even when his father insisted he at least try surfing to help the group's image, he wouldn't go out. Instead, Dennis told him stories and Brian made up songs
>
> (White 1994 p.146)

Reading like the script of a bad 'B' movie, Wilson's life has been like the night-mare flip-side of the California Dream[21]. From the beginning, his experiential base for composing the dream images has come second-hand from others. His whole life can be seen as a metaphor for intermingling of power and helplessness, pleasure and pain that resides in a Dream that, in the same way Wright's Broadacre City became an anti-city, has become, in the anti-city of suburban sprawls and malls, an anti-dream.

Wilson's own life has been a distorted reflection of the dream he composed and sold. His paradoxical experience of reality has had that heavy overlay of the vicarious and virtual that to some extent now informs the daily life of every consumer on

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[20] Any attempt to separate the counter-culture from the culture that spawned it would seem to be logically inconsistent.

[21] Including battles with drugs, dysfunctional families, untimely deaths, sibling rivalry, internecine squabbles with creative partners, and even salvation by a psychiatrist later sued for malpractice!

the planet. Yet the myth he helped create is powerful, and Wilson's sincere belief in its restorative powers is shared by millions. And, like other resilient components of modern pluralist capitalism, it has the capacity to assimilate criticisms of itself into its own continued evolution – when the dream goes bad, it just provides more fuel for the dream machine!

There is a consciousness of how civilisation has reshaped the pre-urban landscape recorded in popular song.

From the Beach Boys:

> Trader got the crown okay
> Cleared humanity from his way
> He civilized all he saw
> Making changes every single day
> Shops sprang up on the prairies and the hillsides
> Then roads cut through the mountains to the seaside
> The other kind fled to hide by and by
> And so sincerely, cried
> (*The Trader* by Jack Rieley and Carl Wilson 1972)

From Billy Joel:

> I've seen those big machines come rolling through the quiet pines
> Blue suits and bankers with their Volvos and their valentines
> Give us this day our daily discount outlet merchandise
> Raise up a multiplex and we will make a sacrifice . . . Who remembers when it all began
> – out here in No Man's Land
> Before they passed the master plan
> – out here in No Man's Land
> Low supply and high demand – here in No Man's Land
> There ain't much work out here in our consumer power base
> No major industry, just miles and miles of parking space . . . (*No Man's Land* by Billy Joel 1992)

From the Eagles:

> Some rich men came and raped the land, nobody caught 'em
> Put up a bunch of ugly boxes, and Jesus people bought 'em . . . Who will provide the grand design?
> What is yours and what is mine?
> 'Cos there is no more new frontier
> We have got to make it here
> To satisfy our endless needs
> And justify our bloody deeds
> In the name of Destiny
> And in the name of God
> And you can see them there on Sunday morning
> Stand up and sing about what it's like up there
> They call it Paradise I don't know why
> You call someplace Paradise, kiss it goodbye
> (*The Last Resort* by Don Henley and Glenn Fry 1976)

And more recently, from Joni Mitchell:

> You see those lovely hills
> They won't be there for long

They're gonna tear 'em down
And sell them to California
Here come the toxic spills
Miners poking all around
When this place looks like a moonscape
Don't say I didn't warn ya . . . (*This Place* by Joni Mitchell 2007)

There are a number of ways to address the issue of providing education for an ecological culture, and music may be one of the most important. Over the years I have tried to put as many aspects of the putative Ecopolis theory into practice as possible. As part of this research in action I worked with my eldest daughter's[22] partner, Jason Hoberg, to put music to a song lyric written in November 1990. Jason recorded the song and released it on a CD entitled 'Ecopolis Now!' in 1997. It has yet to chart, but a later version done in a rap/hip-hop style was popular on the Adelaide live music scene for a while.

Ecopolis Now!

Now I was born like everyone
Under the skies of a friendly sun,
But at the end of the day
When the work was all done,
I'd burn the treasure of ages.

(chorus) Ecopolis now!
Let me tell you my friend,
If we can't save the city
We're doomed in the end.

In a city of speed, in a city of greed
I learnt to destroy all the things that I need.
I fouled up the future
And wasted the seed
Of all my children's dreamings.
(chorus)

When men came with shovels the people rebelled
And told them to take their tech-city to hell –
To take back their poisons
And garbage as well,
And let the earth get well again.
(chorus)

[22] Seren Mari Downton-Hoyle.

Ten thousand years past, the city was born
Demanding new land and gobbling corn.
Engine of destruction –
Eye of the storm.
Now is the time to tame you.
(chorus)

Now we're dying in cities like boiling frogs,
Choking and smoking and spewing smogs;
In these deadly machines
We're nothing but cogs,
But in Life we're a part of the garden.

Ecopolis now!
Let me tell you my friend,
If we can't save the city
We're doomed in the end.

Ecopolis now!
Let me tell you my friend,
We must make the city
Our home in the end.
(Lyric by Downton 9/29 November 1990)

10.10 Sound Bites, Fashion and Cultural Change

Ecopolis Propositions – The Sound Bite Version

Education through popular media invariably seems to involve some 'dumbing down'. There is a converse propensity for pretentious phraseology in much of what passes for intellectualism, just like this. To make the Ecopolis idea more readily accessible to non-specialists, I have continually sought ways of expressing key aspects of the idea in the simplest possible way. There may be something lost in the translation but the sound bite is an integral part of modern mass-communications. Here, in 23 words, are the Ecopolis Propositions:

- *A city is part of its place.*
- *All knowledge must be linked.*
- *Ecocities need their own culture.*
- *Small projects make a big difference.*

The Talk of the Town

The sky is a bit like your best friend. Some days are a bit unpredictable and stormy, some days are stunningly sunny and beautiful, but most of the time she is just there, nice and reliable, part of your life you can depend on. But what happens when the sky no longer behaves? How do you deal with everyday life when your best friend becomes hopelessly moody and unpredictable – when any day could be stormy and violent, when her normally sunny disposition cracks suddenly into the withering heat of anger, or plunges into suffocating despair? When her gales of laughter swirl into typhoons of derision, destroying anyone who gets in the way, or when the occasional cloudy day turns into endless, dismal, foggy depression? What happens when your best friend changes so much you can barely recognise her and the world you rely on is no longer there? How do you adjust to unpredictable and violent changes in the patterns of a friendship that has always seemed settled and stable? How do you change your own patterns of thinking and behaviour to adapt? How far can you lag behind her changes without losing touch completely? As the culture of your friendship shifts into new territory, how quickly can you change and keep up with the new conditions?

Cultural lag may be deadly in periods of rapid environmental change. Cultural lag can be seen in the cultural baggage of customs, values and consequent actions that occur when colonisers enter an alien environment (e.g. English families in Australia and heavy traditional Christmas dinners). Culture is the slowest level for social change according to Brand (Brand 1999 p.37). For human society to adapt to the rapidly changing environmental conditions associated with accelerated climate change it must possess the capacity to accelerate cultural change. Brand's rates of change observations provide essential insights as they are about processes that are all around us but which had previously been poorly articulated. We can now take those insights and recognise that we face an unprecedented situation in which the previously slow and ponderous rate of change of natural systems (compared with human society) have sped up so much that Brand's diagram representing the relative rates of change now needs re-ordering.

All of Brand's kinds of change are interconnected. The changes that happen most broadly and slowly often begin in focussed and fast ways. The fastest rate of change is at the level of fashion. It snares the early adopters, and creates trends that spread into the mainstream and eventually become normal. 100 years ago the horseless carriage was a luxury fashion item for the wealthy; now most of the world's population cannot conceive of a world without cars even if they have no access to one. Cultural change cannot be achieved overnight. But it is possible to quickly change what it means to be fashionable, and that is the first step in changing culture; it is the trim tab to the rudder of culture that steers the ship of society. An ecologically viable society is not going to be achieved easily. It will not be achieved simply by demanding wholesale, sensible, practical, ecologically responsible solutions to everything. As many change agents instinctively know, to get something into the public domain in a vigorous way it must become fashionable – the talk of the town. So to make a rapid cultural shift we may be compelled to begin on the insubstantial,

ephemeral foundation of fashion! Sensible, practical solutions must be embedded in the apparently superficial froth of what is fashionable.

Cities are the crucibles and primary repositories of culture. If there is to be found any mechanism for accelerating cultural change then it is in cities. They can provide the cultural leverage for accelerated change (to use a Newtonian metaphor) or create the cultural fractals that can rapidly map the shape of the necessary greater whole of changed conditions (to use a chaotic metaphor).

Cities are perhaps the most powerful cultural change agents of all. They stand as both consequences and key players in the processes of cultural change. As observed by Orszanki, this has been an important part of the Ecopolis theory – 'The aim of the (Halifax EcoCity) project (was) to act as a seed for the continuing transformation of the city of Adelaide, as an example of what can be done. . .' (Orszanski 1993 p.45). In his recent book on Sustainable Urbanism, Farr observed that 'An adventurous spirit and willingness to experiment has paid off for the creators of Christie Walk, who have produced a rare community-driven project with applicability to sustainable urban developments worldwide.' (Farr 2007). Around the world, many other model developments and proposals for ecological development have played similar roles, part of which is to try and make ecological lifestyles not only functional, but fashionable.

Chapter 11
Synthesis IV: The SHED Sustainable Human Ecological Development

The powerful technological agents we have unleashed against the environment include many of the very agents we require for its reconstruction

(Bookchin 1981 p.15)

11.1 Building a SHED

SHED provides a program for putting Ecopolis into action and a framework for cohering the many facets of design, development, community engagement and maintenance that are necessary to the making of urban/cultural fractals. The Seven Steps are about an evolving system of design and development that includes indicators and assessment tools and continually accommodates, incorporates and assimilates methodologies within it. Much as the success of capitalism is due to its capacity to assimilate anything and everything that can help sustain it, so the success of an ongoing, generic process of human settlement development must be able to continually adapt, adopt and evolve in a similar way.

This chapter describes some of the 'geometry' of the cultural fractals that might demonstrate this integration of knowledge and technique with social and built form. Five elements define the theory. The first is a mission statement**:** ***The Charter of Calcutta***; the second is a performance measure: ***The Frogstick***; third is the set of principles that, in one form or another, have provided the program for the Ecopolis projects in Chapter 7: the ***Ecopolis Development Principles***; fourth is a patterning tool through which the principles and performance might be employed in pursuit of the mission to save the world with city making: ***The Seven Steps***. Taken together with the ***Four Propositions***, these elements constitute the Ecopolis synthesis. What follows in this chapter is a discourse to partially illustrate some of the linkages between the propositions, the projects, and the syntheses.

For a theory to be workable and have practical application it must be understandable. Any theory of human affairs has to employ approximations. To make a theory usable and understandable it may be necessary to label concepts in a way that appears to reduce their complexity in favour of brevity and, ultimately, clarity.

The Seven Steps are designed to be both a conceptual framework and planning tool. They may also be seen as the basis for an educational program structured around the processes of making ecological human settlement. The minimum intent

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is to provide an armature on which can be wound all and any extant or developing knowledge that is pertinent to making ecological human settlement (Proposition 2)[1], and for the mutual qualities of that knowledge to made more visible, integrated and usable by its consideration within the Seven Steps process.

The overarching goal is to be able to design, develop and maintain urban systems consciously integrated into the processes of the biosphere with the intent of maintaining the optimum functioning of the biosphere for human purposes. As all urban systems are now set within the context of a planetary environment that is significantly degraded, so the goal of making those systems includes the proposition that we simultaneously 'Heal the Biosphere' (repair, replenish & support the processes which maintain life) through the evolutionary development of ecological cities. Ten indicators are proposed for assessing the impact of any given development on the health of the biosphere, set out in the form of a 'Frogstick' – an urban ecology checklist[2]. The principles to apply for achieving the overarching goal are set out in the Ecopolis Development Principles[3]. These Principles have been developed and tested in the public domain since 1992, particularly via their application in the Ecopolis projects described in Chapter 7. The ten development principles are here organised in two groups of five, one set of five directly addresses the *biophysical environment*, and the other set addresses the *socio-cultural environment*. The biophysical set aim to ***minimise the ecological footprint***, the socio-cultural set is to do with ***maximising human potential***.

Rag Bag and Building Blocks

> Restructuring the building blocks of towns and cities is now a possibility. This is partly because science and technology have reached an unprecedented juncture where centralization, specialization of function and giantism are no longer either necessary or needed. All of the components of society, including energy, power, waste treatment, transport, and food growing can be decentralized, miniaturized, and integrated on a human scale
>
> (Todd and Todd 1994 p.11)

If the building blocks are available, the Seven Steps of SHED provide a means for them to be brought together with some degree of coherence; the goals and precepts of Ecopolis enabling any pertinent theoretical and practical approach to be integrated (or, at a minimum, accommodated) within the framework of The Seven Steps, the Frogstick and Ecopolis Development Principles. The Seven Steps structure is designed to be able to incorporate any principle, process or technique

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[1] Of whatever kind. The definition of knowledge is intended to be non-culturally specific and is here taken to include and accept non-scientific and 'irrational' ways of knowing, such as Feng Shui and Dreamtime mythologies.

[2] First presented at the Solar 91 Conference in Adelaide on 5 December 1991 (Downton 1991 p.54).

[3] Initially drafted as a set of 12 precepts for ecological development in 1991-92 by Emilis Prelgauskas, Chérie Hoyle and myself, building on the earlier 'Frogstick'.

that is relevant, i.e. that fits the underlying ethos and propositions of the Ecopolis theory. The structure does not provide for a specifically 'arts' or 'science' based process. It is intended to allow for a multiplicity of approaches and link them through their relevance to the Ecopolis Propositions that define the goal of creating ecological cities. Thus configured to accommodate the arts, sciences, humanities, vernacular and popular culture, it is proposed as a means of facilitating the embedment of a cultural framework for integrating all and any principles, processes and techniques that can contribute to the design, development and maintenance of ecological cities.

So that nothing is unnecessarily excluded, the idea of Ecopolis quite deliberately allows for a rag bag of material to be collected for the purpose of weaving or stitching into the fabric of the new cities and settlements required to satisfy the Four Propositions. The overall approach is not to seek some kind of abstract theoretical purity, but rather to acknowledge and celebrate all and any ways of knowing or making urban systems that fit the goal of creating Ecopolis. Thus, whilst seeking specificity to place with cultural placing and relevance, it is not bound to any particular culture, and whilst it is a theory of urbanism, it includes the rural.

> A Greek polis was not an abstract entity: a citizen could know it personally. Even if he (sic) had not paced the country from end to end, he should at least be able to see the physical limits of the state to which he owed allegiance. In the clear air he might discern the chain of hills beyond which lay other states that competed with his own[4]
>
> (Tuan 1979 p.175)

Like the original polis of ancient Greece, Ecopolis is about the city and its region as a place for its citizens to know and understand; not to be in competition, but in order to find common ground and stimulate productive interaction as living systems within the biosphere. That interaction may be seen in trade, cultural exchange and the relationship of ecotones and biomes.

A city should analyse and manage its own metabolism (Newman et al. in Taylor 1996) and it is a working hypothesis of the Ecopolis thesis that making ecocities is about providing the urban ecosystem with the means to be conscious of its own processes. The Seven Steps are intended to assist in this by providing a simple, visible structure within which the more complex processes of the urban ecology can be located and understood. Programs like Agenda 21 can be subsumed in this structure to inform and guide the detail of city-making. SHED is intended to define an integrative process that enables planners, ecologists, architects, landscape architects, city managers, politicians, life scientists, citizens, and so on, to each use their own knowledge and skills in a framework that facilitates the coordination of their multifarious activities. It is oriented to non-specialist and non-expert use and can be employed as part of conventional professional design practice[5].

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[4] All citizens, of course, were of the male gender.

[5] This fits the pattern of my own experience in ecocity design through UEA and Ecopolis Pty Ltd with the numerous interactions between the realms of formal design and the non-expert citizen.

11.2 Charter of Calcutta

We are at a turning point in history.
Our planetary environment is severely damaged.
Desertification is spreading, the globe is warming.
Entire ecosystems are under threat.
And the City is at the centre of the storm of destruction.

But that is the key!
We must cease seeing the City as a problem.
We must see the City as the solution.
For the City is our home.
It is what we make it to be.
It is where we live.

If we fail to seize the Future,
We will be consumed by the Past.
The Future begins NOW!

Let the Charter of Calcutta be simple and clear,
To be heard by all,
And filled with hope and vision –

The City Can Save the World!

In 123 words, the Charter of Calcutta provides a concise account of urbanisation and its impacts on the biosphere and offers hope that human activity through city-making can turn around the process of destruction to one of repair and regeneration. The Charter was formally adopted in the concluding session of the International Conference and Exhibition on Architecture of Cities held in Calcutta on the 20th. November, 1990 (see Frontispiece). Subsequent to its publication in the UEA 'Blue Book' (Downton 1994 and 1996) and on the UEA website, the Charter has been formally or informally adopted by others including the mayor of Oakland, California, Jerry Brown; the City of Bremen initiative in Germany; and the 'Permaculture in Cuba' group.[6]

11.3 The Icons

Inspired by the work of Pliny Fisk at Max's Pot, the icons have been designed with future application in mind as 'buttons' for CD-ROM, website and hypertext application. Each icon has been designed for use at a large scale as signage for

[6] http://members.optusnet.com.au/~cohousing//cuba/hab9606/hab9605.htm (still an active site in March 2008).

exhibitions and events, and for extreme reduction as an element for embedding in text. They are intended to work at any scale from flags to coasters and stamps. I have sought to avoid culture-specific images in generating the graphics, and for the icons to be comprehensible to the widest possible audience I have tried to maintain an element of pictorial readability rather than reduce every icon to a high degree of abstraction.

In the following pages, each of the 27 components of the process, principles and performance measures are briefly described. Some reference is made to the Ecopolis projects of Chapter 7 and, by way of sorting some of the rag bag, relevant theorists are identified to try and draw the threads through from Chapter 4 and point towards relevant material and references for SHED applications.

Table 20: Key to the Icons

	Seven Steps (The SHED)		**Ecopolis Development Principles**		**Frogstick**
	Process		*Principles*		*Performance*
	**1. Shedding**		**1. Restore Degraded Land**		**1. Air**
	**2. Placing**		**2. Fit the Bioregion**		**2. Water**
	**3. Biozoning**		**3. Balance Development**		**3. Soil**
	**4. Lifelining**		**4. Create Compact Cities**		**4. Energy**
	**5. Proximating**		**5. Optimise Energy and Resource Use**		**5. Biomass**
	**6. Patterning**		**6. Contribute to the Economy**		**6. Food**
	**7. Architecting**		**7. Provide Health & Security**		**7. Biodiversity**
			**8. Encourage Community**		**8. Habitat**
			**9. Promote Social Justice & Equity**		**9. Ecolinks**
			**10. Enrich History & Culture**		**10. Resource Use**

Fractals in the SHED

As I described it in Chapter 1, an urban fractal contains all the elements, in greater or lesser degree, of the whole urban system of which it is a part. Because an *ecopolitan* urban fractal contains all the elements, in greater or lesser degree, of a whole Ecopolis, it should be possible to identify the extent to which it successfully addresses the Ecopolis Development Principles and the seven steps of the SHED process, and to assess how well it performs against the measures of the Frogstick. Conversely, if it is not possible to identify a reasonably high degree of success in these regards, then the urban fragment is just that, and not a fractal of Ecopolis.

Table 21: Some Relationships to the 'Geometry' of Urban Fractals

Characteristic	Ecopolis	SHED/EDP/ Frogstick
Relationship to the Biosphere	Consciously integrated into biosphere processes to optimise their functioningfor human purposes.	All.
Relationship to the Bioregion	Nurturing bioregional functions, totally defined by them.	**SHED 1 (Shedding).** EDP 2. Frog 8.
Response to Place	Very strong.	**SHED 2 (Placing).** EDP 1. Frog 7.
Protection of Biozones: maintenance of food production	Ecosystem restoration and remodelling, urban agriculture.	**SHED 3 (Biozoning).** EDP 1. Frog 7.
Ecosystem Connectivity: creating habitat	Conscious connectivity with all elements of the environment.	**SHED 4 (Lifelining).** EDP 1. Frog. 8.
Urban Form: Nodes/centres, patterns of connectivity that define structure and organisation	Compact: urban villages, distinct centres that are determined by topography and place.	**SHED 5 (Proximating).** EDP 4. Frog 10.
Pattern of Development: Networks that contain essential characteristics of the larger city	Walkable with good transit connections. Built form corresponds with needs of social exchange and ecosystem function.	**SHED 6 (Patterning).** EDP 7. Frog 9.
Architecture	Organic. Highly responsive to climate, place and human needs. Use of biomimicry.	**SHED 7 (Architecting).** EDP 3. Frog 10.
Ecological Footprint	1 planet footprint.	All.

11.4 SHED Navigation Matrix, or Concordance

SHED / EDP	Shedding	Placing	Biozoning	Lifelining	Proximating	Patterning	Architecting
1. Restore degraded land	●●●●	●●●●	●●	●●●●	●●	●	●●
2. Fit the bioregion	●●●●	●●●●	●●●	●●●●	●●	●●	●●●
3. Balance development	●●●●	●●●	●●●●	●●●●	●●●	●●	●●
4. Create compact cities	●●●	●	●●	●●●	●●●●	●●●●	●●●●
5. Optimise energy and resource use	●●	●	●●●●	●●	●●●●	●●●	●●●●
6. Contribute to the economy	●	●	●●●●	●●●	●●●	●●●●	●●●
7. Provide health & security	●	●●●	●●●	●●●	●●	●●●●	●●●●
8. Encourage community	●	●●●●	●●	●	●●●●	●●●●	●●●
9. Promote social justice & equity	●	●●●	●●	●	●●●	●●●●	●●
10. Enrich history & culture	●●	●●●●	●	●	●●●●	●●●●	●●●●

FROG	Shedding	Placing	Biozoning	Lifelining	Proximating	Patterning	Architecting
1. Air	●●●	●	●●	●●	●	●●	●●
2. Water	●●●	●●	●●●	●●●●	●	●●●	●●●●
3. Soil	●●●	●	●●●●	●●●●	●●	●●	●●
4. Energy	●●	●	●●●	●●	●●●●	●●●●	●●●●
5. Biomass	●●●●	●●	●●●●	●●●	●●	●●	●●●
6. Food	●●●	●●	●●●●	●●●	●●●	●●●	●●●
7. Biodiversity	●●●●	●●●●	●●●●	●●●●	●●	●●●	●●
8. Habitat	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●
9. Ecolinks	●●●●	●●●●	●●●	●●●●	●●●●	●●	●●
10. Resource Use	●●	●	●●	●●	●●	●●●	●●●●

The Seven Steps connect specific Ecopolis Development Principles and Frogstick assessments in relation to the design, development or maintenance of ecological cities. The number of '●' symbols in the matrix rate the strength of the relationship between the elements: more symbols = stronger relationship. There are, of necessity, functional relationships between all of the elements but the cells are shaded when that relationship is particularly strong, e.g. 'Lifelining/Water'.

11.5 The Seven Steps of SHEDding

Settling in Place: Watershed and Region – A Basis for Process

Making ecocities is about constructing human settlement in a particular place in such a way as to maintain the conditions of that place for human settlement. Despite this apparent anthropocentricity, this requires that ecosystems are maintained in a condition approximating that existing prior to human settlement. It certainly requires a profound sensitivity to regional characteristics and a clear view of the place and the intended activities there. It starts with understanding a region and results in habitations that reflect that region in their making and occupation. It is about regionalism, and a workable link between biophysical definition and human cultural definition of place is found in the watershed[7]. A topographical built form relationship between region and habitation is readily identifiable through their respective capacity (and major functions) as shedders of water. Sustainable human ecological development depends, at the most fundamental level, on an understanding of the connections between human and non-human life through the flow of water within ecosystems. The SHED system proposed here represents an attempt to make the process visible in a way that can be readily understood by experts and non-experts alike, and at the same time identifies links to appropriate theories and practices for the design, development and maintenance of ecological cities.

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[7] Usually 'catchment' in Australian and UK usage.

Notwithstanding the focus on watersheds and regional specificity, the SHEDding process must be understood as steps towards situating urban development within the larger context of the biosphere – and in order to do this it must assimilate and respond to rapid changes in the environment at local and global levels.

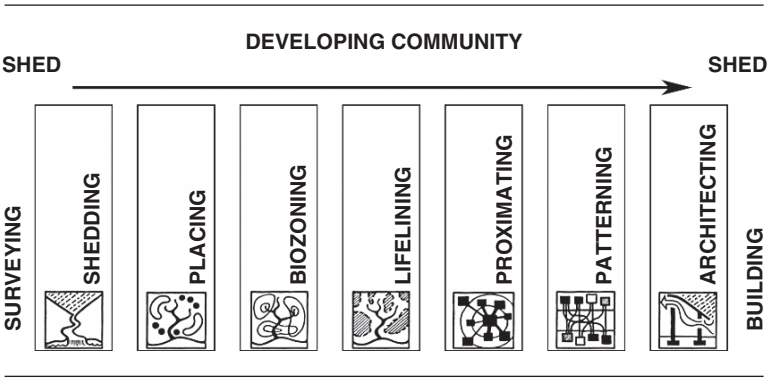
The Seven Steps in the process are all defined by verbs ('doing words'). The goals for that 'doing' are set by the Ecopolis Development Principles, which are also described with verbs because they are about on-going process rather than fixed objectives. The measurement of success in terms of the biophysical environment are in relation to the indicators set by the Frogstick (which are also about process). All together, these 27 icon-identified elements of goals, principles and processes configure a matrix of activity that may be recognised as an ecological development process, engaging people, place and action in what might be called 'Communitecology'.

Communitecology

From the large scale, 'big picture', cultural shedding of ideas and the shedding of rain in the landscape, from the shedding of rain off buildings to the shedding of skins that Brand describes in 'How Buildings Learn', the process of shedding links the human presence with the presence of nature.

The SHED sequence starts with surveying the landscape and progresses to building shelter. That progression is tied to the development of community. It is also cyclical and richly interwoven (see Navigation Matrix).

Table 22: The SHED sequence



The Seven Steps of SHED are organised, partially, on a scalar basis, having regard to the shift in magnitude from the macro to the micro, from the region (water-shed) to the individual shelter (shed). Although numbered sequentially, any Step may be the first because each requires the others to be considered. Biological processes are given strong emphasis, dominating the content of the first four Steps. This provides the context for all the other Steps in which community processes are always implicit – it is taken as axiomatic that there is no need to make cities unless there is a community to settle and provide for. Although The Seven Steps are ultimately about building environments, architecting is effectively de-emphasised, even as it remains essential to the culmination of the whole process of making a place for dwelling. As a design strategy, the Steps might be antithetically compared with those many theories that nominally incorporate 'sustainability' in a way that biological and human processes are described *within the architectural and planning framework* (e.g. New Urbanism). Here, the emphasis is reversed as it is an attempt to *set architecture and planning within the framework of the biophysical and biosocial realities of place* as part of the conscious making of ecological civilisation.

The Emptiness and the Way

The etymology of 'shed' is rich with meaning – another reason for its use. Consider, there is:

- *Shed* as in watershed and its biophysical reality, but also as in letting go or shaking off cultural prejudices…
- *Shed* as in causing to fall or flow…
- *Shed* as in casting off seed, or shedding leaves…
- *Shed* as disperse, diffuse, radiate…

And returning to the theme of my introduction, the *shed* is also that opening between the warp threads in a loom through which the shuttle carries the weft. With this metaphor, the fabric of civilisation is woven as the shed provides the passage for the short, busy creative threads of the weft to join and pattern the long, slow warp threads of cultural and social change. Thus the steps of the SHED provide the emptiness and the way that enables the weaving to take place.

SHED 1 Shedding

> To see a stream without visualizing its sources, its qualities, the power it represents and the unceasing work of that power in shaping its valley, is to be more than half blind. The needless devastation of every great flood is sufficient testimony to this
>
> (Sears, 1970, p.167)

Shedding addresses the proposition that city-regions determine the ecological parameters of civilisation. SHED 1 determines the parameters of regional ecosystems on the basis of biogeochemical processes that are mostly contained by, and are dependant upon, the hydrology of the watershed, or watersheds, that relate to the city's regional context.

Shedding involves identifying the biophysical context and its inherent developmental constraints for city making. It requires the investigation of the watershed(s), and some attempt to reinhabit the bioregion. It readily makes use of a McHargian 'design with nature' methodology as a means of mapping and understanding the region. It involves finding the purlieu – 'the bounds or limits within which one ranges'. Shedding requires at least a basic analysis of the carrying capacity of a given regional environment. Ecological footprint analysis can be used to test the demands that a proposed development might have on local biological and resource limits.

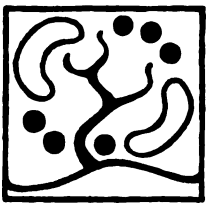
At the Shedding stage, account should be taken of accelerated climate change by identifying and conceptually testing potential scenarios, looking particularly at water, i.e. extreme rainfall and potential flooding and the impacts of sea level rise.

A typical developmental activity that explores 'Shedding' would be the Bioregion Workshop in the Whyalla EcoCity Development process (see Chapter 7). This workshop was a way for the local human community (in this case through the younger generation) to discover and be introduced to the wider community of the other living organisms that are part of their regional environment. Following the lifecycle of each and any organism native to the local environment provides a way to become familiar with the biophysical context, and is a process can be pursued at any level of formality, from scientific study to children's workshops.

The Icon

Derived from a simplified image of a valley collecting rain, with water streaming to a sea or lake – a stylised watershed.

SHED 2 Placing



> In setting out the walls of a city the choice of a healthy situation is of the first importance…
>
> (Vitruvius circa 1BC in Gwilt 1967 p.14)

> Every place should have a spirit; indeed, unless it has been destroyed by brutal unresponsive actions, every place does
>
> (Day 1990/1995 p.107)

Placing addresses the proposition that the collective consciousness and unconsciousness of human inter-relationships with the biosphere is embedded in culture.

Placing involves exploring cultural and spiritual aspects of the bioregional analysis. It is about putting people in a place and finding the right fit. Because it is about identifying the 'genius loci' and discovering the spirit of place it could be regarded at least partially as 'Spiriting'[8]. Geomancy and Feng Shui techniques are relevant and related techniques again include Berg's reinhabitation. Placing includes seeking out the non-physical structure of place as the basis for maintaining deep continuities, particularly by accessing the knowledge of place held in the customs and stories of indigenous peoples as a means of reaching back into past ecologies.

Integration of the built environment with its place should occur at the aesthetic level but it *must* occur at the level of ecological function. Buildings need to be integrated in functional harmony with landscaping and vegetation. The important relationship of any building must be with the place it inhabits rather than simply the space it occupies.

An example of placing is the acceptance of geomancy in the site planning of the Whyalla EcoCity project when a Buddhist priest dowsed the site for the centre of the Gompa in the Buddhist Meditation Centre and that was then used, with the topography of Mount Laura, to set the axis for the Whyalla EcoCity Core Site.

The Icon

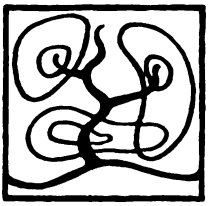
The stylised watershed diagram is bounded by shapes that can be taken to mean topography or hint at aboriginal meanings of place, or they may be interpreted as people sitting together or seeking the best place to dwell, or joining in a circle of embrace with the landscape. The flow of lines are intended to link ideas of water and growth.

---

[8] The concept of 'spiritual' space may be quite instrumental:

'This spiritual dimension underpins our responsibility to our planet and its stewardship. This relationship must be forged in cities where most people live. A first step is to recognise people's strong need for nature, which may be a very deep emotion: the need for something green and wild or a place to go for sanctuary or solitude, a place to experience 'wilderness' in the city. The need for such places, whether in the form of ecology parks, city farms, allotment gardens or just neighbourhood wildspace, lies at the heart of the livable city.' (Ekin et al 1991 p.245).

SHED 3 Biozoning



> In understanding the natural landscape come the benefits of sensible land-use decisions as well as personally and socially rewarding benefits of enjoyment of our surroundings and the satisfaction of greater understanding of an incredibly complex, dynamic, and beautiful whole
>
> (Lewis 1996 p.26)

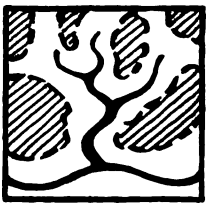
Biozoning addresses the proposition that cities are places for procuring, managing and distributing resources for the mutual benefit of their inhabitants and are inseparable from their hinterlands.

Biozoning includes locating food and biological resource sites on the basis of proximity or least energy planning. It includes biome identification and soil analysis and provides for critical application of appropriate integrated land management techniques including Permaculture practice and theory. It is integral to any Shadow Planning and is about identifying the biological resources and patterns of the region as armatures for fitting city-making in place. Ecotones can be identified at the interface between biozones.

The Icon

The stylised watershed shows three 'biozones' linked by watercourses, two overlap with each other, one does not, indicating the diversity of biomes and existence of ecotones. Within the biozones concentric forms suggest the relative proximities of biological resources. The kidney shapes also allude to the cleansing function of healthy ecological systems.

SHED 4 Lifelining



> Together earth, plant world and atmosphere form a single great organism, in which water streams like living blood
>
> (Schwenk 1965 p.14)

> By identifying and protecting … veins of 'natural' habitat, humans would be acknowledging a fundamental change in the definition of progress. We would be accepting that life depends on life, and that the first principle of human survival is to reintegrate bioregional cultures into matrices of native ecological associations
>
> (Aberley 1994, p.127)

> The notion of corridors linking 'habitat islands' is one of the more practical uses of island biogeographical theory in urban areas
>
> (Douglas 1983 p.144)

Lifelining operates at the functional level of linking elements of the living landscape and it also addresses the proposition that the concepts, principles and techniques required to create human settlements that fit within the ecological systems of the biosphere already exist and need to be linked.

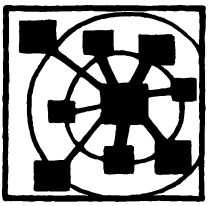
Lifelining involves identifying and mapping the minimum weave of ecosystem elements in the landscape that are vital to continued ecosystem function. It is about finding living links between the islands of biogeography and establishing ecological corridors – typically along the flow of waterways and creeks.

Ecological restoration depends on identifying such lines of life which can be thought of as the reticulation of natural infrastructure. It relates to the ecolinks of the Frogstick analysis. Lifelining is about the interface between urban occupation of the landscape and its pre-urban ecological structure. Conservation and restoration of lifelines across the landscape are essential to maintaining ecosystem connectivity and functionality. In severely degraded or very artificial landscapes, lifelining can be introduced by way of creating or realigning watercourses, e.g. artificial or modified creeks as a means of stormwater control in urban systems that also create wildlife corridors. Lifelining is the process and idea required to inform human settlement development that fits its place.

The Icon

Using the same stylised watershed as Placing and Biozoning (and EDP2 Fit the Bioregion), the Lifelining icon is based on the idea that watercourses are the arteries of the landscape, linking biological zones.

SHED 5 Proximating



> Instead of thinking of *going* places, think in terms of *being* places. That is, think in terms of establishing desirable places close to one another. Transportation is what you have to do to get to places inconveniently located: the less the better
>
> (Register 1987 p.33)

Proximating addresses the proposition that the inter-dependent nature of elements in urban ecosystems requires communication and decision-making structures based on mutual aid, which recognises inter-dependency, and direct democracy, which relates decision-making to place. It involves locating cultural, social, economic and community resource centres on the basis of proximity or least energy planning. It includes mapping existing and potential urban centres as the basis for minimising transport energy and resource demands. Proximating is a way of restoring the pre-mechanical template of towns and cities that intrisically recognises the historical patterns of pre-industrial 'walkable' urban forms developed on the basis of somatic energy. It relates to establishing the framework of Engwicht's exchange space and to the appropriate disposition of trading places, markets and meeting places. Transit oriented development can be seen as being fundamentally built around the idea of proximating.

Efficient planning reduces all energy expenditure to a minimum. In transport this is best achieved by reducing traffic to a minimum and this is best achieved by keeping destinations close together wherever possible. Richard Register calls this 'proximity planning'. Proximity planning favours pedestrian access over all others with wheeled transport and other mechanical means of moving people or goods used as a last resort.

Proximating requires meeting places, marketplaces and convivial spaces. City squares are enormously important elements in the weave of the urban fabric.[9] Surprisingly, perhaps, the world's greatest public places are often quite small and intimate. Great places are essential to the success of the compact urban form proposed for eco-cities yet greatness is not a function of size[10].

The Icon

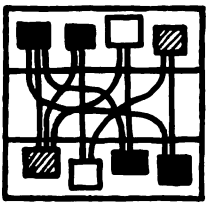
The location of key places in relation to a central place, typically a city or town square, is intimated by the diagrammatic representation in the icon. Concentric circles represent time and distance from the centre, i.e. the degree of proximity, as in Register's proposition of designing for proximity.

---

[9] The scale and function of a successful urban space is best understood by experiencing it as Michael Webb explains so well in his book on The City Square (Webb, 1990).

[10] This was a central precept in the design for the main squares in the Halifax EcoCity Project proposal.

SHED 6 Patterning



> Their circuit (the city walls) being completed, it behoves us to consider the manner of disposing of the area of the space enclosed within the walls, and the proper directions and aspects of the streets and lanes
>
> (Vitruvius circa 1BC in Gwilt 1867 p.21)

> You see then that the patterns are very much alive and evolving. In fact, if you like, each pattern may be looked upon as a hypothesis like one of the hypotheses of science. In this sense, each pattern represents our current best guess as to what arrangement of the physical environment will work to solve the problem presented
>
> (Alexander 1977 p.xv)

Patterning addresses the proposition that ecocity demonstration projects must contain sufficient characteristics, in process and form, to represent ecocities in microcosm – with a high level of participation from the wider community in their design, development and maintenance. It is the primary Step towards creating the appropriate reflection of cultural patterns that manifest in urban fractals.

Patterning is about neighbourhoods as essential building blocks of the larger urban system. It involves identifying the essential patterns necessary for creating urbanity with and for the support of community[11]. It requires an understanding of invisible structures and how to manage their manifestation. Patterning favours the rich and diverse textures of citification rather than the homogenising blanket of urbanisation. Participatory processes are inherent to achieving patterns that have the resilience of traditional urbanism. Techniques for generating the local politics which can favour effective, socially responsible and responsive patterning include Bookchin's municipal libertarianism and the ideas of Magnaghi and the Territorialists. The pattern language of Alexander et al. identifies a number of relevant patterns in the design of spaces, places and built form generally. Patterning also connects to evolving techniques that predict potential patterns of urban growth and morphologies consequent upon the observance of fractal scaling laws (Batty and Longley – Fractal Cities, in Ball p.244). It recognises the value of local codes for built form where they exist (e.g. Islamic precepts for town planning in Arabia), or sets out to identify what they may have been through historical study.

The Icon

Based on Appleyard's famous diagram of traffic-conditioned social interaction in a street (seen in adapated form in Engwicht 1992 p.48) the icon is intended to convey the idea of the concurrency and interconnectedness of the physical pattern of built form with the social patterns of human interactions. Patterning is not a static disposition of objects in space but an active realisation of social exchange integral with built form.

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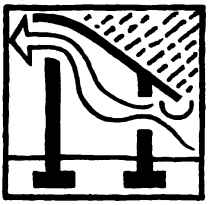
[11] It is not the same as the 'patterning' identified in Mollison (1988, p.8).

SHED 7 Architecting



Say on, sayers! sing on, singers!
Delve! Mould! pile the words of the earth!
Work on, age after age, nothing is to be lost,
It may have to wait long, but it will certainly come in use,
When the materials are all prepared and ready, the architects shall appear

(Whitman 1991 (1856/1881) p.69)

Houses are shaped not just by materials and tools, but by ideas, values, and norms

(Spain 1992 p.111)

Architecting addresses the proposition that architecture and urban design are major components of culture and must be conceptually expanded as part of a life sciences approach to human settlement in its role as an agent of change in the biosphere. It involves designing with the principles of biophilia, biomimicry, Gaean (Gaian) architecture and the Ecopolis Development Principles. It views buildings as ecosystems and making the built environment as a trans-disciplinary activity. The different rates of change of building components underscores the dynamic quality of every static edifice. Architecting is supported by barefoot and community architecture programs and timeless ways of building. It ranges from Wells' 'gentle architecture' and Frampton's crtitical regionalism to Wright's organicism and Yeang's bioclimatic design. It deals with: climate response, energy efficiency, waste elimination, healthy construction, user-responsive design and support for local economies. It includes ecological restoration, catalysation of community, regional responsiveness and 'cradle to cradle' production[12].

Architecting co-supports the habitat of non-human species whilst promoting the health, wellbeing and productivity of the population[13]. It connects human building with the living world. In architecting, the whole is greater than the sum of the parts[14].

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[12] A number of rating tools now exist, each of which attempt to provide itemised and integrated assessments of building performance. Each tool has merits and limitations and most of them suffer for being generated by, or overly responsive to, industry interests.

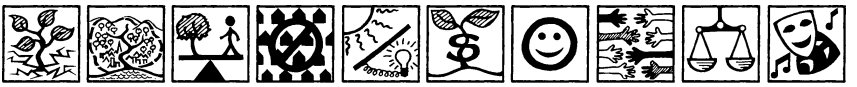
[13] E.g.,'Students in classrooms with the most daylight had a 20–26% faster learning rate than students in classrooms with only artificial light.' (Environmental Building News September 1999 p.12).

[14] Photosynthesis is only about 1–2% efficient (an engineer would never design a tree!); but that is exactly what the Ecopolis design philosophy is all about – each element may not be 100% efficient in itself, but all the elements together add up to something with a rich, organic integrity derived from the synergetic interaction of the parts – an approach that encourages the emergent properties of living systems.

The Icon

Based on the same section that informs the design of 'The Roman Hut' in Christie Walk, the icon indicates an integration of building with function, working with the climate to create comfort conditions, harvesting ambient energy and resources, and fitting its place.

11.6 The Ecopolis Development Principles



The Ecopolis Development Principles (EDP) are designed to provide a set of precepts for developing healthy human settlement that restores rather than destroys ecological health. In its first incarnation drafted in association with Chérie Hoyle and Emilis Prelgauskas, there were 12 principles. The revised version employed here has 10 principles divided into 'biophysical' and 'biosocial' groups. One is about minimising ecological footprints, the other about maximising[15] human potential. The revision was informed by the work of intern Norbert Schulz from Germany who worked with UEA for 4 months in 1995. Schulz suggested that the principles should be considered as a set of five related primarily to the physical environment and the other five related to the human ecology of the social environment.

In order to repair, replenish and support the processes which maintain life, the Ecopolis Development Principles seek to:

Minimise Ecological Footprints (Biophysical)

- *Restore Degraded Land*
- *Fit the Bioregion*
- *Balance Development*
- *Create Compact Cities*
- *Optimise Energy and Resource Use*

Maximise Human Potential (Human Ecology)

- *Contribute to the Economy*
- *Provide Health and Security*
- *Encourage Community*
- *Promote Social Justice and Equity*
- *Enrich History and Culture*

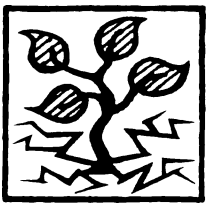
---

[15] I felt that the idea of positive behaviour should be reinforced, thus 'maximise' was used rather than language which was punitive or negative, and all the principles are active, positive verbs.

MINIMISE ECOLOGICAL FOOTPRINTS

EDP 1 Restore Degraded Land

Use urban development to restore the health and vitality of the land



> It is only possible to make healthy places for humans by maintaining the health of non-human habitats
>
> (Hough 1995)

Rehabilitate and maximise the ecological health and potential of land as a consequence of the development of human settlement.

Land should be assessed in terms of its Potential For Development (PFD) relative to its ecological condition (see Yeang in Chapter 4, Table 2). The more land has been degraded by human activity the greater its need for restoration and the greater its PFD. Wilderness and productive green field sites generally have correspondingly low PFD and should not be built on. Degraded farm land where the soil is 'mined out' (as it is in much of South Australia's agricultural region) may have a high PFD where ecological urban development would contribute to an overall improvement in ecological health.

Restoring Degraded Land includes:

- Clean-up contaminated land
- Heal degraded rural areas
- Re-establish native vegetation
- Encourage farming practices which sustain ecological health
- Introduce green corridors of native vegetation in rural & urban areas

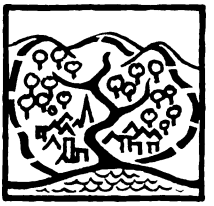
The Icon

With a branching form similar to that of the stylised watershed watercourse, the icon shows vegetation breaking through cracked, parched soil, or concrete-covered streets.

MINIMISE ECOLOGICAL FOOTPRINTS

EDP 2 Fit the Bioregion

Create human settlement which work with the natural cycles of the region



> While I find an amazing depth of agreement among bioregionalists on what constitutes bios, and on what possibilities attend our place in the skein of things, there is some disagreement – friendly but passionate – on what actually constitutes a distinct biological region. . .
>
> (Dodge 1981 p.7)

> . . . to become dwellers in the land. . . the crucial and perhaps only all-encompassing task is to understand place, the immediate specific place where we live. . . ' *we need to appreciate* 'the cultures of the people, of the populations native to the land and of those who have grown up with it, the human social and economic arrangements shaped by and adapted to the geomorphic ones, in both urban and rural settings. . .
>
> (Sale 1991 p.42)

Respect and conform to the parameters provided by the bioregion, and fit the landscape with the patterns of development that follow the inherent form and limitations of the land, understood in socio-biophysical terms.

An Ecopolis is defined in relation to its total regional context and is not simply the sum of the built environment that forms its core.

Fitting the Bioregion includes:

- Maintaining the natural cycles of water and nutrients in the landscape.
- Creating buildings and urban form that fit the landscape and respond to the climate.
- Conserving water and recycling effluent.
- Using locally produced building materials as much as possible.
- Responding to the culture of the region, e.g. through 're-habitation'.

The Icon

Based on an archetypal watershed/catchment derived region, the icon implies the inclusion of the water body adjacent to the terrestrial environment and graphically indicates a city in order to demonstrate the inclusion of human habitation in the bioregional definition.

MINIMISE ECOLOGICAL FOOTPRINTS

EDP 3 Balance Development

Balance development with the 'carrying capacity' of the land

Balance the intensity of development against the ecological carrying capacity of the land whilst protecting all viable existing ecological features. Develop and enhance links between urban and rural areas of an integrated city-region approach. Maximise areas of biological productivity, including vertical, horizontal and enclosed artificial environments.

Balancing Development includes:

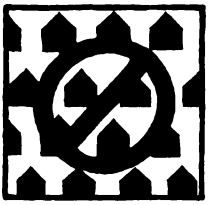
- Reducing the impact of the city on the land beyond its boundaries whether the immediate bioregion or the larger region of impact through its ecological footprint.
- Encouraging diversity of land-use: residential, commercial, recreational, educational, etc.
- Maximise biologically productive land area.
- Developing urban food producing gardens including roofgardens.
- Developing built environments for food production including greenhouses, living walls and multi-storey urban farms.
- Creating wildlife reserves.
- Recognising the place of all living organisms in the environment – pursuing urban design for non-human species.

The Icon

The icon is a simple depiction of the idea of balance between the natural and human world, the same basic design that underlies the Urban Ecology logo.
MINIMISE ECOLOGICAL FOOTPRINTS

EDP 4 Create Compact Cities

Reverse sprawl and stop* ad-hoc *development from consuming the landscape



> In living nature, the notion of unlimited sprawl seems to be adopted by organisms at the lower levels of evolution
>
> (Soleri 1987 p.12)

> Walking provides particularly for increased informal social contacts, which help build up a sense of community. . . Sustainable development promotes (accessible local facilities), with the aim that as much daily activity as possible can be conveniently transacted on foot
>
> (Elkin, McLaren and Hillman 1991 p.243)

> A sustainable city has the advantage of compactness. An emphasis on 'urban' housing densities should ensure the survival of local facilities like shops, pubs, schools, doctors' surgeries, open spaces and bus stops within walking distance of everyone's front door (1991 p.244).

Develop human habitation at relatively high density within inviolable green belts of natural or restored ecologically viable landscape with the overall development density constrained by ecological limits. An Ecopolis is, by necessity, a compact city.

Creating Compact Cities includes:

- Creating walkable cities and promoting non-motorised forms of transport.
- Developing integrated transport networks which minimise car use.
- Providing access by proximity.
- Developing complex and effective three-dimensional built form.
- Having clearly identifiable (permeable, not 'hard') boundaries for urban areas.
- Providing for most daily needs within the city.

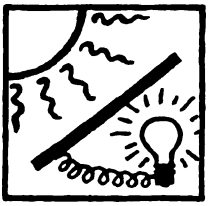
The Icon

Sprawl is the antithesis of compact urban form. This is the only icon where a 'negative' image is used to elicit meaning because the imperative to stop sprawl is so urgent.

MINIMISE ECOLOGICAL FOOTPRINTS

EDP 5 Optimise Energy and Resource Use

Obtain and use energy and resources efficiently



Operate at low levels of energy consumption, using renewable energy resources, local energy production and techniques of resource reuse.

All ecopolitan development should seek to be energy self-sufficient. Nevertheless some human activities need large amounts of energy which may need to be provided from more centralised sources such as desert solar power stations. The primary energy base of development must come from renewable sources – in the immediate short-term it may be necessary to supplement energy supplies from fossil sources but all energy provision should be made readily convertible to renewable sources – thus natural gas systems may convert to biogas or hydrogen. Energy should be used on the basis of calorific efficiency – thus gas is best used for heating and cooking rather than electricity, bearing in mind that the need to maintain EDP7 Maintain Health & Security and the quality of Frogstick 1 Air, means that gas may not be an appropriate fuel where its combustion is within occupied space. Minimise energy consumption.

Optimising Energy and Resource Use includes:

- Using renewable energy of solar and wind power.
- Generating power locally.
- Reducing fossil fuel consumption with a view to its elimination as an energy source.
- Not using nuclear power.
- Designing buildings with solar access and natural ventilation.
- Use effective insulation and ‘thermal mass’ in buildings.
- Designing for climate responsiveness.
- Designing for cradle to cradle production of the whole built environment.

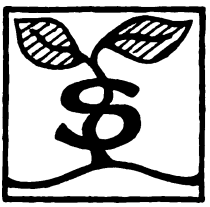
The Icon

A solar panel captures power from the sun to light the darkness.

MAXIMISE HUMAN POTENTIAL

EDP 6 Contribute to the Economy

Create work opportunities and promote economic activity



Support and develop ecologically and socially responsible economic activity.

Materials and component manufacture should be derived from, or be located in the local bioregion to the maximum practicable extent. This should be done on the basis of a total systems analysis which seeks to reduce energy expenditure and material waste. The pursuit of this goal should strengthen the regional economy by generating activity and shepherding the wealth within the regional boundary.

Finance for ecopolitan development should come from ethical sources and exclude financial support derived from exploitative activity. Capital input to ecological development should be local. Any financial structures associated with ecological development should ensure that ownership and control of such development ultimately rests with the users and inhabitants of the development. Industry must at all times be congruent in purpose, process and product with ecological development goals and the maintenance of the points in the Frogstick. Weapons-related technologies would generally be inadmissable in an ecological economy but space technologies may be appropriate.

Contributing to the Economy includes:

- Developing ecologically responsible industries.
- Reinforcing regional trade.
- Developing exportable green technologies & services.
- Adopting 'fair trade' practices.
- Creating appropriate information technologies.
- Providing incentives for innovation and enterprise linked to ecologically responsible performance.
- Using LETS and similar local currency systems to provide local economic resilience and independence.

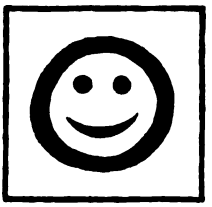
The Icon

A representation of the economy as an expression of natural systems.

MAXIMISE HUMAN POTENTIAL

EDP 7 Provide Health and Security

Create healthy and safe environments for all people



> The evidence we have all points in the same direction: passers-by help in deterring crime. More visible neighbours is better than fewer, good visual relations to the public domain is better than seclusion
>
> (Hillier and Shu 1999 p.6)

> One wants to keep in mind that the most violent environment is the smallest of them all, the home
>
> (Soleri 1987 p.93)

Employ appropriate materials and spatial organisation to create safe and healthy places for people to live, work and play in the context of an ecologically resilient environment.

Healthy buildings are those in which the construction materials, design and building operation are all environmentally benign and non-allergenic.

Providing Health and Security includes:

- Eliminating pollution.
- Promoting and achieving environmental quality.
- Ensuring a safe water supply.
- Recycling effluent for safe re-use.
- Maintaining clean air.
- Designing built environments with good passive surveillance.
- Avoiding a fortress mentality when designing secure environments.
- Providing food security, including the use of urban agriculture.
- Providing habitat for animals and birds.

The Icon

As a symbol of creativity and well-being, the 'smiley' face has a respectable ecocity history which reflects a deeper history of activism for peace and security and is congruent with the UEA proposition to 'make ecocities not war'.[16]

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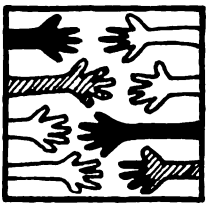
[16] The Smiley Story: At age 21, Register inaugurated the organisation 'No War Toys' to contribute to the peace movement 'as the Vietnam War was heating up'. For a logo he sought 'a universal

MAXIMISE HUMAN POTENTIAL

EDP 8 Encourage Community

Cities are for everyone



> . . . there is room for everybody in the ecocity effort. It is not vicarious but participatory, not to be dictated, but to be created in a million ways simultaneously from the grassroots to the highest levels of planning and back down again, with a role for each of us
>
> (Register 1987 p.49)

Create cities with strong citizen involvement through genuine community participation, not just consultation. The community should govern itself. Incorporate provision for a wide diversity of social and community activities including secure and attractive, physical and electromagnetic communication networks within a three-dimensional urban structure. Community needs must drive ecological development. Ecopolis development must meet community requirements including the community of life that is the eco-system.

Encouraging Community includes:

- Creating development as a community driven process.
- Ensuring community involvement in public administration and management.
- Providing community facilities.
- Designing urban environments that contain diverse and convivial places which encourage social interaction.
- Design urban environments at every scale with diversity and connectivity as key goals.

The Icon

Hands reaching out. Many cultures. Many colours.

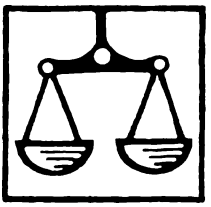
---

symbol based on the human body' that was a 'symbol of creative themes. . . against the destructive themes of war play, violent entertainment – and real war.' Noticing that children drew 'happy faces' he based his design on them and discovered 'that coming up with an intelligent looking, bright eyed happy face is a bit harder to accomplish than you might imagine'. The 'wry, off-balance smile' was 'to the best of (his) knowledge on this bit of historic trivia, the first of the 'happy face' designs that became ubiquitous within four years.' 'You should have copyrighted the thing' said his friends 'You'd be a millionaire by now.' (Register 1996 Chapter 10 'One Person's Ecocity Odyssey' unpublished manuscript p.297–298)

MAXIMISE HUMAN POTENTIAL

EDP 9 Promote Social Justice and Equity

Equal rights and access to services, facilities and information



> What is interesting to note in the urban context is that certain integrated land use and public transport policies – assuming no other changes – can have an income and substitution effects on the less well-off; for example, if a household does not require two private motor vehicles to travel to work and engage in other everyday activities of modern living, there is more money available for, say, housing
>
> (Hundloe and McDonald 1997 p.93)

Employ economic and management structures which embody principles of social justice and equity. Ensure equal rights and access to essential services, facilities and information.

There should always be a significant self-build component in ecological development for two reasons: one is that there should always be the option to invest sweat equity in lieu of any other currency so that the poor and dispossessed citizens can still contribute to making the city – this principle is of particular relevance to developing countries and periods of recession; two, eco-systems do not stand still and an ecological development has to allow for easy adaptation and change which can be effected by individual citizens from the back yard level upwards. Alleviate poverty and create work opportunities.

The marketing of ecological developments must be ethical and in tune with the overall goals of such developments. Management should be responsive to community demands and there should be continual community liaison between the promoters, professionals and practitioners associated with ecological development. All marketing, management and liaison practices must be kept under review to ensure ethical and equitable performance.

Promoting Social Justice and Equity includes:

- Involving all levels of the community in development processes.
- Providing affordable housing.
- Encouraging public use of public space.
- Employing socio-political systems that foster direct democracy.

The Icon

The scales of justice.

MAXIMISE HUMAN POTENTIAL

EDP 10 Enrich History and Culture

Respecting the past whilst looking to the future
Diverse cultural and social groups are the basis for socially vital cities

> If we define culture as a way of life, there can be no doubt that urbanization and the growth of cities are the most significant cultural shifts in this (20th) century
>
> (Streeten 1997 p.200)

> Spaces should be created for cultural expressions, such as music, amateur theater, and the arts
>
> (Streeten 1997 p.204)

History: maximise the value of previous worthwhile human endeavour in terms of both heritage and manufactured artifacts.

Enriching History includes:

- Restoring and maintaining cherished local monuments and landmarks.
- Identifying and celebrating the spirit of place.
- Celebrating and encouraging cultural diversity.
- Respecting indigenous peoples' inhabitation of the land.

Culture: support and promote cultural diversity, incorporating ecological awareness into all aspects of the making and maintenance of human settlement.

Make art and craft integral to an Ecopolis development from the individual site to the city and its region. They must be part of the built environment, not applied later, nor stuck pretentiously in windswept plazas. Art and craft should be considered as much part of a citizen's life as the air they breath and the water they drink.

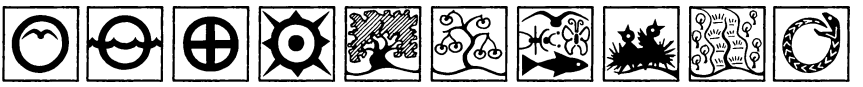
Enriching Culture includes:

- Developing culture by involving all aspects of the arts including music, electronic media and digital technology.
- Integrating the arts and sciences with both daily life and special events and occasions.
- Promoting ecological awareness as part of cultural development.
- Supporting community art and craft events, fairs, fêtes & functions and encouraging festivities and events that relate to the locality.
- Encouraging multicultural art and festivities.

The Icon

This icon was designed to evoke the idea of culture and the history that is necessarily part of it, without being culturally specific. Masks, smiles and frowns are part of most, if not all cultures. Musical notes speak a universal language.

11.7 The Frogstick



Urban design and planning have, historically, lacked reference to environmental indicators. The urban patterning process needs to be linked to indicators and measures of ecological performance. Many such indicators have been established during the last decade in response to the growing need to quantify progress towards sustainable development.

Inspired by Malcolm Wells' 'Wilderness-Based Checklist for Design and Construction' (Wells 1981 p.33–40) the Frogstick was designed as a means of providing an indication of how well an environment was performing in relation to ten key issues related to the maintenance of ecosystem health. It was conceived as an 'urban ecology checklist'. The frog reference is because it is extremely sensitive to its environment. The presence or absence of frogs in their preferred habitats provides an indication of the relative health of that habitat. My own constant retelling of the boiling frog story also influenced my decision to use it in this context (see Chapter 10.3)[17]. The Frogstick is an example of what is now widely recognised as a set of environmental indicators. It was first published in the proceedings of the Solar 91 conference (Downton 1991a p.54) in a paper titled 'Solar Cities for a Sustainable World – Making places fit for frogs'[18]. It was later incorporated in the original Ecopolis Development Principles as Principle 12: 'Heal the Biosphere'.

Local Agenda 21 derives indicators from a consultative process. This engages the community, which is valuable as an educational and awareness-raising process in itself, but assessing the urban metabolism requires scientifically verifiable measures. The Frogstick is designed to be developed as such a set of measures. Indicators

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[17] Boyden et al are responsible for the introduction of the 'boiling frog principle' to the lexicon of urban ecology, a fact that I did not discover until 2000, after ten years of constantly retelling the 'boiling frog' story that I discovered from listening to David Suzuki on the radio!

[18] In a nice piece of symbolism, the Olympic Solar Village development was linked to restoration of habitat for the endangered green-and-golden bell frog.

derived from LA 21 and similar consultative processes should supplement the scientific measuring sticks, not be employed in their stead. In other words there should be a conscious and considered use of conventionally scientific and community (culturally) derived assessments in the analysis and management of urban ecosystems. Consultative processes should not be used to stand in the place of good basic science. Scientific measuring processes determine the knowledge of urban metabolism. This knowledge should be generated and harnessed by city managers and made available to the citizens. LA 21 (or any consultation-based processes) should not be used as an excuse for poor science.

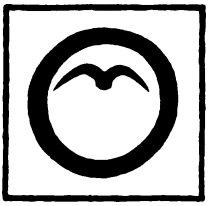
Ecological developments should repair damage by closing the ecological loops severed by past urban development. The Frogstick can be used to identify those impacts of the conventional built environment which separate it from the natural environment, or 'wilderness'; although I agree with landscape architect and environmental planner Jerry deGryse that 'If there are buildings in it wilderness does not exist.' (deGryse 1989 p.49). With this measuring stick one may begin to assess the ecological impact of urbanisation and evaluate the performance of ecological developments by gaining a picture of the extent to which they move *away from* or *towards* sustainability.

There are now a number of rating tools available, particularly for buildings, but they tend to be complex to use and pitched at professionals (one exception in Australia being the NABERS rating tool). Perhaps because they have been manufactured in the interests of industry groups that want to demonstrate that their buildings are environmentally friendly in the marketplace, rather than having been developed as an absolute measure of ecological impact, even the best rating tools tend to separate the assessment of a building's performance from its impact on the biosphere, e.g. by counting bicycle parking provisions but not fixing energy consumption limits. The Frogstick focusses on crucial biogeochemical impacts and presents them in a manner that enables their assessment in broad-brush terms by non-professionals, but allows that the ten measurables can be refined further by scientists and professionals as required.

As a means of helping to integrate extant knowledge, by focussing on these ten critical areas, such as water and air quality, the Frogstick provides a point of connection with published assessment tools and indicators. Thus it should be possible to take an assessment tool and use the Frogstick as a checklist to confirm the extent to which the tool addresses the core issues of environmental performance in the urban ecosystem.

FROG 1 Air:

Pollutes – Purifies



> Increases in childhood asthma and the clustering of lung cancers around cities with dirty air are telling us something
>
> (Steingraber 1998 p.188)

> A fresh analysis of a classic pollution study has vindicated its conclusion that city-dwellers in Europe and the US are dying young because of microscopic particles in the air
>
> (Boyce 2000 p.5)

Cities differ from the countryside not only in their temperature but in all aspects of climate, and city air carries a heavy load of solid, liquid, and gaseous contaminants (Lowry 1971). That load should be as near to zero as possible. Extensive use of vegetation can help to ensure that dust and pollutants are filtered out. Cities should not be heat islands and their net effect on the climate should not be disruptive. Use of renewables for city energy supplies (buildings and transport) would virtually eliminate air pollution.

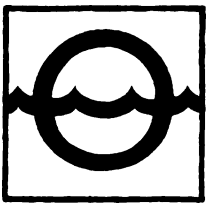
Every building affects the climate at the very local level. Cities can affect the climate at the regional level. Collectively, cities affect the global climate. Ecopolis development requires that the built environment be used intentionally to produce desirable micro-climate changes, creating shelter when the wind blows to hot, too cold or too hard, generating local breezes or warm places to suit the needs of building occupants and so on. An integrated approach to air quality issues is required to recognise the links that extend within and without the built form. Thus there is a need to pay attention to maintaining air quality at all levels of the making of human settlement.

The Icon

Based on the ancient alchemical symbol for air, an empty circle, with the addition of an avian silhouette to indicate the connection of the atmosphere to all living things through respiration and through the atmosphere's composition which is conditioned by living systems.

FROG 2 Water:

Pollutes/Wastes – Purifies/Recycles



Development interferes with the hydrological cycle/balance (Barton 2000 p.102) Ecopolitan development uses the concept of replicating ecosystem function as the basis for designing the hydrology of the built environment. Thus an ecological development would see the same percentage of water lost to evaporation, soaked into the ground, run off to water courses, or absorbed by organic life as existed in the pre-developed environment.

The water supply for an ecopolitan development should be drawn entirely from within the watershed of the bioregion and the entire hydrological cycle should be maintained within its pre-human settlement patterns and fit the boundaries of the bioregion[19].

An Ecopolis would neither pollute nor waste water and would purify and recycle any supplies available to it. Water can be harvested off all impermeable surfaces including the clean smooth surfaces of roof-top solar collectors and sufficient technological means exist to recycle and reuse all waste water and to ensure healthy water supplies to urban areas.

The Icon

Based on the ancient alchemical symbol for water, a circle with a horizontal bar, with the bar extended and made more obviously reminiscent of water to improve the universality of the symbol's readability (e.g. to distinguish it from the logo of the London underground railway!).

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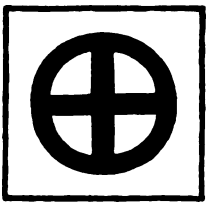
[19] Cities are dependant on centrally-administered water supplies vulnerable to disruptions and pollution. Nearly two billion people drink and bathe in water contaminated with deadly parasites and pathogens (Durning 1990).

FROG 3 Earth (soil):

Destroys – Renews



The food consumed by city dwellers is often produced by agricultural practices that involve the clearance of indigenous vegetation and the destruction of ecosystem stability. Centuries of farming with irrigation has left a trail of salination and soil degradation; modern chemical farming depletes the organic structure of soil. Soil can only be renewed over very long timescales. Ecopolitan developments must have sustainable agricultural and horticultural systems as integral parts of their planning and function and may include 'vertical farming'.

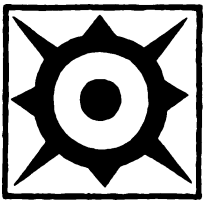
Maintenance of soil fertility is closely linked with maintaining biomass (FROG 5), biodiversity (FROG 7), habitat (FROG 8) and food production (FROG 6). Recycling of nutrients from productive areas in the city-region can be achieved by transporting composted sewage from neighbourhood treatment plants to the surrounding land of the region, reinforcing the relationship between urban and rural areas. Roof gardens and soil based horticulture integrated with built form can extend productive landscapes across urban areas. Nothing should be wasted or allowed to escape the cycle of reuse – even building waste from innovative construction can contribute to maintaining soil quality, e.g. strawbale building waste can become mulch.

The Icon

This is an essentially unmodified use of the ancient alchemical symbol for earth, a circle within a cross.

FROG 4 Fire (energy):

Non-renewable – Renewable



Cities are energy-hungry. At present, virtually all urban energy is derived from non-renewable sources. An Ecopolis would still use a lot of energy, as all living systems do, but it would not waste that energy. Thus it would need much less energy per head of population than present cities. This energy can all come from renewable sources, particularly from wind and other forms of solar power. The goal of powering the functions of the built environment and of running all the technologies necessary to advanced civilisation from renewable energy is achievable[20]. This Frogstick measures the extent to which it is achieved.

Whenever possible ecopolitan development should employ readily available appropriate technologies rather than exotic or unnecessarily high energy or high complexity technologies. At the same time, it has to be recognised that complex semi-passive buildings can be most effectively and efficiently operated with advanced computing technologies.

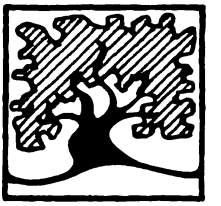
The Icon

Based on the ancient alchemical symbol for fire, a circle containing a point in the centre, with the addition of rays to suggest the sun and, because of the importance of orientation in solar-responsive design, to echo the markings of a compass.

[20] The entire food chain is also a kind of solar engine.

FROG 5 Biomass:

Decreases – Increases/Stabilises



Historically, the sum total of living matter in a region is drastically reduced when humans set up an urban centre there. An Ecopolis would reverse this trend, increasing the effective biomass (and sequestering Carbon Dioxide) as part of an ecosystem re-instatement programme which would aim to achieve a steady state of dynamic balance once the biomass had been maximised. Biomass represents a Carbon Dioxide sink and solar energy resource accumulated through photosynthesis.

Urban design and land division must proceed on the basis of maximising the area available for maintaining biological productivity and biomass (see 'Design Guidelines for Non-Human Species' in Section 8.4).

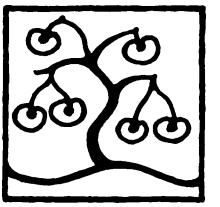
Revegetation has to be a priority in ecological development.

The Icon

Biomass includes all living matter, but here a massive tree image is used to imply the collective mass of living organisms that might belong to any given place. The curving, branched form of the watercourse used in other icons is repeated here in a modified form.

FROG 6 Food:

Consumes – Creates



> The prolonged tending of plants began with the fruit and nut trees, the mango and the durian, the olive and walnut and palm, the orange, and. . . the apple. Here in orchard and garden, a world in which life prospered without inordinate effort or systematic carnage, man (sic) had his first glimpse of paradise, for paradise is only the original Persian name for a walled garden
>
> (Mumford 1970 p.383)

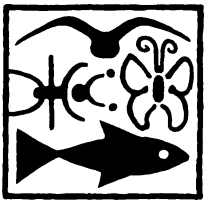
Food production must be maximised, subject to the functional demands of the bioregional ecology. City dwellers usually consume food that is almost exclusively imported from outside the urban boundary. An Ecopolis would make the maximum use of opportunities to grow food plants within its nominal boundaries. Streets would have minimum amounts of hard paved surfaces. Street trees and plants would be chosen for productive potential as well as aesthetics. Maintenance of soil fertility (FROG 3) is intrinsic to sustaining food production but the built environment may incorporate greenhouses (solar harvesters), hydroponics and vertical farming to supplement the productive capacity of natural soils. It is possible to conceive of an Ecopolis that was a net exporter of food.

The Icon

Again, the branching, curved form of the watercourse is repeated here, with the tree-like image shown carrying fruit to symbolise food.

FROG 7 Biodiversity:

Decreases – Increases



> Biodiversity has to be promoted in the context of human communities of the 21st Century. Setting up nature reserves and providing legal protection for species , valuable though they may be, are not enough on their own. A much broader approach is needed, and one which connects biodiversity to the activities of daily living
>
> (Faulkner 1999 p.12)

> We depend on biodiversity for our survival and quality of life
>
> (Taylor 1996 p.ES-13)

Historically, biodiversity in a region is drastically reduced when humans set up an urban centre. In a biological sense, people and wildlife compete for territory and people are most concentrated in cities (Faulkner 1999 p.12). An Ecopolis would reverse this trend, increasing effective biodiversity. This would be part of an ecosystem re-instatement programme which would aim to achieve a self-regulating dynamic balance once biodiversity had been maximised, and respond to any on-going climate change imperatives. Urban forestry programs promise one means of improving biodiversity but many such activities are needed along with a plethora of appropriate revegetation and ecosystem restoration programs. Local wildlife must be accommodated in a positive way, e.g. in Australian cities possums can be regarded as 'pests', or they can be accepted and their presence supported.

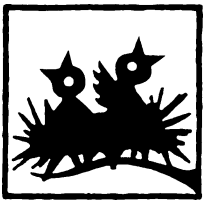
Biodiversity requires protection and enhancement as an integral part of making human settlement.

The Icon

Biodiversity includes all living things. Here, an attempt has been made to suggest something of the diversity of creatures with swimming, crawling and flying creatures including decomposers, predators and prey. Vegetation has been used in many of the other icons, its absence in this one was considered acceptable in order to provide sufficient visual space to allow complexity and clarity in a reduced image.

FROG 8 Habitat:

Destroys – Creates



Much of the habitat created in conventional cities favours humans, rats and cockroaches. This artificial habitat nevertheless relies on extended life-support systems to remain functional. We are now approaching the point where dysfunctional events are becoming common.

Some species extinction in the Amazon is directly attributable to plundering of rainforest for timbers used in urban environments half a globe away. Habitats have multiple value, e.g. wetlands can filter pollutants, but natural systems must not be reduced to the status of instrumental service industries. An Ecopolis must be planned and evolved to create diverse habitats and relate its activities to the global web of life.[21] In the process of creating human habitat we not only make cities but transform the landscape. The effects of this have become global. Ecopolitan development has to consciously seek the means to provide human habitat in such a way as to ensure that the evolutionary trajectory of the planet remains conducive to human habitation.

The Icon

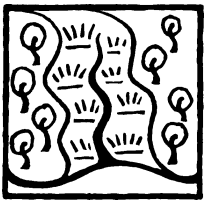
Birds in a nest seem a good a way to symbolise habitat because it reminds us that it is not only humans who modify their environment to create the conditions for survival. It illustrates a co-dependency between environment and constructed habitat that is common to human and non-human species.

---

[21] The idea that urban development need not destroy habitat requires that habitats are properly studied prior to development. There are examples of this kind of study being undertaken, either as compilations of existing knowledge of a regional ecology – as with the study undertaken by Steve Baker for Ecopolis in support of the Whyalla EcoCity Development (1996), or as specifically commissioned studies – as with the Homebush Bay Ecological Studies undertaken for the Olympic Co-ordination Authority (Olympic Co-ordination Authority 1996). With no statutory requirement for ecological studies to be undertaken in relation to development except for high-profile, 'major projects', and with no conventional expectations for such studies to be related to built environment projects, such studies still rely on a 'culture of concern'.

FROG 9 Ecolinks:

Reduces – Increases



> In greatly modifying nature by building… the city, people have created new habitats for plants and animals and have developed new food chains
>
> (Douglas 1983 p.13)

'Ecolinks' refers to the natural links between ecological regions and the need to maintain or replace them in city making. A conventional urban development cuts across routes followed by birds, bees, animals, and seeds, severing these functional ecosystem linkages. An EcoCity would be planned in relation to its entire region (and beyond) within an inviolable network of ecological corridors. Such corridors need to be introduced into the planned redevelopment of existing cities. They already exist in prototypical form with corridors such as that formed along the River Torrens linear park in Adelaide, and in the USA similarly conceived 'greenways' may interconnect parklands and habitat whilst acting as buffer zones for adjacent land uses (Schiller and Horn 1997 p.103).

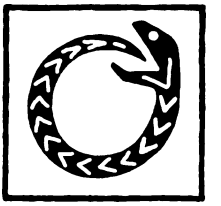
We have now reached a state in which urban areas need to be un-developed to re-establish functional ecolinks. The restoration of creeks is a good example of this. The creation of solar-powered transport and other infrastructural developments would provide opportunities to create or reinforce ecological corridors.

The Icon

Ecolinks have much in common with Lifelining (SHED 4). Lifelining is the process of setting up biologically functional links across the landscape. Ecolinks are a measure of whether they exist. Thus the icon shows part of a 'lifeline'.

FROG 10 Resource Use:

Consumes – Conserves & Recycles



There is no such thing as waste in nature. There should be no such thing as waste in the human part of nature. All systems of resource, energy and materials use in ecopolitan development should be designed and constructed to have little or no waste products. Our collective 'nests' should be kept clean through aiming to recycle all materials as valuable resources.

The appropriate use of recycled materials should be encouraged to reduce waste and unnecessary energy expenditure. Buildings should be constructed in such a way as to be readily recyclable in whole or in part with building components made of material appropriate to their function and to 'life-cycle'.

The concept of cradle-to-cradle management of materials, products and resources is an essential part of serious long-term planning.

The Icon

With this Frogstick's implicit requirement for the promotion of recycling and resource re-use, the icon is based on the ancient symbol for endlessness, Ouroboros, the serpent eating itself.

Frogstick Scoresheets

Table 23: Frogstick 1 – Wilderness

		Away from Sustainability	–10	–7.5	–5	–2.5	+2.5	+5	+7.5	+10	Towards Sustainability
1	Air	Pollutes								☺	Purifies
2	Water	Pollutes/Wastes								☺	Purifies/Recycles
3	Earth (soil)	Destroys								☺	Renews
4	Fire (energy)	Non-renewable								☺	Renewable
5	Biomass	Decreases								☺	Increases/Stable
6	Food	Consumes								☺	Creates
7	Biodiversity	Decreases								☺	Increases
8	Habitat	Destroys								☺	Creates
9	Ecolinks	Reduces								☺	Increases
10	Resources	Wastes								☺	Recycles/Reuses
TOTAL PERFORMANCE										100.0	**= plus 100%**

Table 24: Frogstick 2 – City of Adelaide

		Away from Sustainability	–10	–7.5	–5	–2.5	+2.5	+5	+7.5	+10	Towards Sustainability
1	Air	Pollutes		😐							Purifies
2	Water	Pollutes/Wastes	☹								Purifies/Recycles
3	Earth (soil)	Destroys			😐						Renews
4	Fire (energy)	Non-renewable		☹							Renewable
5	Biomass	Decreases	☹								Increases/Stable
6	Food	Consumes		☹							Creates
7	Biodiversity	Decreases	☹								Increases
8	Habitat	Destroys		☹							Creates
9	Ecolinks	Reduces	☹								Increases
10	Resources	Wastes	☹								Recycles/Reuses
TOTAL PERFORMANCE			–50	–22.5	–10						**= minus 82.5%**

Table 25: Frogstick 3 – Halifax EcoCity Project *(including rural restoration)*

		Away from Sustainability	−10	−7.5	−5	−2.5	+2.5	+5	+7.5	+10	**Towards Sustainability**
1	Air	Pollutes						😐			Purifies
2	Water	Pollutes/Wastes							☺		Purifies/Recycles
3	Earth (soil)	Destroys				😐					Renews
4	Fire (energy)	Non-renewable							☺		Renewable
5	Biomass	Decreases								☺	Increases/Stable
6	Food	Consumes								☺	Creates
7	Biodiversity	Decreases								☺	Increases
8	Habitat	Destroys							☺		Creates
9	Ecolinks	Reduces							☺		Increases
10	Resources	Wastes						😐			Recycles/Reuses
TOTAL PERFORMANCE							2.5	10	30	30	**= plus 72.5%**

Table 26: Frogstick 4 – Whyalla EcoCity Development

		Away from Sustainability	−10	−7.5	−5	−2.5	+2.5	+5	+7.5	+10	**Towards Sustainability**
1	Air	Pollutes						😐			Purifies
2	Water	Pollutes/Wastes							☺		Purifies/Recycles
3	Earth (soil)	Destroys					😐				Renews
4	Fire (energy)	Non-renewable							☺		Renewable
5	Biomass	Decreases						😐			Increases/Stable
6	Food	Consumes						😐			Creates
7	Biodiversity	Decreases							☺		Increases
8	Habitat	Destroys							☺		Creates
9	Ecolinks	Reduces							☺		Increases
10	Resources	Wastes							☺		Recycles/Reuses
TOTAL PERFORMANCE							2.5	15	45		**= plus 62.5%**

Table 27: Frogstick 5 – Christie Walk (*including rural restoration*)

		Away from Sustainability	−10	−7.5	−5	−2.5	+2.5	+5	+7.5	+10	**Towards Sustainability**
1	Air	Pollutes							☺		Purifies
2	Water	Pollutes/Wastes							☺		Purifies/Recycles
3	Earth (soil)	Destroys							☺		Renews
4	Fire (energy)	Non-renewable							☺		Renewable
5	Biomass	Decreases								☺	Increases/Stable
6	Food	Consumes							☺		Creates
7	Biodiversity	Decreases							☺		Increases
8	Habitat	Destroys							☺		Creates
9	Ecolinks	Reduces							☺		Increases
10	Resources	Wastes							☺		Recycles/Reuses
TOTAL PERFORMANCE									67.5	10	**= plus 77.5%**

Chapter 12
Our Cities, Our Selves

Changing our present human habitats into flowering ecocities – an impossible task? Urban Ecology Australia, a small, non-profit organisation, has proven the opposite

(Arnold 1999 p. 24)

The best way of predicting the future is to invent it

(Douglas Adams[1])

12.1 The Keys to the City

> The care of the citizen is the sap of the city. But one can care only for that which one loves. Lovableness is the key to a living city. A lovely city is not an accident, as a lovely person is not an accident
>
> (Soleri 2006/1969 p. 14)

Not only can we not escape from industrial society, we have to take it with us, wherever we go. Nobody in their right mind explores the wilderness without the umbilical cords of electronics and machinery tying them back to the urban-industrial complex of modernity. Regardless of romantic appeals to an imagined pre-industrial era, advanced industrialism (especially one evolving towards biomimetic, biophilic, post-industrialism) is our only hope for the survival of civilisation. After thousands of years of social evolution we cannot return to a pre-industrial state and expect most of the world's population to survive. Now that we are living through massive climate change we are committed to a future that we cannot predict – so we have to design it, create it, make it work regardless of exactly how the planetary dice fall. We need the memes for a portable civilisation that understands how to find its place, whatever that place may be. There is a colonial instinct in this, the colonisation of places we barely know, but we cannot afford to be exploitative because we know that leads to the breaking of natural limits and any number of associated problems. So we need to design the essentials, codify the key aspects of civilisation. We need to identify and codify the keys to the city and recognise that in this, we are shaping ourselves.

[1] Repeat broadcast of 'Margaret Throsby's Interview' on Australian Broadcasting Company's Classic FM radio 17 May 2001, previously broadcast in 1999.

P.F. Downton, *Ecopolis*, DOI 10.1007/978-1-4020-8496-6_13,

The city should not be regarded as something separate from us, something projected and somehow alien to us. The city is not so much 'in the image of man' (sic) as Soleri wrote, as it is an actual, functional part of being human. Take away our cities, and we are as dysfunctional and doomed as birds denied their nests.

Community and Patronage

Our nest making is never done by isolated individuals, it is always, of necessity, a collective, social act. Even the most avid self-builder will rely on the industrial society that they are part of to provide their hammers, nails, drills, wires and pipes. Even the smallest human settlement requires organisation, cooperation and social structure to operate effectively as human habitat. The role of community in every sense is embedded in the making of a places for people to live. Remote authority is inimical to community, except as a foil that might strengthen it. The role of 'community' as a system of mutual aid based on direct democracy is central to the Ecopolis idea. It has been the basis of the Ecopolis projects – without donated community effort and a high level of participation from the wider community in their design, development and maintenance none of them would exist.

The economy of ecological cities has to spring from the patterns of social exchange that enable community to work best. Direct democracy and active citizenship require approaches to architecture, planning and urban design that are as responsive to the body politic and social demands as they are to the sun, the weather, and the living processes of the biosphere.

It would seem that allied understandings of buildings, cities and living systems *can* be placed in a framework that facilitates creation of urban systems consciously integrated into the processes of the biosphere in order to optimise its functioning for human purposes. The nature and intent of those human purposes are about the fundamentals of culture and society and they are crucial to any notion of 'conscious integration into the processes of the biosphere'. Just as patrons of the arts enable innovation to take place by supporting artistic activity that extends or challenges the status quo, and the Cadbury family patronage was essential to the realisation of early Garden Cities, so the role of community patronage is fundamental because of its intimate relationship to the nature and intent of human purposes.

The case study experiences indicate that patrons are needed for promoting democratic processes as part of design and that through community organisations like Urban Ecology Australia those processes can be articulated and developed. Without that participation the full engagement of the community in an Ecopolis cannot take place. With the Halifax EcoCity Project there would have been no project without enormous non-professional community participation, the 'patron' should have been the Corporation of the City of Adelaide but was, effectively, Urban Ecology Australia Inc. In Whyalla, the city council supported UEA and Ecopolis Pty Ltd in their bid to integrate participatory processes in the design program for the EcoCity Development, but without UEA's volunteers that program would not have

been financially supportable, so again, in effect, UEA was a key patron for the process. With the development of Christie Walk, there was no other potential patron except the community itself, for which representation was provided, once again, by UEA.

In the description of these ecocity projects, the role of the community cannot be disentangled from that of the built environment, reinforcing the proposition that people and other organisms are integral to the ecological description of any architecture or urban construct. The Halifax EcoCity Project came to life partly because it engendered the existence of a kind of community even without a physical environment built to house it. The Whyalla EcoCity Development eventually entered a 'zombie-like' phase of existence because although it had (and still has) a community of supporters, its built environment is sparse and the full extent of its development remains in question. Christie Walk is living as a community in formation and as a spawn of the HEP. Its inhabitation is complete and the impact of its existence is already out of all proportion to its physical extent. This would seem to support the idea that there is a distinction between the inhabited and uninhabited states of buildings and cities, with the inhabited, active state representing the flowering, or coming into being, of the thing we call a 'building', or a 'city' in an ecological sense.

One important aspect of the case studies is that they demonstrate that the imperative for change and action has been better understood at the grass roots level of community than it has through higher levels of government. To achieve the radical transformation of urbanism demanded by the 'revenge of Gaia' we cannot wait for government decree but must act as immediately as possible.

Cities of Imagination

The vision of the HEP and the visioning process of the Shadow Plans represent 'vision driven' development ideas that are at the core of this evolving Ecopolis theory. This approach puts people first in a process intended to realise a vision that is inclusive of them and envisioned by them. This inclusivity and responsiveness is a recipe for a rigorous design approach that does not allow for one-eyed stylemongering or narrow agendas. Alexander composed a set of rules to underscore the idea that this kind of design process was viable and credible. Rule number 3 was 'Visions', so that 'Formulated as a rule, every project, then, must first be experienced, and then expressed *as a vision, which can be seen (literally, in the inner eye), communicated to others, and felt by others. . . as a vision.*' (his emphasis) Furthermore (and this fits the history and experience I had with the HEP) 'In practical terms, this vision must come into play *before anything else*. . . that is to say, at the moment when the project is first formulated, first conceived.' (Alexander 1987 p. 51). Such visioning was also essential to the realisation of the Whyalla and Christie Walk projects.

The projects all derive from, and rest upon, the idea of wholeness emerging from an inclusive approach to design and development. The proposition regarding

cultural fractals effectively develops Alexander's 'Visions' rule by suggesting that demonstration projects, which may have been brought about by visioning processes, themselves provide the means to catalyse cultural change.

12.2 Our Cities, Our Selves

> But all history confirms in detail of life and art what language preserves in literal word, that not only 'politics' but 'civilisation' itself are essentially products, not of the individual, but of the city
>
> (Geddes 1915 p. 210)

A World of Cities

Alienation from nature for the vast majority of people, including many of those living in the city-dependent landscapes of mechanised agriculture, is now so complete that it is only through experiences provided in the city that people will be able to reach back from the maya of consumerism to the reality of natural life.

City-Region

A city is not a discrete object in quite the same way as a beehive or a beaver's dam, although ancient walled cities and Soleri's fanciful megastructures are objects as clearly bounded as any beehive. Cities are part of a regional network of parts and processes that procure, manage and distribute resources for the mutual benefit of their inhabitants. Consequent land-use patterns express the city-region morphologies and processes. As we have seen in Chapter 8, with their biotic and abiotic components, cities are constructed ecosystems that have some of the characteristics of organisms.

It is increasingly clear that city-making, with all its associated processes, creates the greatest human impact on the biosphere. As part of evolving the extended phenotype of our built environments so as to sustain our species' survival, it is logically necessary for us to make those constructed ecosystems contribute to the ecological health of the biosphere. Thus ecological cities are those urban systems that are consciously integrated into the processes of the biosphere in order to optimise the functioning of the biosphere for human purposes. Achieving this depends on the socio-cultural processes that we know as politics. Metaphorically and literally, if this analysis and synthesis is correct, we need to be 'taking it to the streets'.[2]

[2] Or as the Situationists might say: 'The hacienda must be built.'

Integrated Knowledge

The case studies demonstrate that the concepts, principles and techniques required to create human settlements that fit within the ecological systems of the biosphere whilst sustaining their biogeochemical functionality do already exist (Proposition 2). The breadth and depth of available information provided by relevant theorists has been sufficient to enable ecocity projects to achieve some degree of realisation. The same projects also demonstrate that these ideas and ways of doing things are not yet embedded in a cultural framework that integrates and facilitates their application in the design, development and maintenance of such systems – except in microcosm through the sub-culture generated in and by the projects and their protagonists. This is precisely how change is initiated and the ecocity sub-culture thus generated has provided the means to explore, in a practical, applied, detailed manner, ways to integrate relevant extant knowledge.

Cultural Change

The study of city ecology, development and education in Part 2 of this book would seem to support the proposition that the collective consciousness and unconsciousness of human inter-relationships with the biosphere is embedded in culture. By extension, it does seem unlikely that ecological cities can exist except as the consequence of the creation and maintenance of societies capable of sustaining the responsiveness necessary for managing such settlements. That responsiveness needs to be in relation to the management of all the inter-dependent elements in urban ecosystems and the only communication and decision-making structures that recognise and support non-hierarchic, inter-dependent network-based structures are based on mutual aid and direct democracy.

The case studies seem to bear out the idea that the creation of ecocities is dependent on cultural change. The Halifax EcoCity Project bears this out in both a negative and positive way. Even though the concept of the Halifax EcoCity Project was convincing to at least several thousand people, one of the main reasons it failed to materialise was the deep cultural inertia of local government; there was insufficient cultural change to move the city council and other conventional institutions far enough to result in changes on the ground. At the same time, the HEP managed to achieve semi-mythic status as an example of something genuinely achievable. As a partial realisation of the HEP, Christie Walk has reinforced the credibility of the HEP proposal and, in microcosm, contains nearly all of the key components of the HEP in the process and artifacts of its design, development and maintenance.

It may be premature to claim that any cultural change has been catalysed by the creation of the ecocity demonstration projects described in the case studies, but there is evidence that they have been influential and the spreading of influential ideas through a culture is a fundamental requirement for cultural change.

Urban Fractals

The ecocity demonstration projects that were attempted and are described in the case studies contained many of the characteristics, in process and form, that might be found in an ecological city but the scale of each project determined to what extent it could represent Ecopolis in microcosm. These urban fractals were only brought about because of a high level of participation from the wider community in their design and, in particular, their development. The absence of a conventional capital or government funded basis to the projects (particularly for the HEP and Christie Walk) highlights and confirms the complete dependence of each project on the community sector. To achieve anything on this basis required the socio-cultural phenomenon of a created community with sufficient shared ideas and preparedness to translate those ideas into activity, that the absence of capital and government support could be overcome. In effect, a cultural change was necessary, with enough depth and substance to be translated into activity with palpable outcomes. That cultural change was built around the idea that Ecopolis could be built. It was a conscious effort to make a cultural shift on the part of many people. The nature of the changes required to make ecological cities implies a cultural shift in approaches to city-making and perhaps it is not too optimistic to discern the beginnings of the conscious, systemic cultural change required to evolve an ecological civilisation.

The participation of the committed, albeit small, communities in the Ecopolis projects represented at least some conscious engagement of those communities with the urban ecosystem. Whether the broader community could be more completely involved with a relatively high level of consciousness of its evolutionary role can only be tested in time. The idea that we are an evolving species is challenging enough, the idea that our cities are tools for that evolutionary process will take much more than a few small examples to convince even the most self-aware of those people who are already conscious of engagement with the urban ecosystem that sustains them.

12.3 Evolutionary Cities

> Historically treated, architecture has seemed too long but a description of buildings, like fossil shells and corals, past and dead. Yet as an evolutionary science it begins anew with the living and growing city reefs. . .
>
> (Geddes 1968/1915 p. 142)

Cities can be understood as living systems, sustained by culture as a form of niche construction. Geddes proposed looking at cities in evolutionary terms almost a century ago but the idea has lain dormant until now. This evolutionary nature of human settlement and its relevance to the concept of the ecological city should be researched and pursued at least as avidly as any exploration of appropriate stormwater infrastructure provision or transportation systems. City-making shapes the planet's ecology and it needs to be understood as the central activity of modern humanity.

An Ethical Imperative

According to Gore our ability to live on this planet and maintain civilisation are at stake. This, he says, is a moral issue (Gore 2006 p. 298). It is certainly about survival. All ethics derive from the need to do those things which help maintain our existence; they are about ensuring survival, essentially by first ensuring the survival of society. Without society we lose the capacity to develop and transmit knowledge through time, from generation to generation.

We are inherently and necessarily social creatures and our evolutionary trajectory has reinforced this as our individual lives on the planet have become more and more interconnected with technologies like air travel and the internet. All knowledge is socially derived. An individual relying on instinct alone may, perhaps, survive, but would be barely human. For that we need a social environment in which to learn, share knowledge, and provide mutual support. Most of the information and knowledge of the world that we need comes through nurture during our relatively helpless years prior to puberty, after which our success in reproduction requires that we continue to learn. As we have continued to develop our mental abilities, so we have extended our period of learning and all of our learning is in a social context. Education itself is now a lifelong activity for many people. Our survival depends on social behaviour.

If we pursue the goal of making ecological cities we would almost certainly improve our chances of thriving as a species. If we do not change the nature of our urbanism we will almost certainly be adding fuel to the fire of global warming. Not to act is dangerous. Making ecological cities causes no harm, except to notions of land development that have proved to be destructive of living systems.

Invisibility

Cities possess a curious kind of invisibility. It is as if we are so used to having them around that we cannot see them properly. Even Jared Diamond's famed books on the history of the world and the collapse of civilisations do not pay much attention to cities as key elements of civilisation, but treats them more as background props to the great drama of human life; indeed they are rarely mentioned (neither towns, villages, cities or urbanisation are even listed in the index of *Collapse*). Diamond mines the city for evidence, using an example, for instance, the ruins of the 'small but densely built' Mayan city in western Honduras (Diamond 2005 p. 168), but fails to identify the city as the key to understanding the mess of activities that we call society. He talks about civilisation but barely acknowledges the single great invention that has enabled it to develop, the cohering tool of choice for controlling human development, and the driving force for progressive social change.

Cities are the most perfectly articulated expressions of all the forces that combine in what we call culture. Cities are at the centre of all societies moving past the stage

of agrarianism and 'rural idiocy'. Even the birth of the state can be attributed to the development of the city. The earliest and most quickly developed manifestation of the state *was* the city.

Important aspects of the Mayan collapse may have been to do with a population growth and a 'mismatch between population and resources', increasing deforestation and warfare, climate change and poor management (Diamond 2005 p. 176), but the focus for all of these issues is the city. If we regard the city as a living system then its component parts, including its regional base and hinterlands, its use of resources, and its population all become part of a more or less coherent whole. When the coherence is lost, collapse ensues; if that coherence can be maintained then there is the possibility of sustaining the conditions of existence for the human society that has given itself the task of managing the system. Control and management of the diverse elements that make up human society require the concept and systematic activities of the city. Diamond's 'five factor framework' for understanding societal collapses does not seem to recognise the central role of the city in both avoiding and creating collapse, he effectively takes this cultural keystone for granted.

To have any hope of preventing the catastrophic collapse of modern civilisation we cannot afford to take the city for granted. Indeed, we have to recognise its central place and essential role as the vehicle of survival. The hardest point about cities to understand, it seems, is that though the physical place we call a city may not appear to be an active element of the landscape, it is the place where all the decisions are made about the management of the wider landscape, and if you could watch a sped-up movie of a city that spanned a century or more you would see that it behaves as a consumer and excreter of materials, both organic and inorganic, and that it is chewing up and transforming the landscape. Understanding the ecology of cities means understanding this fundamental dynamic, and Ecopolis is about making and managing cities that undertake transformative processes as living systems integrated with the landscape.

If the theory of evolution is correct and Laland is right about human culture as a form of ecological niche making (Douglas 2000 p. 33) then cities and buildings are cultural artifacts integral to the life of human organisms, and they may be regarded as having a tendency to evolve towards fitness through natural selection of the most workable types. Evolutionary fitness in this sense would mean the same as it does for other living organisms. Thus cities (or any built environment) will necessarily evolve towards increased energy and resource efficiency. Most human city-making cultures use some kind of money to represent energy and resource value. The continual drive for perceived cheapness or value for money can be seen to represent a drive to maximise energy and resource efficiency. One can only hope that when money values are closer approximations of resource value then the equivalence of fitness in evolutionary terms may be better, e.g. as scarce rainforest timber increases in price its use is gradually curtailed.

Manufacture of built environments is not simply about energy and resource efficiency, however. Optimisation of the metabolic rate of human settlements is but part of a larger equation. Cities are cultural constructs intended to maintain (sustain) the

conditions of their own existence. Cities of good evolutionary fitness for purpose must therefore sustain the cultural processes that are essential to their continued function. These processes include those social fabrics that facilitate community interaction rather than individual atomisation.

Starting immediately, architecture and city-making in the 21st century have to be understood in terms of the design and development of living systems. The keywords for this new design of the urban ecology are connection rather than separation, feedback rather than dictation, process rather than product, emergence rather than imposition. Evolutionary cities must address energy and resource use (through *appropriate* economic means), equity, and community processes. These issues are to do with the *maintenance* of the conditions for living systems that support ecological cities and are fundamental to the Ecopolis idea.

Culture and the Art of Lifecycle Maintenance

> Ten thousand years is the size of civilization thus far. In that time a number of civilizations and dozens of empires have fallen or receded, but the overall advance and convergence of civilization on the planet has been steady
>
> (Brand 1999, p. 30)

The maintenance of ecological cities is not so much to do with regular painting and the clearing of drains (although it includes that) but *about the maintenance of processes*. Even keeping the drains clear is primarily about human organisation. The human organisational forms and activities that maintain all the components of a culture ultimately *are* the culture. The design and development of ecological cities are ongoing processes that need to be maintained for the ecocity to exist and they are integral to its operation as a living system. That integral nature is part of the definition of cities as living systems.

For Ecopolis projects, urban fractals, or even partial fractals like Christie Walk to continue to develop and maintain their viability as ecological developments the conditions that created their existence must be maintained. Their viability depends on maintaining systemic, sustained ecologically and societally responsible, (self-replicating) conditions. The problem of ecocity maintenance is that of maintaining the socio-cultural systems that result in ecological cities. Community-based bottom-up planning strategies grounded in living communities, rather than imposed top down planning strategies, are fundamental to the foundation and sustenance of any ecologically viable human settlement in the long term.

Cities as Extensions of Human Physiology

> . . .the action of the organism on its environment has to be important, and furthermore, it has to be physiological. In other words, a true *inter*action of an organism and its environment

> must result in an extension of physiology outside the conventionally defined boundaries of the system
>
> (Turner 2000 pp. 10–11)

By placing the design, development and maintenance of the built environment within the conceptual framework of a living systems approach it is possible to assess those activities in terms of their ecological function. By identifying whether the energy for making a building is from somatic or extra-somatic sources the notion of embodied energy is made much more specific. By articulating the relationship between the biotic and abiotic components of architecture and cities it is possible to understand what part of these culturally generated phenomena are dependent on living systems and to track ecological relationships.

The Ecopolis theory is predicated on an approach to the making of architecture and cities that defines them as living systems and as extensions of the human organism. Recent work by life scientists Turner and Laland support the idea that building is a form of extended physiology and is a result of genetic adaptation. Buildings and cities can thus be understood as components of living systems. They are, in effect, special cases of niche adaptation (Brown 2000 p. 33). Turner demonstrates that physiological processes can occur outside of an organism (Turner 2000 p. 27), so that the constructions of living creatures can be seen as extensions of themselves. This promises to be a rich field of enquiry.

Turner sees physiology as central to the definition of life and living things as continuous flows of energy and matter (Brown 2000 p. 30). His ideas are built on Dawkins' philosophy of the extended phenotype which proposes that construction activity undertaken by organisms are an extension of their expressed genes. Thus 'A beaver's carpentry genes help it build just the right dam' which results in the beaver increasing its chances of finding food and surviving (Brown 2000 p. 30). This is not anthropomorphism saying 'look at how like humans the animals are because they build things', it is the other way round – look at how much like animals we are when we build things. It is to do with recognising that the structures we make for our habitation are as much extensions of our physiology as are lodges for beavers, nests for birds and hives for bees.

If the making and maintenance of cities were to be analysed on the basis of them being extended phenotypes of the human gene it may be possible to look forward to achieving a kind of unified theory of urban ecology. Organisms extend their physiology by adapting their environment rather than changing their physical bodies. The evolution of brains provides the means to absorb information about the environment and to make decisions about how it might be adapted to the benefit of the organism. Humans consciously appropriate elements in their environment in order to adapt it for the benefit of their physiology. This conscious appropriation and adaptation of the environment enables humans to greatly extend their realm in the biosphere and even to go beyond the apparent limits of the biosphere.

In any case, architecture and associated creative activity should be seen as integral to life processes, as ways of making our habitat function better to increase our chance of survival as a species.

Ecopolis Scenario Planning

> And so all those wind and ocean current patterns that formed during the last ice age, which have been relatively stable since, are now up in the air. . . Our civilization has never experienced any environmental shift remotely similar to this. Today's climate pattern has existed thoughout the entire history of human civilization. . . Every place – every city, every farm – is located or has been developed on the basis of the same climate patterns we have always known
>
> (Gore 2006 p. 149)

The military-industrial-academic complex provided the tools (notably computers), the technology (ways of working with the tools) and the system of knowledge (cybernetics) that formed the basis for the (nominally) non-hierarchic, networked, environment of cyber-space. In 'Counterculture to Cyberculture', Turner describes how Norbert Wiener and the new cyberneticians discovered the necessity of a collaborative, cross-disciplinary method of working and information theory to deal with the multiple sources and relevance of disparate sources of information and ideas that was brought into being by the technology of advanced industrial warfare.

As has been elegantly argued by Turner (2006) the counter-cultural imperatives of the 1960s were constructed on a similar tool, technology and knowledge base that was provided by the pragmatically progressive research into weapons development that arose in the USA and UK in response to the exigencies of WW2 and later, the Cold War era.

The same demands for sophisticated weapons systems and information led to great leaps forward in climate science. Just as Britain's rise to dominance as a naval power depended on the ready supply of timber that resulted in the British Isle's deforestation, so the need to forecast weather conditions for a fleet that depended, literally, on which way the wind blew, led to the establishment of the first modern weather forecasting system. Two hundred years later military nuclear submarines have provided essential information about various ocean conditions, including the thickness of Arctic sea-ice which has such importance that at one time climate researchers became concerned 'that the shrinking of military nuclear submarine fleets, which have provided the historical ice thickness record from the Arctic Ocean, would mean the loss of new data. . .' (Melling 2004). The deep water, ocean based sonar tracking systems used to locate enemy submarine activity depends on highly accurate measurements of ocean thermal conditions. The massive, complex calculations needed to deal with this information as part of tracking submarines could only be performed by creating the world's largest computer systems. These computers were used to model global weather systems in which ocean thermal conditions critically effect climate behaviour, and these powerful tools, created directly in response to military requirements, became the essential tools of climate modellers.

Climate modelling enables us to predict future conditions with some degree of confidence. The various levels of certainty of the predictions provide a range of scenarios to contemplate (eg. will the Greenland ice sheet melt in 20 years or 200?). To have any pretensions of being future-proof, the planning and design of architecture and cities in the present day for conditions being delivered by a changing climate at

some time in the future, has to proceed on the basis of an imagined scenario. This confronts us with a situation in which the science is good, but there is little certainty about exactly what will happen and how conditions will be, and when – the same conundrum that the world's politicians have been fumbling with for years in forums like Kyoto. Just as their decisions, made now, affect the world as it will be in 10, 20 or 50 years time, so does our making of the built environment.

Ecopolis scenario planning is about the planning and design of the built environment for an uncertain future. The amount and complexity of information involved is daunting but the same kind of collaborative, cross-disciplinary approach discovered by WW2 cyberneticians is now needed to deal with that complexity and diversity of information – and the management requirements that are generated by any kind of program for making and maintaining the life of Ecopolis.

Maintaining the cycles of life means understanding that the corollary of life is its absence, and that if cities live, they must also die.

Cities for a Changing Climate

> It is sobering to think that nearly all of the present great centres of population are currently below what could be the ocean surface in a mere blink of geological time
>
> (Lovelock 2007 p. 46)

The core challenges involved in making the architecture and cities of a changing climate are:

- to urgently address issues of climate change whilst maintaining the most liberating and civilised aspects of our cities;
- to combine the power and reach of industrial production processes and advanced technologies involved in making ecocities like Masdar and Dongtan, with the fine grain of community ownership and engagement in projects like Ithaca Ecovillage and Christie Walk;
- to create buildings spanning the spectrum – from straw bale cottages to bioclimatic high-rises – that are genuinely organic, embedded in, and contributing to, the biological realities of a dynamic landscape;
- to use only the daily ration of energy from the sun to power the entire built environment;
- to continue advancing the art and science of city-making whilst rapidly retrofitting and reshaping existing urban sprawls and conurbations to massively reduce greenhouse gas emissions and restore ecological functionality;
- to carry out adaptation strategies immediately by building in ways that can maintain food production and sustain biodiversity whilst coping with permanently extreme weather events ranging from heat waves to ice storms;
- to deliver urban solutions on the scale of megastructures and mass-society whilst retaining the subtleties, diversity and social and aesthetic richness of traditional towns and cities;

- to immediately begin erecting effective defences against rising sea levels;
- to create coherent, functional, efficient and effective urban systems that operate and interact at the scale of regions planet-wide whilst retaining the freedom and natural anarchy of our tribal roots in daily life and decision-making;
- to restore balance to the life processes of the biosphere whilst advancing the interests of our species as its dominant, conscious life form.

The model of the fractal solution provides the means to deal with these challenges because it works at the scale and pace of the immediate and the small whilst setting up the patterns and processes that structure the long-term and the large.

Urban Evolutionaries

> We are not the culmination of history, and we are not start-over revolutionaries; we are in the middle of civilization's story
>
> (Brand 1999, p. 31)

If organisms create extended phenotypes as part of their evolutionary development, and if the human organism is creating extended phenotypes in the form of architecture and cities, then architecture and urban design can properly be regarded as having evolutionary content, and the making of them as being evolutionary activity. Cities are our habitat for human survival and evolution and architecture and urban design are major components of culture that must be conceptually expanded to recognise the central place of human settlement as an evolving agent of change in the biosphere.

Will architects and planners have to become biologists, and ecologists have to become architects? Yes, but only insofar as architects are already physicists and ecologists already study complex structures. Architects are expected to know enough about physics to make a building stand up but it is a rare architect who does the calculations to prove it. Ecologists are expected to know enough about physical structures to incorporate them into their studies of living systems. Just as architects now work with skilled people to 'do the calcs', so the boundaries of trans-disciplinary engagement must expand to include biologists and ecologists so that it will become as routine to deal with the sustainment of ecosystems as it now is to keep a building standing. Nevertheless, community processes are crucial and ecological design '. . .cannot be the work of experts only. It is ultimately the work of a sustainable culture, one skilled in reweaving the multiple layers of natural and human design. Ecological designers are facilitators and catalysts in the cultural processes underlying sustainability.' (Cowan and Van der Ryn 1996 p. 25). In the Ecopolis vision, after 10,000 years of evolution, not only can the city can fulfill its original promise as a vehicle for liberating the human spirit and achieve reconciliation with the living landscape, it can provide us with the means for ensuring our long-term future as healthy denizens of the biosphere.

In the end, it is not the words that count, it is whether the awareness of *cities in evolution* can be achieved.

> Were you thinking that those were the words, those upright lines?
> those curves, angles, dots?
> No, those are not the words, the substantial words are in the ground and sea,
> They are in the air, they are in you.
>
> (Whitman 1991 (1856/1881), p. 65)

12.4 After Words

> All that is not information, not redundancy, not form and not restraints – is noise, the only possible source of new patterns
>
> (Bateson 1973 p. 386)

If we want to create a civilisation capable of reaching the stars, then one of our first steps must be to change the way we make our buildings and cities. As we listen to the noise of our imaginations we may be, in a sense, redesigning the planet, a fractal at a time.

Dancing to the Music of the Biosphere

> We are but whirlpools in a river of ever-flowing water. We are not stuff that abides, but patterns that perpetuate themselves
>
> (Wiener 1954 p. 96)

House Hold[3]

As I glide through the mansions of the biosphere
Rivers of sunlight fill my forests
And beaches lie down beneath crying mountains
That yearn for the flow of seasons,
Drip nectar of wings with the revolving grace
That only a spinning planet can make.

Like a pond in time, frozen,
A room in this grand house
Whose builders were ignorant of the plans
That no architect had ever drawn
Whilst the daylight fled the night
For morning starlight to re-kindle.

[3] 14 February 1999.

And on the wings of air
I glide again
Doors open

And the roof falls away, stripped by chlorine
Choked with carbon, an exhalation of life on speed
With footings deep in a vital web of decomposing soil
Through aeons of black gold and fossil wood.
The house rocks on its foundation
Begins to topple into a lost future
Where the demons come to life
And the horsemen ride.

The walls, all that is above the actual past
And is swayed in the possible future,
All depend on our life force
Our conscious grip of the great construction,
Fix a tile, patch the walls, mend a window
Or build it again from stardust
Over another billion years.

APPENDIX 1: My Favourite Thought Experiment

This essay, date 8 October 2003, is an abridged and modified version of a longer paper given at the Region 7 Seminar of the Murray Darling Association on 26 July 2000.

I conduct 'thought experiments'. These can be fun. They cost almost nothing, you can do remarkable things to anyone, anywhere, anytime — and they don't even notice! My favourite experiment focusses on metropolitan Adelaide (you can do this too). It's simple: at the height of summer, turn off the city's water supply for two weeks.

There is outrage! There is universal expectation that 'someone' will fix it but after just 24 hours the situation is critical because virtually every aspect of maintaining sanitary conditions depends on hot water for cleaning, boiling water for sterilisation or simply water to flush the toilet.

The very young, the elderly and the infirm suffer most, and quickest. Society's most vulnerable members quickly feel pain from the disruption of 'normality'.

After a week, violence is breaking out. Anyone who can is leaving town. Owners of rainwater tanks are attacked by desperate people, less and less able to think straight as they get thirsty, dirty and scared.

The government declares a state of emergency.

Within two weeks the city collapses completely. Normal order is impossible. Violence is routine. Desperation, fatigue and fear have replaced any sense of security the city once provided. Pestilence and disease overruns the city as normal services break down. The thin fabric of civilisation begins to tear. . .

In my even nastier experiment, I turn off the electricity for two weeks as well!

Continuing this exploration of possibilities, imagine all the cities and towns dependent on the Murray-Darling system for their water supply becoming independent. Then imagine them weaned off fossil fuels. . .

Can cities be independent in this way? The answer is 'yes', but instead of poisoning the lifelines of our waterways we should be cleaning and conserving them. Our urban centres must be planned, developed and redeveloped on the basis of their interdependency with the landscape (and vice versa — no farmer would have a livelihood without cities to feed).

We need to transform the landscape. But the landscape that has to change first is the invisible landscape of legislation, because in an advanced civilisation that is one of the principal foundations of its existence.

We need cultural change. It happens at the grassroots level of communities and committed citizens, but it can be accelerated by supportive, intelligent legislation and that is the responsibility of government.

The amount of water we use in adelaide is about the same as the amount of rain falling on the metropolitan area every year. In Adelaide, at the height of the summer of 2020, let's look forward to turning off the tap!

Now conduct your own thought experiment — imagine living in an exciting, beautiful city that fits the ecology of the land. Then, if your ecological city feels good and works well, move it from the realm of imagination, start figuring out how to build it, now begin. . .

APPENDIX 2: Density and Urban Villages

One of the main functions of the quarter acre block is to demonstrate the power of its owner. Control of a large area of land speaks of dominance, control, power, success. But ultimately, control of territory is to do with control of resources – at root, it was to do with ensuring enough food to eat and water to drink. In a civilised society it should be possible to find less primitive ways of demonstrating success. Cities can be good for us (Sherlock 1991). In the culture of an ecological city the clearest demonstrations of success will be those that show understanding of the need to nurture nature and restore ecosystems – to stop being 'future eaters' (Flannery 1994).

In his book 'The City Square' Michael Webb avers that private courtyards, gardens and other spaces for intimacy or leisure can be designed into any kind of housing that is no more than 4–5 storeys high, and the public realm comes alive when urban environments have well designed and appropriate public spaces (Webb 1990). Food can be grown in greenhouses, rooftop and community gardens even in the city (as is demonstrated by Christie Walk). Swimming pools, tennis courts and other facilities can be provided as shared resources. Transit, cycles and walkable streets can replace the near-total dependence on private cars. Attached dwellings, clusters and terraces can provide more energy efficient houses. Co-housing can provide other shared facilities like laundries and playrooms for young children. And so on. . . (Moughtin 1996).

Keeping down the size of a building's physical footprint can contribute to reducing the overall size of its ecological footprint (Rees and Wackernagel 1995). The need for greater dwelling densities suggests that an Ecopolis might have some high buildings, but surprisingly high densities can be comfortably achieved with 3–5 storey housing as centuries of civilised town and city building has proved (and again, as Christie Walk demonstrates), so some would argue that except for the few childless couples or individuals who choose it, there is no need for high-rise housing (Sherlock 1991).

Keeping developments compact to encourage and allow for the greater spread of natural environments and restore the health of the ecosystem would be powerful demonstrations of real social responsibility, but one of the strongest arguments in favour of urban consolidation or denser living, is economic. You simply need less

pipes, wires and roads if dwellings are closer together. This economic argument is a strong one. Having people live within easy walking distance of one another also facilitates spontaneous personal interactions, helping to generate community. So as long as the quality of life provided by denser living is at least as high as that provided by low density living, then the ecological, economic and social arguments in favour of higher densities make sense.

Urban Villages

In exploring scenarios for urban village development options for 43 hectares at North Coogee in West Australia, Scheurer et al. identified three approaches which effectively illustrate the difference between 'medium density' Australian models of urban form and European models:

- Scenario I 'Liveable Neighbourhood' supposes compact layouts so that people are within 5 minutes walk of local centres, simply connected streets where people can walk, cycle or take public transport, windows and verandahs for passive surveillance, and shops, businesses and community facilities forming 'neighbourhood hearts' (Scheurer et al. 1998 p.34–35). Scenario I is essentially new urbanist in its scope.
- Scenario II adds 'characteristics of ecological housing and lifestyles' using an 'Urban Ecology' approach which combines a range of ecological aspects in a single space and is 'often pursued by local activists (bottom-up projects)' with 'an experimental and explorative character' producing 'unique and very locality-based results'. (p.40) Stressing the need for interacting with the community in implementation, Scenario II proposes more community space, car-free housing and upgraded public transport along with rainwater capture, greywater recycling and community gardens (pp.40–46).
- Scenario III applies 'some of European best practice of sustainability-oriented urban planning' to the mobility management and ecological components of Scenario II (p.49). Scenario III is most similar to the Halifax EcoCity Project in its scope and rationale.

In the comparative review of the three scenarios it is concluded that whilst I may be easiest to implement, the potential synergies provided by II and III would be more likely to support the development of an economically strong community, primarily due to their greater density and lower relative infrastructure cost, e.g. a light rail link to nearby Freemantle becomes viable. The comparative chart of the Scenarios indicates that whereas the amount of built-up land is little different in either case (52, 53, 55%) the number of residents increases substantially in each scenario (1,800; 2,500; 4,500) and the number of car parks declines dramatically (1,584; 733; 450) (p.56). This clearly illustrates the greater land-use efficiency of 'urban ecology' development options, and also shows the vital need (and intrinsically greater viability) for public transport in such options. Because they are sited in

the heart of the City of Adelaide which is relatively well serviced by public transport, the Halifax EcoCity Project and Christie Walk development should be viable as ‘Scenario II’ or ‘Scenario III’ equivalent developments.

I undertook a similar, though less comprehensive comparative review of scenarios for Greater Taree City Council to demonstrate alternatives to ‘rural residential’ zoning. It showed that on a typical 5 acre (2,025 hectare) rural residential block most of the wildlife habitat was lost and only one dwelling could be erected; with conventional suburban development 25 dwellings could be erected but all the original wildlife habitat was lost; whereas in a ‘village development’ model 25 dwellings could still be erected with 50% of the land retained as wildlife habitat (Ecopolis 1994b pp.4–7).

APPENDIX 3: City Size: the Case of Somerset and Adelaide

Cities and Size

In discussing cities, size is important. The word 'city' can mean anything from multi-million population conurbations to the traditional pre-industrial cities of less than 100,000 people, or even the tiny urban concentration of a place like Wells in Somerset, England, population 10,000 and a city by virtue of its possessing a cathedral. Mumford and Bookchin favour smaller cities over the sprawls of urbanisation whilst Roszak is hardly an advocate of the modern urban experience. He supports the idea of what may as well be understood as a country town so that, 'Ideally, as in ancient Attica, the country roundabout should be regionally integrated with the opportunities of an accessible, humanly scaled polis.' (Roszak 1973 p.419). I support the idea of smaller cities, but the merits of country towns are, in my experience, less than liberating.[1]

The walkability, rural integration and population concentrations of the pattern of settlement in southern England can be gained by noting a series of predominantly *rural* walking routes published in a guidebook for eight routes around Wells (population 10,077) which range from 2 to 12 miles (3.2–19.2 km) and cover an area of approximately 100 sq. km. to include the nearby villages and towns of Wookey Hole (1,322), Priddy (632), Westbury-sub-Mendip (794), Cheddar (4,500), Chewton Mendip (509), Croscombe (628), Shepton Mallet (7,657) and Dinder (not available). (the 1991 population estimate shown in brackets is taken from 'Somerset Population and Housing Estimates 1981–1993').

It is instructive to compare the quite densely populated living fabric of a part of southern England (in this case, my home county of Somerset) with the metropolitan sprawl of Adelaide (see diagram). One maintains its biological productivity with

[1] The population size of ancient Greek 'polises' may have been similar to modern English country towns, for instance, but there needs to be a cultural basis to city life that is of and about the city, rather than the country, lest the exercise of the intellect be diminished by compliance with agrarian-derived custom and the circumscribed world of local agriculturalism.

Figure 76: Metropolitan Adelaide (tone) overlaid on an outline of Somerset, England – dots represent towns and village

ambient rainfall and is characterised as 'countryside', the other depends on imported water for irrigation and is characterised as a suburban 'city'. One contains many places and is regarded as an environment to explore, the other is homogenous and not popularly regarded as an interesting tourism destination.

APPENDIX 4: Adelaide, Calcutta and the Western Comfort Zone

In Calcutta, slum dwellings may hold a dozen or more people per small room, whereas '. . .25% of households in Adelaide have a single adult living in them either as a single parent or as a lone person – the lone person is 20% of the total household.' (Clements 1992 p. 446). This fact is integral to the comfortable, low density lifestyle that Stretton argues would be disagreeably changed by a move towards compact cities. This sub-urban apologia, curiously, ignores the real human cost of the transport system on which its 'equitable' low density form relies. Whilst praising the Australian auto-dependent lifestyle for its freedom and provision of private space Stretton fails to address the price paid in carnage on the roads (Stretton 1996). Worldwide, one million people are killed every year by cars. Many more are maimed. Even setting individual human and social costs aside, the economic cost of death and disablement is an enormous price to pay for personal space (Newman et al. 1992 p. 5). Other respected Australian researchers support the idea that cars are problematic and do not provide a sound basis for city planning. Forster, for instance, points to the issue of equity, noting that 'Households without cars are obviously disadvantaged.' (Forster 1999 p. 66) Stretton ignores this issue and argues that more efficient cars would resolve the problem of transport energy consumption. Leaving aside the fact that more efficient vehicles are necessarily newer vehicles and are unlikely to be affordable for people on low incomes who struggle financially just to keep old, inefficient cars on the road, they do not assist in maintaining efficient city morphologies. In the two decades dating from the Oil Crisis of 1973, vehicles became more efficient, but whilst California's population increased by 50% in that period, the area of its cities increased by 100%. (Register 1997). Confirmed sub-urbanists like Stretton may complain about the arithmetical skills of compact city protagonists (Stretton 1996), but they seem blissfully ignorant of the rigorous mathematics of Wackernagel and Rees that measures urban resource consumption to clearly demonstrate the unsustainable nature of the western industrial model of urbanisation. Indeed, Australia's ecological footprint is ten times greater than that of India – 8.1 hectares/capita vs. 0.8. Calcutta thus has approximately the same ecological impact of Adelaide, even though its population is 11 times greater (Wackernagel et al. 1997).

APPENDIX 5: Charter for a New Municipium

The Charter for a New Municipium is for 'a bottom-up, not hierarchical globalisation centred on solidarity' and addresses:

- **Globalization and local development:** In which 'This perspective in local development, identified with civic networks' and the growth of fair government for local society, must not become narrow-mindedly local; on the contrary, new networks as alternative to long-range-global ones must be built, grounded in local differences and uniqueness, for non-hierarchical and non-instrumental cooperation.'
- **The new role of local administrations for a bottom-up globalization:** In which 'In order to make sustainable futures become reality, local governments must assume direct functions in economic choices. . .and. . .Empowerment of local societies through new democratic practices is a central concept: the reinforcement of local societies and their decision-making systems is the only way, on one hand, to resist the homologation and domination of economic globalization and, on the other, to open up to and promote fair networks.' The idea of the 'new municipium' 'is the outcome of a process aimed to transform local municipalities from bureaucratic administration offices towards self-government social workshops.'
- **New forms of direct democracy:** Which can produce 'scenarios for a common future, in plain and everyday language' and integrate 'structured participation paths, including the Aalborg charter and Agenda 21 engagements, thus making them into ordinary instruments for territorial, environmental and economic government.'
- **New multicultural territories:** In which 'The new municipium produces new social scenarios by recognizing deeply rooted living and working practices of inhabitants originally from different countries and places.' A process intended to produce 'new community relationships at a social and individual level between different people and cultures.' noting that 'public space in particular is where many new and culturally different living practices are shared.'
- **New welfare indicators:** Which include evaluation criteria that are about 'the degree and form of social participation in decision-making in relation to the aim of empowering local societies. . .sharp reduction of the role of the Gross National

Product as the only welfare measure. . .the level and forms of local heritage development as the basis for sustainable wealth production. . .ecological footprints of sustainability. . .and. . .the quality of relationships and mutual exchange networks between local societies.'

- **New self-sustainable local economic systems:** In which "Insecurity created by 'development', by the fragility of high technologies, high skyscrapers, genetically modified lives and seeds, emphasizes the new need for diffuse knowledge control in reproducing living worlds, in community trust, and in the choice of context-suitable technologies."
- **Forms of local territorial heritage valorization:** In which 'The new municipium assumes an extensive definition of heritage, identified with the peoples and places, including their environment, landscape, urban characters and values, knowledge, cultures, arts and crafts, in uniqueness of living between past and future.'
- **Fair exchange and trading networks:** That promote "new exchanges of cultures, typical productions, technical and political knowledge, with a view to going beyond wild economic competition in favor of new north-north, south-north, and south-south forms of cooperation. . .Fair exchange networks constitute a tiny but solid support for the 'Lilliputian' strategy against economic globalization."

Reflecting some nervousness about the continued militarisation of the planet, the New Municipium sees its program as one that can "generate safe communities without cities becoming 'armor-plated', or competition for the quality of products degenerating into war."

Acknowledgments

Now I sit by the window and watch the cars
I fear I'll do some damage one fine day
But I would not be convicted by a jury of my peers
Still crazy after all these years

(Paul Simon 1974)

I want to acknowledge and thank all those members of Urban Ecology Australia, volunteers and interns, who have had energy and courage to give to the task of testing ecocity ideas in the real world of the living community, especially: Emilis Prelgauskas, whose enthusiasm for the ideas of Ecopolis and Urban Ecology in the early years helped to sustain our collective momentum and get things to move beyond rhetoric; Sharon Ede whose constant questing after knowledge and information and determination to share it remains an inspiration; and David Munn, Urban Ecology Australia's first Life Member, without whom there would be no Urban Ecology Bibliography. Over the years David has given me an almost complete library of the works of Lewis Mumford, which remain a touchstone for my own endeavours as a researcher and writer on cities.

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Many interns have passed through the portals of Urban Ecology Australia and Ecopolis Architects, helping to make possible the ongoing study of, and activism for, ecological cities. Some are cited in this book but I'd like to particularly acknowledge the exceptional energy and vitality of two young women who died tragically whilst they still had a great deal left to give – Jessica Bullen who died 3 July, 2005 and Nina Creedman who died 24 March, 2007. Jessica was a tireless activist for better pedestrian and cycling environments and safer roads but was killed by a driver with a long history of driving offences – his license was suspended for only one year; the irrepressible Nina was killed by a rockfall whilst hiking in New Zealand and remains sorely missed by all of us who got to know her as a friend as well as great co-worker.

Nina, a California girl, would have understood why I also extend my thanks to Brian Wilson. If ever a man lived out the contradictions of the American (and by default, the post-World War 2) dream, it's Brian. In the best of his music he takes the everyday and brings out the beauty and generosity of spirit that is immanent in the world. I think that's a healthy way to look at life. I've listened to his music since adolescence and still find myself inspired by the work he's doing now, in the 21st Century. He stands as a great example for the redemptive power of music and the capacity for us curious humans to rethink how we live and find better ways to be.

Dr. Barbara Hardy has not only provided crucial support for Christie Walk but has helped to provide me with the means to navigate some perilous fiscal waters and I am very grateful for her faith in my work. In a similar way, thank you Joan Carlin. And thanks to all the Christie Walkers who have lived so many of the ideas described in this book, and who have given so much.

Christie Walk was awarded the Silver Prize in the inaugural Ryutaro Hashimoto APFED[1] Awards for Good Practices and as the recipient of the prize money, I pledged to use it towards documenting the project, which is described in Chapter 7.

Brian Forte, Roman Orszanski and again, Emilis have endured my various expressions of enthusiasm and despair over many a lunchtime and have been staunch friends whatever the weather. As has Dr. Effie Best, who has also provided invaluable editorial assistance, general encouragement and stimulating conversations. Thank you Peggy and Frank Downton for bringing me onto this fabulous planet and

[1] Asia-Pacific Forum for Environment and Development.

for giving me the genetic predisposition and intellectual arrogance to believe that my work was of worth. I regret that I wasn't able to finish this book in time for either of you to see its publication.

I'm a product of socialised medicine and education and I'm a product of my time but had things been otherwise, I would have been otherwise. I've never received 'free' education or medical treatment, but I have received education and medical care that I didn't have to pay for directly because I have had the fortune to be born into a society that saw the value of sharing resources so that individuals could benefit, so that the society which they make up could benefit.

I'm acutely aware that my capacity to finish this book owes not a little to my doctor Johanna Martin, cardiologist Enzo DeAngelis, surgeon James Edwards and staff of Ward A4 at the Royal Adelaide Hospital. Modern medicine and massive technological capabilities may have made the repair of a congenitally 'incompetent' mitral valve an almost routine procedure but there was nothing routine about it to the patient.

Thank you in particular to Kanako Nakanishi and Shani Burdon, assisted by Linda Morgan, for helping to keep the practice of Ecopolis Architects alive and well through the ups and downs of me having surgery and writing this book. With such a complex and personal project it is easy to fall into any number of stylistic and grammatical holes and I am grateful for having had various chapters and sections reviewed and critiqued by Jen St Jack.

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My children, Dafydd, Seren and Rhiannon have put up with enormous intrusion into their lives over the many years that I have pursued this ecopolitan obsession. They have grown up with these ideas and have seen my time taken away from them. Thanks for your patience kids – and thanks to each of you for providing me with some marvelous grandchildren to make it even harder for me to find time to finish this book!

My partner in life, Chérie Hoyle, has supported my ambitions and suffered the consequences; she has been the essential organisational force behind the creation of Urban Ecology Australia and its ecocity projects. She has lived the pleasure and pain of these ecopolitan experimentations as much as I have and quite simply, without her, my thesis, this book and the projects that inform it would not exist. Words don't say it well enough, but – thank you, Chérie.

Adelaide, September 2008

Paul F Downton

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[1] Although there are an ever-increasing number of websites that chronicle sustainable, green and ecocity initiatives, very few are listed here. This bibliography primarily presents the main printed sources of information and ideas that have contributed to the development of the Ecopolis idea.

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