

Jim Norwine *Editor*

A World After Climate Change and Culture- Shift

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 Springer

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For Z, always. . .

*Exuro perfectum genae tuae memoria nostri
jucundo caeli ludunt. (Burn the perfect cheeks
of heaven with your remembrances of our
delight and play.)*

Acknowledgments

I was at his side putting together everything, my delight increasing each day, playing before him all the while, playing in this world made of dust and my delight was to be with the sons of men. Proverbs 8:30–31 (Latin Vulgate translation).

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Chapter 1

Introduction: Imagining the Unimaginable

Jim Norwine

Abstract This book is an imaginative geography of “after” worlds . . . “after,” that is, another century of (a) profound climate change in the form of unprecedented anthropogenic planetary warming and (b) an expanding and deepening “postmodern” culture-shift, one which already has begun to transmogrify modern assumptions in a way eerily reminiscent of how, five centuries prior, those then-new ways of mind and being consumed the seeds of tradition, habit, and belief and spit out strange fruit.

What is essential is invisible to the eyes. [Saint-Exupery, *The Little Prince*]

No one knows enough to undertake a book like this . . . [Hugh Kenner 1971]

More light! [Goethe]

1.1 Approach, Assumptions, Aspirations

The twenty-first century will mark the start of one of those very rare “hinge” periods of human history, perhaps even comparable to Karl Jaspers’ famous “axial age” of 800–200 BC.¹ In this book, more than 20 international scholars respond to this

¹ For comparison, think of the revolutionary impact of the invention of agriculture ~ 10,000 years ago. However, it is German philosopher Karl Jaspers’ seminal idea of the “axial age” of ~ 800–200 BCE that has most helped us understand the radical nature of pivotal periods. His great insight was that, at about the same time, in such geographically distinct places as China (think Confucius), India (e.g., the Buddha), Persia (Zoroaster), the Middle East (Elijah), and Greece (the classical philosophers, notably Plato), the human search for meaning experienced a revolutionary and irreversible pivot from a “before” to an “after” world, one with much greater emphasis on the individual, self-reflection, justice (e.g., the Golden Rule), and the idea of transcendence. My claim is that the current century represents the apotheosis of another such a pivotal, in-between, interregnum, and that the transformation toward a new “after” world is one certain to (a) be interesting, (b) be challenging, (c) have both good and bad effects, and (d) present opportunities for both advancement and threat of destruction on a scale unknown since the evolution of our big brains ~ 200,000 before now (incidentally, another time of major climate change). In fact, some scholars have characterized the comparable ~ 600 years marking modernity/postmodernity—roughly 1500–2100 CE—as a new or Second Axial Age (Bellah and Joas 2012).

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premise: two powerful change-agents and their “double-whammy”² consequences will profoundly influence the course and outcome of our century and beyond.

The first of these powerful agents is *climate change*. By this century’s end, the world (as well as human experience and apprehension of it) will be significantly altered by the process and direct effects of anthropogenic global warming and by our adaptations, mitigations, and other responses to it. A significant issue is the magnitude of the change and how disruptive it will be to human and natural economies and ecologies, which constitutes a principle focus of this volume.

The second of the change-agents is the epochal *culture-shift* associated with the ascendancy of “postmodernity,” already nearly normative in parts of the developed world, an axial shift that—like its predecessors—will feature significant, sometimes violent, conflict with older, thicker worldviews, in this instance, those of traditionality and modernity. The last comparable culture-shift was the radical transformation associated with the onset of the modern, scientific worldview of Copernicus, Galileo, Descartes, etc.³ This transition toward a postmodern cultural condition has not occurred without its own associated tensions. Yet, despite the occasional punctuated and widely publicized conflict the pace of this change has mostly been of a “beneath the radar” nature. For example, while conflicting value-systems can express themselves in sudden and extreme outbursts, like the 9/11 destruction of the World Trade Center by the Al-Qaeda terrorist group, their effects tend to be like those of climate change: rather more “downstream”—gradual, incremental, with ever-gathering pace and power, such that changes in our ways of thinking and doing are so transformed as to be almost imperceptible. This nearly imperceptible change represents a lethargic creep in not only the visible expressions of public opinion but the very nature of our philosophical commitments as largely free and democratic societies.

Change-agents of this order are extraordinary. The last equivalent climate change was the ending of the last ice age as the warm Holocene epoch began about 10,000 years ago. To experience the simultaneous and combined effects of *two* such drivers (climate change and culture change) is truly extraordinary, the likes of which perhaps have never been experienced previously in human history or at least recorded in human memory. Accordingly, it seems reasonable to believe that the twenty-first century will be, or will at least initiate, one of those very rare, transformative “hinges” of human history, in this instance perhaps even of earth’s history as well.

Thus, a “double whammy”: a first-order environmental change in the form of *global warming*, and a shift to a *postmodern social condition* (Taylor 2004) as the dominant or “default” cultural condition. This double whammy will be felt as a collision between two trends moving in opposite philosophical directions: climate change constricting the limits of possible behaviors and postmodern culture expanding them to infinity. And, all this in a civilization, that of the West, which some would say already shows signs of suffering systemic weakness.

² Mid-twentieth century slang for a combination of two unfortunate or negative circumstances or events from the American comic strip “L’il Abner” by Al Capp.

³ A worldview that itself represented, to paraphrase Paul Johnson, the realization of a substitution in the Renaissance of “certainties and credulities” with skepticism, criticism, and reason.

Can a world *after* climate change and culture-shift be imagined?⁴ And, if so, what will it look like? I brought together this team of scholars from around the world to address these questions. Not surprisingly, the reader will find that some contributors were relatively uncertain, even apologetic, in their answers, while others took a more confident tone in tracing the constellation of possible scenarios that may arise from the unfolding of this impending “double-whammy.”

1.2 The First “Whammy”: Global Warming

The first negative change-engine is anthropogenic or human-caused global warming. Notwithstanding the revelation of controversial emails between some leading climate scientists, most dispassionate studies have concluded Earth’s climate

- is warming due to increasing levels of atmospheric “greenhouse gases,” such as carbon dioxide, due to the burning of fossil fuels;
- is likely to warm by 3–5 °C (5.4–9 °F) by the end of this century, nearly as much temperature increase in a century or so as was experienced during the last 10,000-year warm phase known as the Holocene Epoch, during which the planetary surface mean temperature has risen by nearly 5.5 °C (10 °F) to the present day; and
- is very likely to cause economic, ecological, and other disruptions, most of which will almost certainly be significant and negative, some probably regionally catastrophic (e.g., the impact of sea-level rise on low-lying islands) (Norwine and John 2007; National Research Council 2009; Freedman 2009).

Geographically speaking, the economic problem will be due to what we might call geographic inertia or the fact that infrastructure is in the wrong place in the new warmer world. Rearranging the human geography of affluent countries like the US, Sweden, or Israel will be vastly expensive but almost inconsequential compared to the potential cost of the rearrangement of the human geography of the rest of the planet. The dislocation of millions of people in Bangladesh due to rising sea levels is but one example. Such alterations will create jobs but may not add much to human capital, at least directly, since we do not end up with two cities where there was one, but rather one new facility, city, or system replacing the previous one. Further complicating such dislocations is the likelihood that, in many instances, recipient cities and arriving populations exhibiting a different demographic makeup may be resistant to the idea of cultural assimilation. This dynamic is already seen in nation states where the transnational migration of people has given rise to disputes over multiculturalism.

And, this is only one part of the story. The transformational effects of human-induced climate change on the *non-human* realm are likely to represent at least the same scale of almost unthinkable challenge.

⁴ Here imagine absent the transformations potentially wrought by extreme, outlier “singularities,” e.g., the onset of a biotechnical “trans-” (or “anti-”) human utopia/dystopia (choose one) (Vance 2010), or a regional- or global-scale war involving the use of weapons of mass destruction, etc.

1.3 The Second “Whammy”: Postmodernity

You have your way. I have my way. As for the right way, the only way, it does not exist.
[Attributed to F. Nietzsche]

Broadly speaking, culture-shift refers here to a transformational change from the former dominant Western cultural condition, which was characterized by the technology and values of modernity (e.g., individuality), along with the lingering effects of traditionality (e.g., honor, family) to those of postmodernity.

Surely a visitor from Mars or ancient Rome would hardly find these early days of postmodern trans-humanity or anti-humanity (or “whatever”) little more alien than would a person from only a century past. How utterly strange by comparison with those of the modern age are the assumed modalities of postmodernity. Consider as merely one example the assumed locus of authority. In postmodernity, unlike both traditionality and modernity, final authority concerning almost anything is a curious hybrid of the personal and the collective, that is, of self-reference informed by/tested against, not Aristotle or the Bible, as in traditionality, or objective scientific evidence, as in modernity, but via cyberconnection with, well, countless other “authoritative” selves.

While it is impossible to sketch postmodernity in a stroke or two, two intertwined defining aspects are those of a radically heightened self-referentiality and a rejection of so-called “privileged narratives,” the latter a rejection so profound and total as to cause deep dubiety not only toward any and all hegemonies but toward any and all inherited/imposed certainties, absolutes, and constraints or limits on human will and agency.

Postmodernity’s most basic assumption is arguably not Nietzsche’s famous death of God but the corollary death of meaning—capital-M meaning—itself. How so? Consider that a sojourner in physical reality inhabits a realm of elemental absolutes—e.g., gravity, things falling apart, death itself—truths as much a part of the warp and woof of physical reality as space and time or matter and energy.

Now compare the experience of a traveler in the realm of human valuescapes. What is she to make of the would-be “truths” she encounters, “compassion is better than cruelty,” “today is a good day to die as a warrior,” etc.? Filter out the culturally-specific and the evolutionarily-programmed, and what she seems to be left with are what Plato might have called “convenient fictions.”

Thus, there are two faces of the postmodern condition: one promising liberation and emancipation—“we will be masters of the universe”—the other threatening nihilism—“gods of the meaningless . . . but have a nice day!” Viewed positively or optimistically, the ascension of values like tolerance over older ones like racialism represents an immense advance of human and maybe even ultimately non-human well-being. Viewed negatively or pessimistically, such a move masks a lurch toward an abyss of solipsistic nihilism, where tolerance is merely the happy-face of “toleration,” where, like the masks at a carnival festival, “difference” is a game we play to bear the pain of intuiting that none of it means a damn thing. Who is right? My guess is both/and, but this early in a culture-shift of such proportions, nobody really knows.

Even if it is the case that postmodernity is the rising new and potentially hegemonic worldview “star,” on the way from here to there surely we can assume a century-defining struggle between/among it and the older worldviews, one traditional and one modern. Moreover, it is important to recognize a key source of conflict: both traditional religion and modern secular disbelief are “thick” worldviews of absolutes that reject postmodernity’s “thin” relativism. That is, sharing as they do a belief in a single ultimate meta-authority means they vie for the same intellectual ground in people’s lives and hence tend to view their conflict as a zero-sum game with only one winner.

1.4 Triangulating: Looking Back to Look Ahead

Perhaps it might be useful to begin by looking back a hundred years or so to around the year 1900. By that time, people living in the developed world, one might argue, had already crossed or were completing their passage across, the boundary from traditionality into modernity. Many thinkers confidently assumed that crossing this threshold marked the beginning of a triumphant new age of reason and progress with archaisms like nationalism and religion left in history’s dustbin. “Just look around,” they might have said. “The world is being *humanified* via the forces of science and technology, that is, by modernity itself. Who knows, perhaps human nature is even self-evolving to a higher plane of development and consciousness.” Moreover, if asked in 1900 to project modernity’s downstream consequences 200 years hence, i.e., circa 2100, surely more intellectuals than not would have been sanguine rather than gloomy about that future. What strikes us now with the wisdom of hindsight is how much we would *agree* among ourselves about modernity’s package of technologies, efficiencies, and values as the last century’s preeminent change-agent, yet how much we would *disagree* whether on balance it was a story of loss or gain.

On one hand, it was a wonderful century. By 2000 AD, vast numbers of people were living far longer and richer lives than in 1900 such that, by some measures, the world held more obese than hungry people and perhaps even more “middle class” (as defined rather generously) than poor people. On the other hand, it was a terrible century. Nietzschean prescience notwithstanding, in 1900 few of us would have foreseen the slaughter of approximately 100 million as most cruelly exemplified by those murdered in the Holocaust; the creation and use of the ultimate existential weapon of annihilation; and environmental destruction on an unprecedented and perhaps existential global scale, all *only made possible* because of the application and efficiency of modern methods, technologies, and not least, beliefs.

Whether the last century was more terrible or more wonderful remains unclear in part because some aspects, like population growth, could be added to either side of the ledger, positive or negative. What is clear is that both the best and the worst features of the century were largely the products of a single great change-driver—one referred to here as modernity as an imperfect shorthand, short-cut way to allude to the “world brought into being by rationality (the scientific method), and that gave us

the scientific, industrial, and technological revolutions”⁵ (Smith 2012)—we could have foreseen in 1900. They were not the consequences of “natural” forces, such as plate tectonics or meteoric impacts, but rather of the maturation and full flowering of a cultural condition that we have come to call modernity, one in which human nature increasingly seemed to have trumped “nature-nature,” in geographer Yi-Fu Tuan’s memorable turn of phrase.

Now let us fast-forward to the present, the early twenty-first century. One intriguing parallel with the early twentieth century is that, like 1900, we too intuit that we have crossed a one-way threshold, in our case from modernity to a postmodern world.

What is different? First, the future no longer seems to be “all about us,” but to a very great degree, it now appears to be about our relationships with the natural world, i.e., “the environment.” Second, our vision of the future is much darker than the naively optimistic “glorious new world” assumption of unstoppable progress most of us would have shared a century ago. Why these changes? Simple: on the way to now, the twentieth century happened. The grey opacity of our present vision of the future owes much to the experience of confronting new horrors—eugenics, the Shoah and the gulag, weapons of mass destruction, estrangement of self from natural and human Others, Earth itself endangered, take your pick—all either invented or raised orders of magnitude by modernity itself.

That brings us to our quest in this volume to “imagine the world” after the two forces of change here considered help form many of the lineaments of the future circa 2100: climate change and culture-shift.⁶

1.5 Our Scheme

We begin by constructing a foundation of knowledge, what we know “robustly” in the sense of believing with the confidence typically accorded to an accepted theory in science, Part I; what we think we know, i.e., believe but with less confidence, Part II; upon which we then build or construct our imagined worlds, Parts III and IV.

⁵ The relevant passage from Jonathan M. Smith’s helpful personal note reads in full as follows: “There is a problem . . . of ambiguity in the term “modernity.” This points to two different developments. Modernity is the world brought into being by rationalism and the scientific revolution, and that gave us the scientific, industrial, and technological revolutions. It is entirely concerned with improved *means* of human existence, and has been underway for about 400 years. Modernity 2 is the world brought into being by modernist movements in theology, philosophy, and the arts. It is concerned with reformed *ends* of human existence, and it has been underway for only a century or so. Post-modernism is a phase in this second movement and is much more closely related to the first, modernist phase than the modernist phase is related to, say, the neo-classicism of the 18th century. . . . it may be useful to distinguish the revolution in *means* from the more recent (and, of course, related) revolution in *ends*. The latter has had, I suggest, two phases: High Humanism (circa 1920–1970) and Low or Demotic Humanism (circa 1970 to Present).”

⁶ Not that either change will stop at century’s end, of course. In fact, at this writing, the rate of planetary warming in particular seems likely to *increase* after 2100, perhaps not slowing until sometime after 3000. But, just as it may be said that things changed profoundly “after” the scientific revolution of the 16th century, even though the scientific age had really only just begun, “after” here is in the sense of entry from and into, i.e., lying on the other side of another huge paradigm-shift.

Part I: Setting the Stage includes an essential “primer” by Jonathan M. Smith to understand the meaning of significance of “being-in-the-world” intended to prepare the reader for the road ahead, i.e. the rest of the book. It continues with an explanation of global climate change and a depiction of the most likely climates of the four regions here considered circa 2100 by Gerald North. It concludes with a chapter explaining culture-shift here defined, including a consideration of competing contrasting “thick” (e.g., traditional religion, secular naturalism) and “thin” (postmodern relativism) worldviews by Michael Bruner, John Davenport, and myself.⁷

Part II: Imagining the Future: General Impacts and Implications begins with a chapter dealing with consequences of climate change by Michael Jennings. It then moves to a discussion of demographic and social resilience aspects by Koko Warner and a meditation by John Davenport that addresses some important potential “downstream effects” of climate- and culture-change—both good and ill—for human and natural economies and ecologies.

Part III: Regional Scenarios: Regional Impacts and Implications is I think the book’s centerpiece. It consists of four chapters in which “new lifeways/lifestyles” circa 2100 are imagined for Europe,⁸ the Fertile Crescent⁹/Middle East,¹⁰ the US,¹¹ and East and Southeast Asia.^{12,13}

⁷ Among the questions explored here is that of whether a thick new, alternative “environmentalist” worldview is emerging and, if so, its form. My previous research has indicated that most contemporary undergraduates, whose overarching worldviews tend toward a pronounced hybridity of traditional, modern, and postmodern values, privilege “green” values (to varying degrees), but it has also revealed that they also mostly tend to “privilege” personal freedom and lifestyle. Recent survey research by Anthony Leiserowitz of the Yale University School of Forestry and Environmental Studies (2000; see also Astin et al. 2011) confirms this “dissonance” between sacrifice in principle and in practice. Most college students surveyed affirmed that global warming is real and that humans are the main cause and the need in principle of making changes such as sharply reducing greenhouse-gas emissions. However, when confronted with the question of raising taxes on electricity consumption 71 % disagreed (49 % strongly) with only 29 % agreeing (11 % strongly), and to the question of higher gas taxes to reduce driving, 67 % disagreed (48 % strongly) with only 34 % in favor (18 % strongly) (Leiserowitz 2007). An even more recent Stanford University survey (Krosnick 2010) points to the same value-conflict: most Americans surveyed (75 %) affirmed the reality of human-caused warming but opposed increased taxes on electricity (78 %) and gasoline (72 %) to reduce greenhouse gas emissions.

⁸ Anke Uhlenwinkel, Germany, and Niem Huynh, USA

⁹ Pinhas Alpert, Fenjun Jin, and Akio Kitoh, Israel

¹⁰ Yilmaz Ari, Hakki Yazici, and Ilhan Kaya, Turkey

¹¹ Mark D. Bjelland, Michael Bruner, and John Davenport, USA

¹² Darlene Occena-Gutierrez, the Philippines; Wen Lin, Duy Tran Xuan, Renee Ness, and Niem Huynh, USA

¹³ Although these twin forces will almost certainly eventually transform states of mind and being throughout the world, this work focused principally on the subtropical and adjacent areas in the USA, the Middle East, Europe, and Asia. This emphasis owed partly to my own previous subtropical location and interest, but mostly to the fact that various studies suggest that the “downstream effects” of climate change seem likely to be particularly acute in such locales (Seager 2007; Fu et al. 2006).

These authors were given free rein to sketch and explain their imagined future worlds according to their own lights with the proviso that the emphasis should to the extent possible be on the lived-lives of ordinary people.

Part IV: Better or Worse: Inhabiting Imagined Worlds? Part IV consists of four very different but equally provocative reflections on the “meaning” of the future worlds imagined in Part III. In the first of these chapters, Gladden Pappin offers a reflection on the challenges and opportunities in the two great change-agents, together with the newly emerging environmentalistic worldview, might pose in the form of a (necessary?) anti-democratic “soft totalitarianism.” In the second chapter, David “Jim” Nemeth envisions how draconian and courageous decisions implemented in the present will circumvent imminent environmental and more collapse and systematically improve the human condition into the future within a nurturing natural habitat in unprecedented ways (for example, through a deliberate constraining of humankind’s self destructive ambitions and expectations) thus making for a best possible world and a sanguine *fin de siècle* circa 2100.

The third reflection by Jonathan M. Smith presents an opposing position: that this century could as easily prove to be a hinge to very undesirable outcomes. Firstly, consider that the world will be warmer in 2100 possibly such that Earth is no longer hospitable to human habitation. Also, the tensions and conflicts already evident between traditional, modern, and postmodern values could turn out to be a zero-sum game with disastrous (e.g., violent) consequences. The combination of the “sins of late modernity” in the form of a degraded environment along with those emerging trends of postmodernity—self-referentiality, narcissism, and nihilism—have the potential to create undesirable or unpleasant (or worse, perhaps *anti-human?*) possible futures.

Part IV concludes with a “manifesto” by Arran Gare. This chapter’s provocative passion and distinct point of view will strike some readers as radical, as I confess, it does me as an ideological centrist. However, whether one agrees with Gare or not, the hard truth is that the challenges posed by this hinge century are themselves extreme or potentially even existential. Hence the inclusion of Gare’s articulate “heart’s cry.”

1.6 Closing Thoughts: “Imaginative Geography”

This book is an imaginative geography of a world/worlds “after”: a) another century of climate change mainly induced by anthropogenic planetary warming, and b) a century of an expanding and deepening culture-shift, which already has begun to transmogrify modern assumptions in a way eerily reminiscent of how, five centuries prior, those then-new ways of mind and being consumed the seeds of tradition, habit, and belief and spit out strange fruit.

The combination 10 millennia ago of the birth of agriculture and the onset of the warm Holocene, while of course a mixed blessing (long-established ways of life were disrupted and destroyed), surely on balance proved salubrious for humankind’s material well-being if not necessarily so for the rest of Earth’s other living communities. At the present moment, however, it is difficult to be sanguine about the consequences

of global warming and, at least for me, even culture-shift, especially in the “short run” of the twenty-first century. Most of the anticipated “downstream effects” of planetary warming seem likely to be bad, and even the new policies and adaptations needed to slow the rate and impact of warming will probably have unforeseen unpleasant consequences, particularly for the poorest and most vulnerable among us (e.g., in the form of dramatically increased energy costs for basic necessities, like home heating and cooling). Of course, it is true that in the longer run, generations to centuries, an almost unimaginable better world might lie on the other side of “after” fossil fuels.

The positive aspects of contemporary culture-shift and all that goes with it are undeniable and impressive. Just to mention a few, the heightened access, participation, and tolerance signified by a new assumption that “all voices, especially those of the formerly marginal, must be respected and heard;” the possibility of drastically expanded/enhanced life spans and life ways; and the simple yet stunning fact that in the early twenty-first century, for the first time ever, more humans are fat than hungry.

However, some of late modernity’s progeny are frightening doppelgangers that bring to mind Alasdair MacIntyre’s warning of a “new dark age” (MacIntyre 1981). Consider the following four threats, any one of which could prove “existential” one way or another:

1. The threat of a—perhaps the—zero-sum, last-man-standing, true-believer conflict, i.e., between modern secularists versus traditional religionists;
2. Conversely, the threat of nihilism, where organized religion’s certainty—God as ultimate, absolute, meaning-source—has been replaced by a comparably non-negotiable, true-believer “faith” in a meaningless universe such that nothing is truly better than anything else (e.g., the value of compassion over that of cruelty), i.e., “real” in other words in the same way that gravity is real, except as artifact of human or evolutionary invention. Of course, this may take the form of what philosopher Richard Rorty (approvingly) called “soft nihilism” in which we agree to pretend that, e.g., life is sacred, nudge-nudge wink-wink. The challenge to soft nihilism is our knowledge that having slain all absolutes—“God is Dead!” in Nietzsche’s famous phrase—we have left no room for absolutes save as convenient fictions, fictions no less ultimately unreal or made-up, alas, even those “conveniently” provided via the evolutionary process itself. Such fictions seem unlikely to be robust when jackboots are heard outside the door. Consider again as but one example the so-called sanctity of life. Really? Frankly, without even venturing into the gut-wrenching realms of abortion, power and hunger, the death penalty, and euthanasia, the evidence of our individual lived-lives and our collective behavior seems to me less than convincing. Perhaps, as Heidegger claimed (Heidegger 1949; Hart 2011), modernity is the “time of realized nihilism,” one in which “all values have become subordinate to the demands of the human will” (Hart 2001), in which case postmodern tolerance is better thought of as the narcissistic indifference of a who-really-cares-it’s-all-just-convenient-fictions-anyway “toleration”;

3. The threat of an elite-driven, anti-democratic age, justified perhaps because ordinary people are so ignorant and greedy that they cannot be trusted to do what is necessary in order to “save Earth”¹⁴; and
4. The threat, contra Kurzweil (2005) and other optimistic futurists, that the future turns out to be post-, or even anti-, rather than *trans*-human.

As I write these lines, the paths toward better and worse worlds both seem very real to me, perhaps even equally likely. In this book of imagined world(s), we have together striven to the best of ability to inform. As to application and action, to making real rather than imagined worlds, no one else can do that for us, you and me. We inhabit postmodernity, dear reader. Even the most “traditional” and the most “modern” among us are self-referential to a degree as incomprehensible to Darwin as it would have been to St. Francis. All voices must be heard, right? A very good thing, but all good things come at a price. The burden we bear is that now, in a way never known since our hunter-gatherer ancestors, we all share responsibility. We cannot honestly say that we did not know, we are innocent, the “devil” (state, corporations, media) did it, not us.

I hope our readers find that the contributors to this book have done their best to confront this challenge in interesting, insightful, and useful ways, and—above all—that we have faithfully endeavored to be bringers of light.

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¹⁴ For example, I think about a recent newspaper editorial about the threat of climate change in which it was advocated that the “social license” of fossil-fuel companies “be revoked.” Some or many of us may say, if necessary, so be it, but we need to reflect on the question, “can we stop there?” Will it not become necessary to apply this revocation all the way down to individual behavior, perhaps even attitude? Perhaps so, but fair is fair. If some personal choice, lifestyle, and even the nature of democracy itself must be sacrificed, let it be done with a maximum of transparency and collective dialogue rather than by coercion and imposition, however well-intended.

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Part I

Setting the Stage

Notwithstanding the survival lust we share with other living entities, and contra protestations of true-believers—myself included—that each life must be about an essential this or that, actual human lived-life has always been one of in-betweenness or better, in-betweennesses: temporal and spatial, other- and this-worldly, personal and collective.

Not least among these, of course, is the realm between nature and culture, one this book is all about and one in which, to paraphrase geographer Yi-Fu Tuan, “human nature seems to have trumped nature-nature” in the everyday lived-lives of late modernity (Tuan 2006).¹

Geographers like Tuan endeavor in what they refer to as “geosophical” studies to understand “what being-in-the-world is truly like” (Tuan 2006). This book aspires to imagine just that, lived-life as understood circa 2100, and our imaginings raise serious questions about humanity’s apparent victory over natural constraints on human will and agency. Part I begins with a geosophical primer (Smith) intended to help the reader venture “in-between,” i.e., into a third realm where the strictly human and the strictly natural meet, merge, and mate.

As the title, *A World after Climate Change and Culture-Shift*, suggests, we endeavor to imagine a world “after,” in the sense of following a century or so of climate change and culture-shift. Our scheme begins with establishing what we think we know “before,” i.e., now. Thus, in Chaps. 3 and 4, we explain what we think we know of the basics of these two change-agents at present, and also suggest something about their likely future trajectories. The future, particularly the future in terms of the outcomes and effects of these change-agents, is where what we think we know must become what we think we think. Hence the “imagined” world developed in the following sections.

¹ To illustrate this idea of the seeming contemporary triumph of culture and technology, I sometimes asked my students to think about what killed 20-year-olds 100,000 years ago—20-year-olds just as bright as you! I added—compared to what kills young adults today. Accidents often in both cases, yes, but most of the latter are products of a *culture*-dominated existence, e.g., car wrecks, drug and alcohol overdoses, suicides related to social stress/pathology, and so on.

Chapter 2

Estrangement: A Beginner's Guide to the Strangeness of the World

Jonathan M. Smith

Abstract Geographers adopted the concept of Being-in-the-World from Martin Heidegger. However, most have wisely eschewed the philosopher's larger ontological and pantheistic project. Nevertheless, geographers can make use of basic phenomenological concepts and terms. The world of appearances can be reduced to the three basic phenomena of objects, subjects, and death, and each of these phenomena engenders in humans a feeling of estrangement, angst, or alienation. There are four responses to the world's appearance as an uncanny place: otherworldliness, existentialism, naturalism, and escapism. Because the events predicted in this volume will almost certainly make the world appear more and more uncanny, an important (but here unanswered) question is which of these responses will prevail.

This chapter is meant to serve as a basic guide to the experience of being in the world. I will explain the origin and meaning of the concept of being in the world, its place in geography, and its relevance to the themes of this volume. As will be seen, geographers took the phrase from the philosopher Martin Heidegger, but have generally (and I think wisely) used it without scrupulous attention to Heidegger's total philosophic system. All that most geographers really wanted from the concept, and the larger phenomenological discourse of which it is part, was a vocabulary to describe the experience of being in a place. Only a few geographers were concerned with Heidegger's deeper ontological project. Most have wished to know, with regard to any particular location, what it is like to be *there*.

Peering into the spectral shadowlands of coming years, we are all understandably gripped by a similar curiosity. We wish to know what it will be like to be *there*. But alas, because the future is so very taciturn, we must content ourselves with figments compounded of wishes, fears, and such extrapolations of selected data as seem necessary to lend the confection an air of plausibility. Many such essays in futurology will be found in this volume. Futurology is always semi-fiction, just like

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history, but this does not mean it is sheer fantasy or idle speculation. Futurology and history are semi-fictional because their composition requires imagination as well as reason, imagination being the faculty by which one makes one's self the subject of a reality that is not present to one's senses. It is how we know what it is like to be where (or what) we are not; and it is the only means by which we can know this until we actually get there.

The outline of this chapter is simple. First I will discuss the concept of Being-in-the-World that we find in Heidegger, explaining some of its attractive and repellant aspects. I will then sketch a simple phenomenology of being in the world, arguing that one of the most interesting aspects of this phenomenology is a pervasive sense of alienation, or strangeness, and then describe four basic attitudes toward this existential angst. Finally, I offer some remarks on the significance of this phenomenology for thinking about being in the future envisioned by the authors collected in this volume.

2.1 Being-in-the-World

The phrase Being-in-the-World first crept into geographer's conversations from the work of Martin Heidegger, a German philosopher whom it is easier to admire than to comprehend (Heidegger 1962). It arrived on our doorstep adorned with hyphens that gave it a beguiling Teutonic ponderosity, but that also warned of shadowy philosophical entailments. If we admitted this stranger, it seemed that we might soon be opening our door to his relations, and the kin who followed him might be considerably less appealing than this forerunner.

This apprehension was not misplaced, for Heidegger's phrase is indeed part of Heidegger's philosophical system, and it is not possible, or at least not proper, to use it outside that system. This is why we will not be talking about Being-in-the-World in this chapter. Being-in-the-World is properly a pantheist concept, and I leave it to the pantheists for whom everything is, in a sense, hyphenated. I will, however, talk about being *in the world*, removing the stress on *being* to disown Heidegger's ontological project, and deleting the hyphens as prophylaxis against Heidegger's pantheist theology.

It is not easy to explain the precise difference between Being-in-the-World and being *in the world*, but we may begin to see the difference if we think of it in this way. If I said, "I was writing on the porch, and Mrs. Wilson came up the walk to speak with me," the information respecting what I was doing and where I was while doing it is incidental to the entire reported event. It is relevant, but it is not essential. However, if I said, more plaintively, "I was *writing on the porch* and Mrs. Wilson came up the walk to speak with me," you would understand that the fact that I was writing, and more especially doing so *on the porch*, was (so far as I was concerned at least) the gravamen of my story. It is a story about me, and my writing on the porch, not about Mrs. Wilson.

Now the meaning conveyed by stressing the phrase “writing on the porch” with italics is roughly the same as the meaning conveyed by linking the phrase “being in the world” with hyphens. Both make it clear that the *action* denoted by the verb (whether “being” or “writing”) is profoundly important to the story I am telling, and that the *circumstances* of the action (“in the world” or “on the porch”) are profoundly important qualifiers of the verb. In other words, it indicates what I have called the gravamen of the story.

The phrase Being-in-the-World is, at first, difficult to see in this light, for apart from Hamlet’s famous soliloquy, we do not generally think much about the verb to be. If I tell you, “This morning I *exercised*,” there is some chance you will be interested, even impressed. But if I tell you, “This morning I *was*,” you will probably think that I need to go back to bed. The act of *being* that we Anglophones express with words, such as “is,” “are,” “am,” “was,” and “will be,” seems to us very unremarkable unless connected to some less common action. “I am *eating a potato chip*” seems, at least on its surface, a more interesting remark than “I *am*.”

But of course, when one thinks about it, it really isn’t, and a basic purpose of Heidegger’s ontological project and of his portentous phrase is to make us think about it. His aim is to destroy this blasé attitude towards being and foster a sense of wonder over the simple but startling fact of existence. He would like me to spring from my bed each morning rejoicing that “I *am*” and “things *are*.” And when one considers the alternatives, it’s hard to say he is wrong.

The other basic purpose of Heidegger’s portentous phrase is to imply that the being of every human is altogether and inescapably *in* the world. He is telling me that I am not, for instance, a sojourner in the world, as a Christian would claim, or an exile in the world, as we are told by the Gnostics. I am rather a product and possession of the world. It is entirely *in the world* that I live and move and have my being. I am, in fact, both a child of the world and its slave. This is why environmentalists are attracted to Heidegger, and why Heidegger was attracted to Fascism. If being is altogether sunk in the world, then the world is a prison and there can be no objections against its rules.

The hyphens in Being-in-the-World are, for me, symbols of the bars of this pantheistic prison, and this is why I strip them away. For although I am most certainly in the world, shaped by it, and in some small ways, shaping it in return. My being is not, as on pantheism, constituted by the world. Its ground, I believe, lies elsewhere.

2.2 The World is an Uncanny Place

We have all heard it said that appearances can be deceiving, and can no doubt recall more than a few embarrassing and disastrous blunders that we have committed after failing to heed this profitable warning. The distinction between appearance and reality is indeed fundamental to our understanding of the world, and the better part of philosophy has sought to dispel the fog of appearance and gaze with unclouded eyes on things as they really are. Plato’s parable of the cave is the paradigmatic

illustration of the basic idea. Phenomenology, in a sense, reverses this philosophic attitude because it seeks to gaze with unclouded eyes *on the shadows*, its aim being to understand the reality of *appearances*.

Now it should be clear that appearances have many layers. Indeed they are often likened to onions. A red patch appearing in my field of vision may, for instance, upon closer inspection appear to be my Uncle Henry dressed in a Santa Clause suit, and upon closer inspection still, to be an impersonator of my Uncle Henry attempting to crash my Christmas party. Among philosophers, phenomenology is an investigation of the first layer of appearance, of primitive experience prior to all human judgment, conceptualization, or interpretation. In the example just given, a phenomenological philosopher would most likely be interested in my being “appeared to redly.” Phenomenological geographers, meanwhile, work on a different layer of the onion, investigating appearances that are shaped—many would say “constructed”—by human judgment, by concepts such as uncle, impostor, and Santa Clause suit.

The earliest phenomenological geographers had no direct connection to philosophical phenomenology but drew from the work of historians, anthropologists, and sociologists the general lesson that any explanation of human behavior must take into account the world that those humans believe themselves to be acting in. A geographer must, in other words, be able to see the world as it appears to the humans that geographer is attempting to understand. As geographers, they were particularly interested in what Carl Sauer called “environmental evaluation.” An important early example of this phenomenological geography is Ralph Brown’s *Mirror for Americans: Likeness of the Eastern Seaboard, 1810* (1943), and in 1946, John Kirtland Wright proposed “geosophy” as a general title for inquiries into “geographical ideas, both true and false, of all manner of people” (Wright 1966).

Most studies in geosophy have attempted to understand the “world” of a particular people, period, or place. They investigate worlds that appear under the judgments of particular cultures and ideologies. Such judgments are often called worldviews. In this chapter, our purpose is to imagine the world that will appear to people in the near future, people whose judgment, we suppose, will be deeply affected by traumatic changes in the physical and cultural environment. Before attempting this imaginative geosophy, however, I must lay out a simple phenomenological schema of appearances in which it is maintained that our world appears to contain three basic phenomena—objects, subjects, and death, and that all three of these phenomena strike us, to one degree or another, as uncanny, alien, and strange.

One of the first discoveries I make upon entering the world is that I am a body among bodies, an object among objects, a thing among things. Some of these objects afford me pleasure, and one in particular makes all the difference between misery and bliss. Some of them get in my way and make me angry; some of them hurt me and teach me the meaning of fear. I find that these objects are arranged in what I will someday call space, and that in some cases, there are means to make them move. I push them and I pull them, and sometimes they push back. The bliss-maker usually comes to me when I cry.

As the years go by, my understanding of objects improves. I learn their types, their properties, and where they may be found. I discover that there is more than one bliss-maker in the world, and that misery-makers are many and cruel. I bark my shin, break my arm, crack my head, and know the carnal pleasure of a warm fire after a long hike through snowy woods. I move things, make things, and break things. I learn to master things and bend them to my will. I also find that they are impossible to befriend. Over the ages, many have wished that this were not so and have fancied a world in which men lived with things on terms of friendship; but this is a dream. Things are incapable of friendship.

Things are incapable of friendship because they have *their* being—all of it—in a world devoid of compassion, or malice for that matter, a world governed by nothing but stupid, brutal, pitiless laws. And we humans can understand this world because part of us exists in that world too. I have a body that has volume, mass, and momentum that occupies space, exerts and responds to force, and exchanges energy and material with its environment. It is because I partly exist in this world of things that I can appreciate this harrowing description.

In the enormous machine of the universe, amid the incessant whirl and hiss of its jagged iron wheels—amid the deafening crash of its ponderous stamps and hammers—in the midst of this terrific commotion, man, a helpless and defenseless creature, finds himself placed—not secure for a moment, that on some unguarded motion, a wheel may not seize and rend him, or a hammer crush him to powder. This sense of abandonment is at first very awful. (Strauss 1873)

The abandonment Strauss sensed was abandonment by God, which is to say abandonment by a being that related to him as a subject rather than as an object, and its awfulness is what later existentialists would describe as the “nausea” or “vertigo” that one feels when the illusion of meaning evaporates. Existentialists refer to the void that remains after the disappearance of meaning as “the abyss.” Everyone over the age of 16 has caught at least a glimpse of this ghastly cavity. However, there is no agreement as to what it means, or even as to whether it means anything at all. The existentialists say it does, which I for one find puzzling.

Existentialists see the absence of meaning as meaningful because they are human, and being (partly) in a world of meaning is part of what it means to be human. We inhabit this world of meaning as *subjects*, not objects, and so it is properly called the subjective world. In the course of discovering *this* world, a child will, once again, learn many things, but among these lessons, perhaps the most startling and important is that a great many objects are not party to the subjective world. Sooner or later, he realizes that it is pointless to talk to his teddy bear. Everything the awakening child sees is a body in the world of bodies, but only some of the things he sees are also subjects who have part of their being the world of subjects.

Moreover, the child discovers that, even within this exclusive world of meaning, there are catacombs and crypts of subjectivity. He will recognize the existence of a great brotherhood of men (and women) and sense in the faces of strangers the presence of other minds, but most of these minds will be largely inaccessible because they are sequestered in undecipherable languages and inscrutable cultures. Even among those with whom he shares a common tongue and lifestyle, he will find great variability in

sympathy and mutual understanding. If he is fortunate, he may find a friend, which is to say a subject who inhabits a world of meaning similar to his own.

But a true friend is a rare gift, and the subjective world has its own special power to provoke the nausea of existential loneliness. As the geographer Yi-fu Tuan describes it: “Language isolates. The more an individual knows and the more subtly he is able to say what he knows, the fewer listeners he will have and the more isolated he will feel” (2002).

What Tuan should have written is that language isolates those who fail to find a friend who speaks the same “language,” who recognizes and responds to the same meanings, who dwells in the same crypt or catacomb of the subjective world. But since most of us do, in fact, fail to find such a friend, most of us know what Tuan means.

The subjective world is fissiparous. It is generally agreed that friends are more easily found in childhood than in youth and more easily in youth than in maturity. This is because a boy of 10 has a good deal in common with most other boys of 10, and so he finds himself surrounded by potential friends; by the time he is 50, divergent experiences and the development of innate characteristics will have isolated him in some remote and recondite region of subjectivity. Likewise, it is generally agreed that, far from being isolated by language, members of a pre-modern culture were united in a state of (no doubt imperfect) subjective unanimity known as *homonoia*. Among them, consensus was the norm. Among us, it is different. Post-modern culture is the dominion of dissent. That everyone is now sequestered in his or her own crypt or catacomb of the subjective world can be seen in the fact that we now use the word subjective to indicate private meanings and peculiar opinions. We have forgotten that the subjective world was once a public place (Scruton 2002).

We have our being at least partly in the world of objects, and when this world is not, as Strauss put it, seizing us, rending us, or crushing us into powder, we may feel stirrings of affection for this world. But the feeling is never mutual. Love the world of objects as much as you will, it will never return your love, and in it, you will at least intermittently feel an outcast, an alien, a pariah. In the world of subjects, there is love to be found, but not so frequently and seldom so abundantly as might be hoped. It is, as we have seen, a fissiparous world disposed to produce existential loneliness. In either case, therefore, our experience of being *in the world* is an experience of being a stranger in *an alien world* (Lawler 2002).

This sense of alienation is greatly compounded by death, the third basic phenomenon that appears in the world. Death appears as neither object nor subject, but as the negation of both; and in our apprehension of death, we apprehend something *utterly* alien. I at least *resemble* other objects and subjects, and in the world of objects and subjects, it certainly appears that I *am*, but in the face of death, I discern no likeness because death appears as that which (presently) I *am not*.

These are assuredly deep and murky waters, but since phenomenology is a science of surfaces, there is no need for us to plumb their profundities or chart their currents. For our purpose, it is sufficient to say that death fiendishly amplifies the alien appearance of the world. This phenomenological fact is largely absent from the idylls of geographers who have rhapsodized over “earth as the home of man,”

but it is forcefully indicated (if dubiously interpreted) in Heidegger's notion of the *unheimlich* or "not-at-home." This is normally translated into English as "uncanny," meaning queer in a vaguely ominous way; and this, when one thinks about it, is just how the world appears.

2.3 Four Attitudes Toward this Uncanny World

The world appears queer in a vaguely ominous way. Surveying our surroundings, we apprehend an uncongenial place filled with pitiless objects, inaccessible subjects, and the appalling promise of annihilation known as death. It is a prospect from which we naturally recoil with a sense of estrangement, angst, or alienation (Jonas 1963).

Four general attitudes are taken to this feeling of estrangement, angst, or alienation. The first is to suppose that we feel alienated because we are, indeed, aliens who have fallen or been cast into a world that is not our true home (Lawler 2002). In Christianity, we are exiles suffering punishment for a primitive crime; in Gnosticism, we are victims of a malignant cosmic power. Each of these systems proposes a salvific mechanism by which some, at least, may be restored to their proper estate (and also a means by which the damned are removed to a place of perfect estrangement), but neither offers hope for resolution of the problem in this world.

Existentialism is the second attitude taken to this sense of estrangement, angst, or alienation. As we have seen, existentialism teaches us to gaze into the abyss and face the facts of vulnerability, isolation, and death; but it also goes on to urge a sort of joyous rage in the face of this cosmic cold shoulder. Because we are rebuffed by an alien world, existentialism enjoins us to *will* meanings and values into being, to *choose* commitments and objects of care, and to glory in the very whimsicality of these caprices as an assertion of our boundless freedom (Mitchell 1980). As Strauss noted above, the feeling of abandonment is *at first* very awful; but in time, taking in the implications of a universe that really *doesn't care*, some people will find nihilism liberating.

Naturalism is the third attitude taken to this sense of estrangement, angst, or alienation. Naturalism proposes that a sense of estrangement is a not a primitive fact of the human condition, but that it is rather a form of false consciousness under which we labor as a historical accident and from which we will be delivered by a revolution that institutes a "natural" form of human consciousness and social organization. Marxism, for instance, promised to cure alienation by abolition of private property. Contemporary environmentalist doctrines similarly promise to cure alienation through repudiation of anthropocentrism and acceptance of animalism. Notwithstanding its scientific embellishments, the philosophy is at heart a reprise of Diogenes' cynicism. Unsurprisingly, it makes special efforts to encourage blithe attitudes towards natural death (Feagan 2007).

Escapism is the fourth attitude to estrangement, angst, or alienation. Now often described as consumerism, this attitude was first identified by Pascal in the seventeenth century. Eric Voegelin summarizes Pascal's argument this way: "When passion subsides, the experience of a fundamental emptiness and metaphysical forlornness emerges unobscured, the anxiety of existence springs up crying to be

assuaged, and the ordinary method of assuaging anxiety is diversion by new activity” (Voegelin 1975). Escapism can be practiced in sensational or narcotic forms, but in every instance the aim is distraction from the anxiety of existence.

2.4 Whither the World of Appearances?

If the natural and social changes predicted in this volume should indeed come to pass, we must expect this sense of estrangement to increase. We already understand that we have no friends in the world of things, but we have grown accustomed to thinking that what we do have in that world are many docile slaves. Catastrophic anthropogenic climate change will undermine this confidence and complacency; in fact, it will appear as a slave revolt, the greatest nightmare of every comfortable ruling class. Romantic dreams of identification with nature are, after all, a luxury afforded to men who have dined well and are looking forward to a night of untroubled sleep in a comfortable bed. Men who miss meals and stand a good chance of becoming a meal for something else see nature as an enemy.

Meanwhile, there is every reason to expect that existential loneliness will increase in a postmodern culture of self-referential values and private meanings. As was noted above, the subjective world is fissiparous, and each of us is energetically squirming into a crypt or catacomb of private meanings in which we will, no doubt, complain (to no one) that we feel lonely and estranged. We are far advanced into a world in which Facebook defines the word “friend.” In some European countries, nearly half the population lives alone, and in the United States, we are doing our best to catch up to this standard of estrangement.

And death would seem to have become unbearable for growing numbers. Everywhere one looks, one sees fantasies of endless juvenescence, of undiminished fertility, virility, and desirability. The acceptance of euthanasia, which will probably accelerate, does not reflect growing comfort with death. It reflects a decision to finish the ghastly business of dying as quickly possible.

If these predictions are borne out by events, estrangement, angst, and alienation will almost certainly increase in the near future. The final question is which of the four attitudes towards estrangement will prevail in a world that appears to be growing more and more alienating and uncanny. Will there be a revival of otherworldly solutions, a resurgence of existentialism, a redoubling of naturalism, or a further retreat into escapism? I venture no prediction, but am sure that one of these vectors will set what we might call the style of being in the world in the near future. These are the attitudes to watch.

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Chapter 3

Global Climate Change

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Abstract This article explains how large-scale climate is defined, how it is established physically, and why it can change. The mechanisms for change are briefly described along with internal processes that can magnify or diminish the response to externally imposed perturbations to the conditions for equilibrium. Delays can also occur among the internal feedback loops because some are very slow compared to human experience. The study of ancient climates helps put the subject of climate change into perspective, since the climate has changed many times in the past. The outlook for the coming century is an unrelenting warming with some shifts in precipitation patterns, some of which are very troubling, including the case of the American Southwest where less moisture seems likely.

3.1 What is Climate and Why Does it Change?

Everyone has some sense of climate and its distinction from weather. Technically, climate is the statistical summary of weather. For a particular location, this might amount to such quantities as the average temperature, but we have to decide the period of time from which to run our average. Then there is the seasonal cycle to deal with. One approach is to take month-long averages and then average these for each calendar month.

Now we have a set of 12 monthly means forming a seasonal cycle. But of course, no two Januaries are alike, and we might want to find some indicator that tells us how much they vary from one another. In particular, we might want to know things, such as how odd is this or that particular January. We could make a histogram¹ of these January values and see just how concentrated the distribution of these frequencies of occurrence is about the mean. Another good question to ask is how this January is correlated with the last one or the next one. Does a cool January make a decent prediction of that the next January will be cool? For that matter, does a cool January

¹ A bar graph indicating how often a particular range of values depart from the mean.

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give us a clue about the expectation of February's departure from its mean? We could even venture out to spatial dimensions and ask what the mean temperature over a region is, or even how correlated is the departure from the means of distant points at the surface (or above the surface). Finally, we have all the other weather variables, such as precipitation, humidity, cloudiness, and so on. All of these combinations taken together give us a more thorough picture of what is meant by climate.

What we are saying here is that climate is the aggregation of all the statistical summaries of all the quantities of interest, including such things as the cross-correlations² of all these variables. Many but not all of these statistical distributions are multivariate normal distributions (bell-shaped histograms), and quite a bit is known about variables that follow these bell-shaped curves. For example, we can tell the likelihood of occurrence of extreme values far away from the mean for variables that satisfy the normal distribution. We usually assume that if the earth were not perturbed, the statistics would be steady over long times. That is, the means would not vary from time to time.³ If we see after a long time⁴ that the long-term means or other parameters are different from one long-term mean to a later one, we might confidently assume that the climate is actually changing.

Climate can change for several reasons. The first and simplest reason is the case where the energy balances between the warming due to sunlight and the cooling to space by radiation, leaving the top of the atmosphere⁵ is somehow disrupted. An example is that if the Sun became suddenly become brighter. This would cause the heating rate to exceed the cooling rate and result in a warming of the planet. As the planet warms, the outgoing rate will increase until the balance is restored. This latter action is because a warmer earth will radiate more than a cooler earth.

Another way climate might change is if the atmospheric and/or ocean circulation were to change from one pattern to another. For example, it might be that the circulation of the Gulf Stream for some unexplained reason lowers its strength of flow drastically and remains at a reduced current speed for hundreds of years. Such an event would lead to a cooling of the British Isles, among other calamities. This kind of climate change cannot be ruled out in our complex nonlinear system. Nonlinear here means that if you were to double a stimulating perturbation, you might achieve more or less than double the response. However, at the moment, our experience suggests that suddenly increasing the Sun's brightness or slowing the Gulf Stream are not likely.

We are left to ponder how the radiation budget might get out of balance.

² How associated the changes in one are reflected in the other.

³ As above, we know how to treat the seasonal cycle here.

⁴ Big samples—long enough records to fill out the statistical distributions or histograms.

⁵ For earth-like temperatures, this is in the infrared portion of the electromagnetic spectrum: you cannot see infrared radiation with the naked eye, but can do so easily with the right instruments.

3.2 Earth's Energy Balance

The Sun warms the earth with mostly visible radiation. On average, about 1360 watts (W) fall upon a square meter slanted perpendicular to the Sun's rays. So the silhouette or disk of the earth's cross-section receives energy at this rate. Averaged over the spherical earth's area, this amounts to about 340 W for each square meter of earth's surface. About 30 % of that radiation is reflected back to space due to clouds, bright surfaces, such as deserts, snow, or ice-covered areas, or the angular dependence of the sun's grazing angle to the surface, especially water surfaces. Tiny particles suspended in the air (called aerosols) can also reflect back sunlight. Once those of the Sun's rays that are not reflected get into the complex earth-atmosphere system, they are absorbed, warming the local matter that absorbed them. This absorbed solar heating amounts to an average of about 238 W for every square meter on earth (imagine a strong lamp focused on a desktop). Warm material surfaces radiate according to the laws of physics: the warmer they are, the more they radiate. In order to balance the absorbed incoming and outgoing energy rates, the planet needs to radiate from its atmosphere's top 238 W on the average for every square meter of earth's area. This balance of heating and cooling is struck if the earth's temperature is at -18°C (-0.40°F), which is about 30°C (54°F) colder than the actual earth's surface.

At first, this suggests that our planet is too warm to balance the heat budget. The solution is that most of the radiation emitted to space actually is emitted from levels high in the atmosphere, such as from cloud tops and atmospheric gases that absorb and emit in the infrared portion of the spectrum. Temperature over the earth tends to fall off at a rate of about 6°C (10.8°F) per kilometer⁶ above the surface. The average temperature at the elevation where this radiation leaves the planet is at about -18°C (near 0°F) or about 5 km (15,000 ft) above the surface. How do we know this is the correct explanation of the discrepancy? Is this just hand-waving? We have been flying satellites in orbit above the earth's atmosphere since the early 1970s. We have measured and compared the emission of earth in great detail (wavelength by wavelength) since that time. Not only the expected amount is being radiated, but the detailed distribution of energy emitted at each wavelength band was compared with theoretical computations nearly 40 years ago. These calculations were based on the amount of carbon dioxide and water vapor that were measured independently in the air above observing stations at the surface.

3.2.1 *Disturbing the balance*

We can disturb the balance of rates incoming and outgoing to/from the top of the atmosphere by several means (these are thought experiments—do not try them at home).

⁶ Recall that a kilometer is about 3,000 ft.

1. We could change the sun's brightness from 1360 W/m^2 .
2. We could change the altitude of the location where the emission takes place to a level where the temperature is cooler. If a gas absorbs the upwelling infrared radiation from the ground (a so-called greenhouse gas), it will re-emit the radiation upwards (also equally downwards) at a rate determined by the temperature at that emission level. If we add more greenhouse gases to the atmosphere, they will elevate the layer where the radiation is emitted to space. This action results in a reduction of cooling radiation to space. In turn, earth will raise its temperature to restore balance.
3. We could add aerosols to the air, as is done after some volcanic eruptions, which results in "dust layers" screening the planet from sunlight and thus adding to the planet's reflectivity. If the dust makes it to the stratosphere (50,000 ft above sea level in the tropics), the screening can last several years after the eruption.
4. We could change the reflectivity of the planetary surface by replacing absorbing materials at the surface with more reflective ones (e.g., forest removal, concrete parking lots on dark soil).

The most important change for us today is the increase in atmospheric concentration of greenhouse gases, most importantly carbon dioxide (CO_2). It currently has a concentration of 400 parts per million. This means that for every million air molecules, there are 400 CO_2 molecules, denoted as 400 ppm. Note that ordinary air molecules (nitrogen, oxygen, and argon) are not greenhouse gases, but carbon dioxide, methane, nitrous oxide, and water vapor are greenhouse gases. Water vapor concentrations are highly variable, but on the average, they are tied to the surface temperature, such as a moist, warm surface leads to muggy air.

Before the industrial revolution,⁷ the CO_2 concentration was about 270 ppm. It has been increasing exponentially at about 0.5 % per year since. Other greenhouse gases also have been increasing at about the same rate, giving the equivalent of 1.0 % per year CO_2 equivalent. CO_2 is well mixed by atmospheric circulation throughout the world atmosphere, taking only a year or two to mix well across the hemispheres.

There are large natural flows of CO_2 from the atmosphere and the other components of the earth system. These large natural flow rates all balance to leave a steady concentration of this trace gas in the atmosphere, that is until the beginning of the Industrial Revolution (1749 CE). While our increases are a small fraction of these natural exchange rates into and out of the air, our rate of input from fossil fuel burning and some other processes, such as cement manufacture and deforestation, are overwhelming the distribution system. Natural processes only remove about half of the CO_2 that we pump in annually—the atmosphere is retaining the rest. The problem reminds us of pouring water into a bathtub at a rate faster than an open drain can dispose of it to maintain a steady water level. The source of the CO_2 can be easily attributed to our burning of fossil fuels (coal, petroleum, and natural gas), because the latter are from deposits that are mined from deep below the earth's surface, having been buried there tens of millions of year ago. That the origin of the increase is from

⁷ Usually taken to be the date of the invention Watt's steam engine, 1749.

these materials can be proven by its depleted carbon-14 (^{14}C) content. This unstable (lifetime 5,700 years) isotope of carbon is formed in the atmosphere by cosmic rays. But when sequestered below the earth's surface for millions of years, it will have completely decayed leaving behind the naturally occurring ^{12}C . There is no ^{14}C in the increase of carbon dioxide in the air. It all comes from old carbon.

If the CO_2 concentration is doubled from its pre-industrial value of 270 to 540 ppm, the altitude of the effective level where the radiation leaves the system for space will increase such that the outgoing radiation to space will be reduced by about 4.0 W/m^2 . It is not a controversial result that this would lead to a warming of about $1.1 \text{ }^\circ\text{C}$ ($2.0 \text{ }^\circ\text{F}$) if all other factors are held constant. Of course, when we change a factor like the concentration of CO_2 , nature does not allow us to hold all other factors constant. Other factors react to the new environment. Warmer air will induce more moisture into it, adding to greenhouse gases. Ice sheets will expand or contract, changing earth's reflectivity, etc. These newly induced factors are called feedbacks.

3.2.2 Feedbacks in the Climate System

The standard index that all climate models are compared to is the response of the global average temperature to a doubling of carbon dioxide in the atmosphere. This is commonly referred to as the climate sensitivity. There is common agreement among climate scientists (even the so-called skeptics) that if the carbon dioxide concentration in the atmosphere was doubled with all other variables held constant, the global average temperature would go up by about $1.1 \text{ }^\circ\text{C}$ ($2.0 \text{ }^\circ\text{F}$). Virtually all climate models agree on this result. The problem lies in how each of the world's climate models treats the climate feedbacks. Of the 20 or so global models that are running worldwide and well tested, i.e., they reproduce the present seasonal cycle and many details of the present climate, including the circulation patterns of the atmosphere and ocean, etc., the range of climate sensitivity is between $1.5 \text{ }^\circ\text{C}$ ($2.7 \text{ }^\circ\text{F}$) to about $4.5 \text{ }^\circ\text{C}$ ($8.1 \text{ }^\circ\text{F}$). In other words, we can say it is about $3.0 \text{ }^\circ\text{C}$ ($5.4 \text{ }^\circ\text{F}$) plus/minus 50%. This is the so-called equilibrium sensitivity, i.e., it is the response of the earth system if we allow time for the system to come to its ultimate equilibrium, which could actually take centuries. The reason for the increase over the $1.1 \text{ }^\circ\text{C}$ ($2.0 \text{ }^\circ\text{F}$) when all other factors are held constant is attributable to the feedback mechanisms in the climate system.

The simplest and most important of these feedbacks is the water vapor feedback. This comes about through a very simple mechanism. First of all, water vapor in the air is a very strong greenhouse gas. Imagine that the planet's surface temperature is increased by some primary driver (say, the sun brightens), then the water vapor almost instantaneously (days to weeks) will increase approximately strongly to maintain essentially the same relative humidity. This can be demonstrated from data as well as in climate models. The effect of this is to amplify the response to the primary warming agent by as much as a factor of two. I have lumped together with the water vapor feedback the so-called lapse rate feedback. This latter has to do with the change

expected in the lapse rate as climate is changed. It is strongly correlated with the water vapor feedback.

There are other feedback mechanisms as well. The next easiest to understand is the ice/albedo feedback. The albedo is the reflectivity of the earth to sunlight, and it is currently about 30 %. But if we warm the planet by a primary warming driver, we will soon cause the area of the planet's surface covered with snow and ice to shrink. This would reduce the planetary albedo and warm the earth even more, positively amplifying the original response. Most believe the snow/ice feedback multiplier is smaller than the water vapor feedback, and it may lead to a further amplification of a few percent given the present area of snow/ice. The 20 or so climate models around the world seem to agree on the effects of these first two feedbacks.

The last feedback that I want to mention is the cloud feedback, which is the most difficult to model and, therefore, the main cause of the spread of climate sensitivity among the models. Clouds engage themselves in the radiation budget because they are highly reflective of sunlight and they radiate to space from high in the atmosphere where it is colder than at the surface. The latter is reminiscent of the greenhouse effect. These two effects nearly cancel in the radiation budget at present. But when a primary driver forces the climate, both the area covered by cloud and the altitude of cloud tops may change, and these effects can differ in different locations on the planet. For example, during climate change, the global circulation systems might shift, and along with them, whole cloud assemblies. Different climate models treat cloud dynamics somewhat differently, and this leads to the spread of climate sensitivities across the models. But on the whole, it seems that surveying the models suggests that all of them exhibit a net positive feedback. Empirical studies using satellite data also favor positive cloud feedback, but the kind of data needed for definitive tests are currently inadequate to quantify the strength of this amplification.

The feedbacks then are key to just how much response we can expect from a doubling of carbon dioxide. This is the origin of most of the spread of sensitivities among the global climate models. This refers to the equilibrium-to-equilibrium response. However, in the real world, the system may take centuries to finally reach its equilibrium value, and besides, we are not instantaneously changing the carbon dioxide (and other greenhouse gases), but we are gradually increasing them at a carbon dioxide-equivalent rate of about 1 % per year. This would suggest an effective doubling in about 70 years. Much of the response will be delayed by that deep pot of water we are heating called the ocean.

3.2.3 Delays in the Response of the Climate System

As we heat the oceans (70 % of the earth's surface area) from above, we cannot expect its temperature to increase simultaneously with the primary driver. The 30 % of the area covered by land does nearly keep up, but even there, nearby oceans delay the response. The oceans can be thought of as covered by a well-mixed layer (stirred by the winds) of thickness about 50–100 m (150–300 ft). If we could believe that

the deeper parts of the ocean were unaffected by the warming from above, the delay would only be a few years. But deeper parts of the ocean do slowly take heat from the mixed layer through a variety of mechanisms, so the approach to equilibrium is about a decade. However, this is superimposed upon a further slow adjustment that should take centuries. This long adjustment time of the whole water column means that, even if we halt the greenhouse gas increases, we will continue to warm for quite a few decades. Moreover, if we were to instantaneously set the greenhouse gas level back to preindustrial levels, it would take centuries for the climate to go back to those earlier values (NRC 2010).

Another long adjustment time that cannot be overlooked is the time it takes for CO₂ concentrations in the atmosphere to adjust to new values after a change in input flows of the gas. This adjustment time is similar to the temperature adjustment since the main slow mechanism for removal of CO₂ from the air is via mechanisms that take the dissolved (and transformed) CO₂ from the mixed layer into the deeper ocean. As we continue to pump more CO₂ into the air, some of it (currently about 45 %) is drawn down from the air by the biosphere (land and ocean), but the rest is accumulating in the atmosphere because we are simply pumping it in faster than the system can dispose of it. The adjustment time for CO₂ in the atmosphere appears to be about 200 years.

3.3 Past Climates: The Context of Climate Changes

While the past is not to be taken as a predictor of the future, it does provide some context to assess where our last century's warming stacks up with respect to previous ones. There exist some data that suggest properties of climates from even millions of years ago. As continents moved about over the multi-million-year time scales, they occasionally drifted into the proximity of the poles. If the land/sea configuration is just right, ice sheets can form and even grow to be continental scale while resting on and even depressing the land surface from the weight of overlaying ice. Credible data analyses suggest that this has happened several times over the long record, and the most recent of these ice ages began a few million years ago. We are still in this one with plenty of ice (perhaps 60 m of sea level equivalent) mostly in Antarctica and Greenland. Over the last 2 million years, the ice sheets have covered what is now Canada and the equator-ward edge has entered into what is now U.S. territory as recently as 18,000 years ago. At that time, sea level was about 120 m (360 ft) lower than today because of its removal from the oceans to form ice on land, and global temperatures were about 5 °C (9 °F) lower than at present. The waxing and waning of these ice sheets was timed by the changes in the earth's orbital elements,⁸ which are influenced by the orbits of other planets (primarily Jupiter). But most curiously, the carbon dioxide in the air at those times was in inverse lock step with the glaciations,

⁸ (1) eccentricity of the elliptical orbit, (2) tilt angle of the spin axis with respect to the orbital plane, and (3) the season of closest approach to the sun along the elliptical orbit.

going back many cycles. We know, for example, that during the last large ice sheet cycles, the CO₂ varied between 200 and 280 ppm—low when big ice sheets were present, high when small.

After the last glacial maximum about 18,000 years ago, the ice sheet over North America took some 8,000 more years to disintegrate, leaving North America essentially ice free for the last 10,000 years, a period called the Holocene. During this recent period, the CO₂ has been rather steady, and the changes in orbital elements have not been large. The Holocene then has been a relatively benign time in climate history—ideal for the development of civilization.

There have been a few recent variations of climate worth mentioning at the multi-decadal time scale. For example, many indicators suggest that the time between 1600 and 1800 was colder by 1 or 2 °C (1 or 3 °F), especially in the North Atlantic region. This has been referred to as the Little Ice Age. It probably was also cold elsewhere, but data are sparser outside these areas. Some data suggest that it might have been warmer at least in this same region during the centuries between 900 and 1200 CE (NRC 2006). The filling in of climate information over the last few thousand years is a high priority for research at this time since we would like to see just how unusual the rate of warming over last century has been compared to other centuries over the Holocene.

3.3.1 The Past 50 Years of Climate Change

The period for which we are in a good position for inferring something about our understanding of climate change is the last 40 or 50 years. Just before this time in the mid-1940s, there was a warm period that apparently was centered in the Arctic. It was strong enough that it can be seen even in global averages. In recovery, the climate cooled for some decades before beginning a strong warming period that started in the 1970s and continues today. The reason this period is so important is that our supply of data is so abundant.⁹ We not only know the land surface temperatures from instrumental readings, but we have reliable temperature data in all the ocean basins, not just at the surface, but as much as 700 m (2,700 ft) below. These recent decades have been the era of global weather forecasting; so as a by-product, we have good temperature data not only from the surface, but by balloon measurements even into the stratosphere at many sites. Since the early 1970s, we have precise measurements from earth's orbiting satellites of such variables as sea-ice coverage and solar brightness (taken from above the atmosphere). Since the late 1950s, we have direct (in situ) measurements of carbon dioxide and the other greenhouse gases. While aerosols are more problematic, we even have satellite estimates of the amount of attenuation of sunlight attributable to these tiny airborne particles. In recent years, we have measured the morphology and mass distributions through precise gravity

⁹ Some climate scientists argue that this warm anomaly was an artifact of poor Arctic data during and following World War II—in my opinion, the issue remains unresolved.

measurements and surface topography from satellites of the ice sheets with great accuracy. Precipitation is now routinely measured over remote parts of the world oceans by satellite. Even the components of the earth's radiation budget have been measured since the mid-1980s, unfortunately, not yet to the level of accuracy for satisfactorily testing the strengths of the climate feedbacks.

The upshot of this huge volume of information is that we have a pretty good sense of the evolving temperature distribution over the regions of the planet for the last 4 or 5 decades. It has gone up some few tenths of a degree Celsius (about 0.15°C (0.27°F) per decade), with an error probably less than 10%. We also have pretty reliable estimates of other response variables, such as precipitation in regions worldwide. Equally important, we have measures of the primary drivers of climate change.

Since we have both the input and output variables, we are in position to eliminate some pesky candidates for the cause of the warming over the last 50 years. For example, by the use of earth orbiting satellites, we now have been measuring the solar brightness from platforms at levels outside the earth's atmosphere. We can now rule out the possibility that this brightness has been increasing and therefore has contributed to the warming. There is a tiny 11-year ripple in the solar brightness (due to processes related to sunspots) that can even be detected in the temperature data, but it is cyclic and not trending upwards. We can also rule out some potential natural variability candidates. For example, no large blob of warm water has surfaced from below during this strong warming period, increasing the likelihood of the cause being a disturbance of the radiation budget and not some anomalous internal rearrangement of heat in the system. We clearly see the signatures of volcanic eruptions and the dust they leave in the stratosphere as drivers of climate. There are three prominent eruptions during this interval: Mount Agung (East Indies, 1963–1964), El Chichon (Mexico, 1982), and Mount Pinatubo (Philippines, 1991). We have good measurements of these attenuators of sunlight, and we can easily detect the cooling resulting at the ground in the global record. Both are consistent with our climate models, but other variables, such as ocean delays, prevent us from pinning down the climate sensitivity directly from these events. Ancient volcanoes are also recorded in ice cores and provide insight into past climates.

Another significant finding is that the stratosphere has been cooling over the last 50 years while the lower atmosphere and surface have been warming. This is also an expected signature and more evidence of the greenhouse gases being the driver, e.g., solar brightness increases would cause the stratosphere to warm. Sea level continues to rise as measured from downward pointing radars mounted on satellites and traditional tide gauges in a manner that is also consistent with our climate model scenarios. Sea level rise is due to the expansion of water volume as it is heated and the melting of land-based ice as it displaces sea water with fresh melt water. Sea ice is retreating likewise on schedule: according to the National Snow and Ice Data Center (2011), the “average ice extent for September 2011 was 4.61 million km^2 (1.78 million square miles), 2.43 million km^2 (938,000 square miles) below the 1979–2000 average.” Moreover, the National Oceanographic and Atmospheric

Administration (2011) website notes that old sea ice in the Arctic (that lasts for a few years) is becoming rarer.

One troubling aspect for climate forecasters is the large recent flows of ice into the oceans from Greenland and Antarctica as estimated from satellite data. These flows are running a little faster than was thought at the time of the Fourth Assessment Report (IPCC 2007). Ice dynamics in continental-sized glaciers is one of the major areas of research since this is one of the more poorly understood processes in the climate system.

Climate models predict that, with global warming, the storm tracks that circle the earth in middle latitudes in both hemispheres should be receding toward their respective poles, and this has been confirmed by observational record. We will return to the implications of this finding later as we examine future climates in the subtropics.

3.3.2 Global Climate Toward the End of This Century

There are about 20 global climate models distributed over nearly as many countries that contribute to the Intergovernmental Panel on Climate Change (IPCC) reporting cycle. These are the models mentioned earlier that show a range of climate sensitivities (doubling CO₂ and between equilibrium and equilibrium) of 1.5–4.5 °C (2.7–8.1 °F). In order to estimate what will happen in the future, we must know what the inputs (future population, affluence, technology leading to a set of time series for carbon dioxide, methane, aerosols, land use, etc.) are going to be over that period. The IPCC has adopted a set of scenarios that are internally consistent futures for these inputs. They each take a particular way of life as the path to the end of the century. While there is no best way to do this, the scenarios provide us with some potential extremes that we might expect in our future civilization.

The main finding is that as conditions evolve over the next century, we can expect the global average temperature to increase by somewhere between 2 to 5 °C (3.6 to 9 °F). The low end of this range is not too serious, but the high end could be disastrous. As we noted before, if we wait until then to do anything to prevent the warming, it will be very hard to return to present conditions: instantaneously resetting the greenhouse gas emission to today's level would not return the climate to today's level for at least another 100 years.

3.3.3 Changes at Sub-Global Scales

In reviewing the results of the 20 global circulation models, there are several features that stand out and can be considered robust across the models. First, the polar regions warm faster than the middle and low latitudes. Most readers are aware of this because of the media attention to the explicit images of melting sea ice and other changes in the polar environments that affect local ecology (polar bears, bird migration, etc.).

Moreover, the unprecedented melting of permafrost has disrupted spring and fall passage over roads in Alaska and other polar areas. The very first model runs from more than 20 years ago anticipated the so-called polar amplification of the warming. Some of this increased sensitivity near the North Pole is due to the snow/albedo feedback mechanism, but other factors are involved as well.

A second robust finding in the climatological data is that the large land areas are warming slightly faster than ocean surfaces. This effect is also well known in models and simply related to the fact that the local heat capacity is less over land than that over ocean. It is like heating a shallow pot of water versus a deep one: the shallow one comes up to boiling much sooner.

A more subtle finding is that the mid-latitude storm tracks in each hemisphere are receding toward the respective poles. This requires introducing a bit of climatology. Each hemisphere has a belt of stormy weather encircling the globe. It is centered between 35 and 45 degrees of latitude (north and south), and each lies just under the jet stream for that hemisphere. In these belts (I'll call them the "storm belts"), the winds flow from west to east, and they grow stronger with altitude (up to the jet). These so-called westerlies are not purely circles concentric to the earth's spin axis but are wavy along their path like a flapping flag. They bring with them the high- and low-pressure areas that proceed from west to east around a mid-latitude circle. As the systems pass over the landscape, they create precipitation and other forms of intermittent weather. Equatorwards of the storm belts are the subtropics where the weather is mostly calm with low level winds that flow along the surface toward the equator and slightly towards the west in both hemispheres. These are the trade winds. Early mariners crossing the North Atlantic came west in the trade winds then moved north to join the westerlies on their return to Europe. Where the trade winds from the two hemispheres converge at the Equator, the air accumulating (converging) at the surface must rise, and this leads to tall cumulus clouds and heavy rain (the Inter-Tropical Convergence Zone or ITCZ).

Continuing this simplified summary of the circulation of the atmosphere and the resulting climates in the tropics and subtropics, we will see what happens as we introduce the seasons. In the summer hemisphere, the storm belt will naturally move polewards following the overhead sun, and what I have labeled the ITCZ will leave the Equator into the summer hemisphere. The region between the center of the storm belt and the ITCZ, the subtropics, will expand in latitudinal extent. The continent of Africa will experience a rainy region that moves north during northern summer and south during northern winter. Large herds of wildlife move with the rain to seek fresh green grass and shrubs to eat. A cycling ecological complex of life moves with them through the seasons. Again, this is a very simplified picture.

When we insert land-sea geography and topography into the picture, this ideal pattern is broken. For one thing, the migration of the convergence zone will move farther polewards over land surfaces than over ocean surfaces. This is simply the effect of the land heating faster in the seasonal cycle than the ocean waters. Topography can also become important if mountains are situated polewards of the advancing convergence belt. Sloped and elevated land will warm faster than flat land (e.g., the Himalayas on the Indian subcontinent). In addition, as the air goes up hill, it cools

and might reach the dew point, increasing the likelihood of heavy precipitation. This latter is a highly simplified description of the monsoonal rain pattern in different parts of Asia, Africa, Central America, and Australia.

This schematic picture of the seasonal swing of the storm belts and the movement of the tropical convergence zone sets the stage for what we find in the global climate model studies of future climate in specific regions around the tropics.

3.4 Future Climate in Selected Subtropical Regions

By now, we have established that it will be warmer over the globe by the end of the century. The warming in the upper subtropics of each hemisphere should be at about the same level as the global average with somewhat more warming in the polar regions and less in the deep tropics. Getting warmer where it is already hot will be a problem for those populations.

Precipitation changes will follow a different course. We expect the subtropical regions to expand polewards. These are the trade-wind zones, most which are already dry and hot. In other words, we expect the subtropical areas to expand. Just how much expansion in a particular region will depend on geographical features such as the positioning of land and sea as well as topography.

Let us construct a simple picture of a seasonal scenario at typical subtropical site such as the northern coast of Africa: areas that do not receive rain in summer, but have some winter precipitation from mid-latitude storms passing through the Mediterranean. As the climate changes, we expect the storm belt in the Northern Hemisphere to recede toward higher latitudes. This means the last frontal passage of weather crossing Algiers will occur earlier in the spring than before. Similarly, the first frontal passage in the fall will be a few weeks later, making the dry season last a few weeks longer with a resulting diminishment of annual rainfall. Note that in Northern and Central Europe, there is an increase in precipitation due to the same movement of the storm belt toward the pole. These patterns can be seen throughout the subtropics in both hemispheres.

Figure 3.1 shows a map with contours indicating the expected rainfall at the end of the twenty-first century based on about 20 model simulations running with one of the more “business-as-usual” scenarios. These 20 models are from different research centers around the world, and the results are those reported in the Fourth Assessment Report of the IPCC (2007). Scenarios featuring more mitigation of greenhouse gases over the course of the twenty-first century might show less than these extremes, but the figure gets the idea across that, along the polewards borders of the line separating the subtropics from the mid-latitude, storm belts will be dryer. The model results are pooled to give an average outlook. There is a strong similarity from one model simulation of the future to another. It appears that the warming and the expansion of the subtropics are both robust features of the simulations, and this adds to the credibility of the projections.

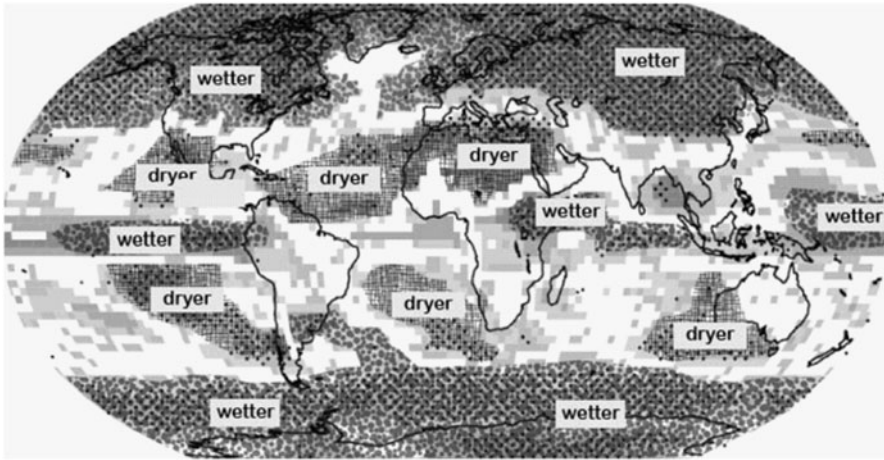


Fig. 3.1 Simulations of December-January-February precipitation changes for the end of the century compared to the present (using results from about 20 climate models). June-July-August conditions are similar. Note the band of *drier* (cross-hatched) conditions in the subtropics in both hemispheres, part of which overlaps West Texas. *White* areas indicate that less than 66% of the models agree on the sign of the change (Schmandt et al. 2010)

The subtropical areas tend to be dominated by the influence of the monsoonal circulations. This is so especially where there is an east-west coastline running across the region. In these cases especially (e.g., India, South East Asia, Northern Australia, West Africa, US Southeast), the heavy rain belt encircling the globe moves north and south with the seasons, but when the rain belt reaches the land, it moves quickly onshore and dumps lots of water. As autumn arrives, the rain retreats, and in many of these areas, there will be no rain again until the next spring. Perusal of Fig. 3.1 suggests that these monsoon-dominated regions will not be affected as much as some others with respect to annual average precipitation. However, the text of the IPCC Working Group I document leaves some questions about the ability of our present climate models to faithfully simulate the behavior of the seasonal cycle of the monsoons. We may have to wait for the models to improve before we can have confidence in the projections on the subject of seasonal monsoon patterns. In the following rather brief sections, I summarize what the IPCC AR4 says about expected regional changes in climate for North America, Europe, the Middle East, and East/Southeast Asia.

3.4.1 North America

The largest changes in surface temperature at the year 2100 are expected to be in the extreme northern regions where warming of about 5 °C (9 °F) with a range of ± 1.5 °C (2.7 °F), depending on which scenario is chosen and which climate model

is used. This margin of uncertainty (about $\pm 30\%$) is typical of all the temperature forecasts so I will not repeat it as I cover other regions. The surface temperatures in the western, central, and eastern sectors of the US are expected to warm about 4°C (7.2°F) more than the northern tier of the continent.

The annual mean precipitation across the northern tier is expected to be larger by 15–20%; this is especially so in Alaska and the Hudson Bay areas in winter. Consistent with the projection that the storm belt will move polewards is the forecast that rainfall will increase across the northern tier of the US and decrease in the southern portions. The largest decreases will be in summer, which should see dryer conditions on the west coast well into Canada. The US Southwest would be hit particularly hard by the lack of rainfall and increased temperatures, which will lead to greater evaporation rates and drying soils. The same mechanisms lead to less precipitation throughout Mexico. There is a remarkable pattern of agreement among the models for these outlooks in North America.

Some caveats are in order. The models represented in the IPCC 2007 Report still have large uncertainties in their simulation of several phenomena that are relevant to the above forecasts. Leading among these is the ability to forecast the El Niño–Southern Oscillation cycle (ENSO), either in its future intensity or frequency of cycling. Some models say that ENSO will be more El Niño-like while others disagree with this conclusion. Next comes the forecast of tropical storms, including hurricanes. Again, the models disagree among themselves as to the frequency and intensity of these events, which, by the way, tend to be modulated by the ENSO cycle. Other more subtle features are not yet finalized in the current models. Among these are the monsoonal behavior that wets the US Southwest and the western coast of Mexico in late summer. This feature, which is so important to those regions, is not yet well simulated in the models. Another is the so-called low level jet, which is a stream of moist air flowing from the Gulf of Mexico northwards into the Great Plains at low levels, moistening the air over these regions in summer. This feature fuels summertime storms throughout the high plains of the US interior. So there are several (and perhaps many more) smaller scale mechanisms in US climatology that the models are just now beginning to resolve satisfactorily, but may not be relied upon in the global warming context, especially 90 years from now.

In addition to these matters, we can safely predict that snowmelt in mountainous areas can be expected to build up later in the fall and melt earlier in the spring. This will lead to changes in river runoff that is relied upon in the US Southwest especially.

An interesting case study is that of the winter and summer of the Texas (USA) region during 2010–2011. Winter rain in Texas is modulated by the ENSO cycle. Usually the winter is cool and dry during La Niña but warm and moist during El Niño phases of ENSO. During the winter of 2010–2011, there was a La Niña in the Pacific. This led to a more than expected dry winter in the Texas region even for La Niña conditions. As winter proceeded, the entire region began a dry period with the corresponding winter-spring crops suffering. The soil dried out, and as the spring came, there was less moisture available to fuel spring storms. The circulation pattern that set in was not conducive to facilitating the flow of moist air from the southeast. With the dry soil and clear skies, Texas began to heat up in the spring. By midsummer,

the entire region was in severe drought conditions, and record high temperatures were being registered across the state. The temperature averaged over Texas during June, July, and August was 2.9 °C (5.3 °F) above normal and precipitation was 15 cm (5.8 in) below normal for those months according to the Texas State Climatologist.¹⁰

There is a very significant negative correlation between summer rainfall and temperature for the state, but this past year has broken the bank with both precipitation and temperature more than two standard deviations away from the summer means, even after removing the ENSO effect. John Nielsen-Gammon, the Texas State Climatologist, estimated that most of the warming was more due to the clear skies and dry soil than is attributable to global warming. Sadly for Texas ranchers and others that depend heavily on water, La Nina is cranking up again in the Pacific, meaning that our winter is again likely to be dry, repeating the cycle we saw last year.

The Texas case of 2010–2011 and possibly beyond raises the question about the future climate in the area. This has indeed been a very unusual situation undoubtedly aggravated by the two effects (secular change in temperatures and the phase of ENSO) reinforcing each other, all combined with positive feedbacks. But in fact, we do not know whether this peculiar period of drought can be expected more often or not in the future because we do not yet know whether the ENSO cycle will be running at higher frequency and/or intensity than there would have been without global warming. In principle, this is a solvable problem as our models improve. As remarked elsewhere in this essay, the problems of ENSO and tropical storms are probably within reach of the models of the next few years.

3.4.2 Europe and the Mediterranean Region

The trend is similar to that of the preceding section: wetter in the northern parts upper middle latitude areas, lower in the lower middle latitude areas, especially those called subtropical. This pattern is induced by the general retreat of the storm belt polewards. Temperatures in Northern Europe (Scandinavia and the northern third of Germany, Poland, etc.) should average 4.0 °C (7.2 °F) \pm 30 %. For Southern Europe (Spain, Portugal, Italy, Greece, the Baltic countries, and the Mediterranean including the northern rim of Africa), the warming is expected to be a tiny bit less at 3.8 °C (6.8 °F) and the same percentage error. The largest temperature changes are in summer in Southern Europe, exceeding 4.0 °C (7.2 °F). Coastal edges are moderated by the Mediterranean, but the heating increases rapidly inland especially in summer.

All of Northern Europe can look forward to increased precipitation, especially in winter. But all of Southern Europe and the Mediterranean region can expect decreases in precipitation up to 30 %, especially in summertime Spain and the North African coast. There is particularly strong agreement among the IPCC models on this inference.

¹⁰ See <http://blog.chron.com/climateabyss/2011/09/texas-drought-and-global-warming>.

3.4.3 Middle East

The eastern Mediterranean countries, such as Israel, Syria, and Turkey, fit into the forecast of the previous section. The temperature change patterns for those regions are about 3.0 °C (5.4 °F). Again, the precipitation decreases are serious at 20–30 % in all seasons. The Arabian Peninsula will be warmed by about 4.0 °C (7.2 °F) especially in summer, but the southern parts of the Peninsula, and the Persian Gulf might get an increase of precipitation, especially in summer because the summer monsoon might intensify in this region.

3.4.4 Asia

As we move east into the Asian interior, we find a familiar pattern: warming increases poleward, approaching 7.0 °C (12.6 °F) at the Arctic coasts. Warming is also strong in the higher elevations of the Himalayan Plateau, maximizing above 4.0 °C (7.2 °F). Warming is more moderate on the eastern coasts. For example, South Korea and Japan might only experience 3.0 °C (5.4 °F).

On an annual basis, India should get more precipitation, but the rain might have a peculiar seasonality. The northeast of India might be dryer in winter but wetter in summer. This suggests that the monsoon rains might be more intense at higher elevations in the northeast. Southeast Asia (Myanmar, Cambodia, Thailand, and Vietnam) are to expect moderate warming of 2.5 to 3.0 °C (4.5 to 5.4 °F) with dryer winters and wetter summers (a few percent).

3.5 Concluding Remarks

Finally, a best-guess estimate of changed temperature and precipitation conditions for each of the four regions discussed in Chaps. 8, 9, and 10 is given below. These values undeniably reflect back-of-the-envelope thinking because it is based on an assumption of a mean annual atmospheric carbon dioxide increase of 2.0 ppm from the present to approximately 2050 as well as an assumption that no “geoengineering” fixes such as the introduction of stratospheric particulates has taken place. Still, they are probably about the best we can do at this time, given my assumptions (Table 3.1).

In this chapter, I have attempted to lay the groundwork for talking about future climates of the earth as driven by continuous increases in greenhouse gases such as carbon dioxide and methane. The views expressed in the essay are rather close to those expressed in Working Group I of the Fourth Assessment Report (AR4) of the IPCC. In turn, these are the mainstream views of nearly all of the atmospheric climate scientists who have a working knowledge of the physics of radiative transfer. We cannot entirely dismiss a skeptical view of climate sensitivity springing from the uncertainty around climate feedbacks, especially cloud feedback. If cloud feedback

Table 3.1 Estimate of changes in temperature and precipitation for four global regions

Region	Mean annual change (+/–)	
	Temperature (°C)	Change in precipitation (%)
USA: North	5	Increase 15–20
USA: South	4	Decrease 5–15
Middle East	3.0–4.0	Decrease 20–30
Europe: North	3.0	Increase 10–40
North Asia	4.0	Decrease up to 20
Southeast Asia	2.5–3.0	Increase 1–2
South Asia	3.0	Increase 3–35

is more correlated with water vapor feedback, and if the combination turns out to be a negative feedback, then the amount of climate change would be less than that held by the mainstream view. So far as I know, this contrarian view is held by less than a handful of those seriously engaged in this field of research. This does not mean those skeptics are wrong, just that there is insufficient support among their peers to upset or even ruffle the currently dominant paradigm. But the empirical results and theories of scientific investigation are always tentative and subject to revision as new discoveries are made.

The picture drawn here cannot be the end of the scientific story. There are many unresolved issues, and I will take the opportunity here to enunciate a few.

1. We need longer records of climate data; these can be aided by innovative techniques and broadened bases for revealing past climates. Longer records of such data streams can also come in the future as more data are collected from satellites and from observations beneath the ocean surface. For example, many records of precious information about Greenland ice can be doubled in just a decade.
2. We need to encourage new techniques in isotope-based inference of atmospheric, oceanic, and biological systems that are relevant to climate processes, past and future.
3. We need to refine our Atmospheric General Circulation Models so that the simulation of smaller scale structures at all latitudes, but primarily in tropical features, is more faithful to observations. This cannot be done without simultaneously mounting new creative field experiments in some very remote locations.
4. Polar environments must receive special attention because of our poor understanding of the dynamics of the great ice sheets because of their importance in estimates of future sea level.
5. We need to refine other components of models, such as the oceans, where new understanding is likely to come from simulation grid refinement especially over fine-scale bottom topography of the oceans.
6. Moving away from the physical media, we need to learn more about the very slow feedbacks associated with the emission of carbon dioxide and methane trapped in soils and other media into the atmosphere as temperatures rise.

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Chapter 4

An Evolving Worldview: Culture-Shift in University Students

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Abstract In this chapter, we argue that Europe and North America, and to a lesser extent other areas, are in the midst of a major change in worldviews, what we term a Culture-shift. In moving from one way of being to another way of being, world citizens, especially young adults, are moving from one set of values to another set of values. This movement from a modern worldview to a postmodern worldview is characterized by a transition from science-as-authority to a more self-referential foundation of authority.

The final outstanding change of the (20th) century seems to be cultural and psychological: the spread of the idea that human happiness is realizable on earth and human destiny manageable. (Roberts 1999)

This seeming paradox (of a hybrid worldview) . . . has become more and more central to the way we live (in postmodernity): . . . (a cowboy-like) ideal of a boundless, autonomous, self-legitimizing individual . . . (who inhabits a realm of almost hive-like) management and regulation. (McClay 2012)

Biological evolution is too slow for the human species. Over the next few decades, it's going to be left in the dust . . . the Singularity is near. (Kurzweil 2005)

4.1 Intellectual Foundations and Philosophical Assumptions

Near the opening of the twentieth century, William James claimed that the great discovery of his time was that lives could be changed by changed attitudes (Norwine and Smith 2000). At almost precisely the same moment, Max Weber trumped James' claim with his hugely influential argument that new attitudes led to new ways of

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life: specifically, that Calvinist Protestantism had “defined and sanctioned an ethic of everyday behavior” and attitudes that helped create not just modern capitalism (Landes 2000) but a cultural paradigm-shift to a new value-system, the materialist worldview (Inglehart 1990) of modernity. In this particular context, and as it is used throughout the chapter, a worldview is simply a set of presuppositions or basic beliefs that bring order out of what would otherwise be chaos.

In this regard, the logic of capitalism and its material aspects of change (or any other mode of production for that matter) might also be considered both a reflection and reproducer of the presuppositions (i. e., the worldview) that underlie its existence.

The idea that modern capitalism, and more generally modernity itself, an enterprise and period marked by strong currents of individualism and self-referential behavior, are indeed informed by and representative of Calvinist thought has its own set of contradictions. Calvinist Protestantism also bequeathed to modern worldviews the notion of shared sacrifice via individual hardship, a view conveyed through a stoic sensibility common to individual, familial, and community life. For example, the Dutch polder model is illustrative of how material relations—literally holding back the ocean from inundating a geographically distinct land base and socially reproduced idea of the homeland—helped shape a national ethos that has historically prized self-sacrifice for the common good. Yet, the same small nation expressed economic aspirations by peering outward beyond the physical limitations to colonize lands in the East Indies.

These early intimations of a globalizing world contain within them a snapshot of the physical conditions out of which one strand of early capitalism and the materialist worldview it informs historically emerged. Likewise, they provide a cultural backdrop containing a few of the constitutive elements that helped condition how a Calvinist ethic may have diffused and partially shaped Western worldviews. Today, the intellectual resonance of Calvinist Protestantism, especially among the larger secular population, has been either assimilated or partially lost amidst the splintering cacophony of popular culture, a medium through which the shifting dimensions of postmodern worldviews find expression. Important to our current discussion of culture-shift is the observation that the postmodern era is marked by a more complete severance of worldviews from the traditional valuescape, including more and more distance from the notion of shared sacrifice.

One determinant influencing this trend is the pronounced shift away from a public discourse of *ethics* toward one more concerned with *aesthetics*. This development has been primarily associated with the valorization of individual difference and preference. By grasping at the vast potential associated with forging a pluralistic society¹ postmodern thought has, at times, fractured the viewscape to such an extent that efforts to criticize the proverbial Calvinist homeland here in America and abroad have simply refashioned the individual as *their own* quasi-metropole. Within the framework of postmodern worldviews, climate change adaptation (a contemporary holding back of the ocean), presents a dilemma: Should the personal liberty of individuals

¹ Certainly not a bad thing in and of itself.

take precedence over the shared maintenance of community life? To suggest otherwise might potentially bring the postmodern person dangerously close to adopting the dusty old values, sometimes presented as ruinous moral virtues, of a bygone era.

For the remainder of the chapter, we will draw from this aesthetics/ethics distinction by loosely employing Kierkegaard's understanding of these terms. In the first case, according to Kierkegaard, aesthetics or rather lifeways primarily concerned with aesthetic sensibilities and pursuits are marked by the overriding pursuit of intellectual pleasure, immersion in sensual activities, and an inclination toward narcissistic behavior. The last of these three commonly manifests as the tendency to oscillate between two modes of being. Of living one's life in the spirit of performance art followed by stints in which a strong and unreflexive preoccupation with perfunctory tasks serves to alienate community members until the next "performance" begins. A more clinical understanding of Kierkegaard's notion of aesthetics might draw parallels between its particular mode of being and a position of arrested development along the hierarchy of life stages. Alternatively, an ethical life in Kierkegaard's estimation assumes a greater sense of direction, including a strengthened commitment to not only oneself but others for whom a higher degree of responsibility and sincere concern is present. This mode of being is ordinarily accompanied by a noticeable consistency and coherence to one's actions, which fosters a stable environment for the realization of higher-order goals. Moving forward, we will refer to the ethics/aesthetics pairing either directly or indirectly by incorporating alternative locutions (e. g., self sacrificial/self referential, etc.) that correspond to their master terminology.

At this point, it is critical to articulate three points within our discussion of paradigm shifts and sociological investigation of the history and diffusion of philosophy. First, although contemporary environmental problems are a product of historical trends, their solutions may not be entirely devoid of established ideas circulating through the valuescape out of which the problems first arose (e. g., Calvinist shared sacrifice). The counter-argument to this claim is often encapsulated in the common refrain "the kind of thinking that got us into this trouble won't get us out of it." Although this statement contains truth, it still leaves undefined what "kind of thinking" is ultimately a driving force behind the particular "type of trouble" being discussed. The wholesale refutation of an identifiable paradigm, for the sake of accelerating some well intended ideological transformation, seems more in the neighborhood of programmatic philosophical engineering than sound social or environmental theory. It would be akin to children blaming all current life circumstances on their parents. Similarly, by attributing the totality of social and environmental ills to some nebulous idea of "modernist hegemony"—i. e., the parent framework from which all current philosophical reiterations are born—one minimizes the potential for distinguishing between the relative strengths and weaknesses of an established order.

Second, it is incorrect to assume that all newly emerging ideas concerning a restructuring of lifeways necessarily pose a fundamental threat to the underlying assumptions upon which traditional models of community life have been historically erected. Some elements of culture may be conservative (i.e., less susceptible to change), such as food or theological commitments, while others like settlement patterns, architectural styles, or the adoption of high-technology may be more dynamic

and continuously evolving. In both the East and West, much of the developed world is undeniably fraught with problems directly tied to the excesses of modernity. To suggest that legitimate criticism of unencumbered material progress is unwarranted would be misinformed. To deny that some of these assumptions are gross distortions of preexisting ideas (e. g., market freedom as God) valorized in modernist discourse, but that their root ideas retain value, would be disingenuous. To suggest and deny both of these things would be unfortunate from the perspective of building an educated and responsible democratic populous.

Third, the eventual outcomes, the realities, gaining momentum and gradually materializing as a result of the two aforementioned observable tendencies,² may be exceedingly difficult to ascertain at the moment. Predicting the future is especially difficult, given the in-between or transitory status of where social life currently is located relative to the continued ramping up of global warming paralleled by our deeper immersion into a postmodern condition. These trends are coupled with the waning yet persistent³ influence of strong Protestant impulses that initially gave rise to materialism. By imagining the difficult experiences likely to accompany culture shift *and* climate change, we are attempting to intellectually position ourselves beyond the collective learning curve. It is in this anticipated space, fit for futurist thinking, that we hope to gain a clearer understanding of what may be a philosophical grounding and material basis for human flourishing. For some this flourishing is extended beyond humans to include all living things that make Earth their home. It is unclear at this moment in time whether ideas under the aegis of postmodernity are better suited than the ideas of modernity to address the challenges of a finite planet dominated by human activity.

Some of us think that postmodernity represents a similar change of dominant worldviews, one which could turn out to be just as singular as modernity by being a stunning amalgam of James *and* Weber. If we are correct, then the changed attitudes, assumptions, and values might work together to change ways of life which in turn transform our geographies of mind and being, that is, both the actual physical landscapes and the mental valuescapes we inhabit. One increasingly common outcome of this ongoing transformation, itself a symptom perhaps of post-industrial secular societies, is the movement away from self-denial toward a denial of the supernatural. This development promises to fundamentally alter future geographies of mind and being by shifting the locus of causality from an exalted Godhead to the domain of Nature. How this Nature is ultimately defined has broad repercussions for the, at times, artificial distinction between religious and secular worldviews. For Levine (2011), “secularism is a positive, not a negative, condition, not a denial of the world of spirit and of religion, but an affirmation of the world we’re living in now . . . such a world is capable of bringing us to the condition of ‘fullness’ that religion has always promised” (Levine quoted in Wood 2011). For others, this “fullness” is present in more religious-oriented pantheistic or pandeistic belief systems with, in the latter case, the inclusion of God as the ever unfolding expression of a complex universe with an identifiable beginning but no teleological direction necessarily present.

² I.e., a simultaneous retreat into and valorization of contrasting valuescapes.

³ Some might argue, occasionally resurgent

More dissident perspectives on the postmodern human condition draw from cultural anthropological theories concerning the constructed nature of human experience. Here, feelings of “fullness” or meaning are merely considered dependent on the social reproduction of variously constructed half-truths that are, in turn, loosely connected to some larger fallacy, such as the belief in a higher being, intelligence, or power that is greater than one’s self. Hellenga brings to light, in rather somber tones, the deeper realization encountered by the advance of the author’s fictionalized character toward the ultimate conclusion of such a nihilistic worldview:

God really is dead. It hadn’t seemed to make that much difference at first, no more difference than the death of a distant, elderly relative. What he hadn’t realized before now was that even the smaller meanings had to go, too, like lifeboats that are pulled down into the vortex when the big liner sinks. He hadn’t counted on that, hadn’t thought it through. He no longer cared about the big meanings. Let them go. But to think that there was nothing out there at all. All the holidays . . . rites, rituals, ceremonies designed to ground human experience in some larger reality . . . smoke and mirrors. Nothing but human creations. (Hellenga 2006)

“Human creations” that are untethered from such non-negotiable truths as gravity, planetary motion, or seasonal changes, which together create the physical context out of which ancient spiritual and later traditional religious practices were forged. According to this logic, even Saturnalia and other pagan rituals must be considered cultural constructs with limited utility. Each is assumed to be a mere formality with limited connection to the harvest cycles that undergirded early urbanization, the ensuing division of labor, and numerous instances of complex human culture, including one’s own personal worldview, to have historically evolved. As the above quotation illustrates, individual worldviews are immensely important. Therefore, any aggregate shift in the dominant worldview associated with a given era or transitional period is of great interest because of the new lifeways and thus the material consequences it may bring.

4.2 Introduction

Our purpose here is to explore changing worldviews in the twenty-first century, what we refer to as *Culture-shift*. When we write about Culture-shift with an upper-case “C,” we are discussing those infrequent but monumental changes from one dominant worldview to another. Norwine (2008) likens these worldview shifts to “continental plates in collision.” Without going into detail here, we could argue that a shift from a Christian worldview to a scientific worldview in the West was an example of such a monumental change. Our argument is that some evidence suggests that we are in the midst of a major Culture-shift to a postmodern worldview.

Each worldview is a cluster of values that are profound and deep in their implications. A worldview provides a framework for explanations, constructs meanings, and helps direct the fashion in which we live our lives. Often the worldview is unconscious, a way of seeing the world or a way of being. The values may seem contradictory to an outside observer but not serve as a source of tension for the

individual believer. In fact, we argue that in the midst of the current change in worldviews, individuals may hold values from opposing worldviews at the same time. Such hybridization remains unproblematic for some; that indeed distinctly different worldviews, like those represented by modernity and postmodernity, are somehow reconcilable from a third viewpoint. However, one line of criticism suggests that there is no third position from which to declare that postmodernity has some good points and some bad points. This is because modernity and postmodernity are systems that determine not which particular points are necessarily good or bad but rather what defines a good or bad point. As worldviews, they wrangle over the power to either refine or erode the practice of making distinctions between good and bad. Hence, postmodern art and architecture purposefully dispense with convention as a means of breaking all the rules, while postmodern worldviews played out in lived-life adventurously challenge cultural norms by exchanging tradition and nostalgia for the deviant and the irreverent toward making the later two more commonplace in public life.

Let us be clear that what we mean by Culture-shift encompasses values as well as emerging technologies. In a sense, taken together, postmodern values and emerging technologies constitute a new “postmodern civilization.” The future of this new civilization is hard to predict. If worst-case scenarios about climate change are accurate, then the future might be grim. Nevertheless, the current major Culture-shift might very well lead to positive developments. Some commentators, like physicist and futurist Michio Kaku (2008), foresee a surprisingly happy future for humankind.

While we are not confident in predicting the future, our research among undergraduate students over the past 20 years gives us some confidence in advancing the thesis that a postmodern worldview is gaining strength. In the latter part of this chapter, we will discuss our findings. First, let us set the stage by taking an excursion both through popular culture (with a lower case “c”), and through some of what others have written about values and worldview shifts.

4.3 Background

About 25 years ago, co-author Norwine became fascinated by the late-modern phenomenon of human nature trumping nature-nature (paraphrasing Tuan), of culture replacing nature as the everyday “default” reality within which humans are imbedded. At the most primary level, this conceit is of course an illusion. Geographers hardly need to be reminded by tsunamis, AIDS, avian flu’s 70% human mortality rate, or simply stubbing a toe in the dark that any notion of culture actually replacing nature is laughable.

The seeming humanification of the world is indisputably significant, but over time, co-author Norwine’s attention shifted again to a subject J.K. Wright in a 1947 paper described as “geosophy,” (Wright 1947) the study of geographical ideas from any and all points of view. A number of leading American geographers, including notably David Lowenthal, Carl Sauer, Edward Relph, and Yi-Fu Tuan, fleshed out the body of the early geosophical work during the second half of the twentieth century.

By examining various geographies of the mind and the imagination of the everyday lives of people, such pioneering efforts validated the deepest desires of the human heart and soul as relevant topics of scholarly inquiry.

Of direct relevance to this chapter is the intellectual foundation that such geosophical inquiry has provided for our current discussion of worldviews, a term which subsumes under its aegis the imaginative thought-forms that help inform our collective valuescapes. Beginning somewhere around the middle 1980s, co-author Norwine thought he detected an intriguing change in the outlook of many college students. They seemed less likely than students a generation previous to assume the authority of objective evidence. Instead, authority for them appeared more and more to be *self-referential*, i.e., evaluating truth-claims on the basis on one's own personal life-experience. Norwine found himself wondering if this apparent change was genuine; if real, whether it could be studied empirically; and if it could, whether it reflected a larger, cultural equivalent to a scientific paradigm-shift, i.e., from a modern to a so-called postmodern outlook.

Thus an odyssey into the realm of valuescapes and worldviews began. Norwine already was reasonably conversant with the idea and literature of the "postmodern condition" but was curious about the particular on-the-ground implications of postmodernity for personal values, especially those of college students. A year spent reviewing the literature indicated that while sociologists, cultural anthropologists, and other social scientists had studied various aspects of ethical behaviors,⁴ values themselves seemed to have been neglected. Later, it would become clearer why the social sciences avoided values. Values are difficult to define, expressing as they do a worldview that is partly personal and partly shared with a cultural generation. Values are inherently ambiguous and slippery nearly beyond belief.

In response to such issues, Norwine assembled a multi-disciplinary team which, since 1990, has endeavored to identify and explore the postmodern "turn" as reflected in the worldviews and values of university undergraduates. Why this on-the-ground empirical approach? Because the research team is mainly interested not in intellectualist postmodernism but in the situated, lived-lives experience of *postmodernity*. Why university students? On the one hand, these students clearly represent many of society's future leaders, and on the other, their assumptions and attitudes would provide ready access to the *Zeitgeist* and, above all, to the content and direction of the worldviews and worldview changes of "youth culture."

4.4 What is a Worldview?

What is a "worldview" anyhow? The English word worldview, conventionally now one word, no hyphen, is derived from the noted German term *Weltanschauung* (Naugle 2002). Worldview is typically formally defined along the lines of "the

⁴ "Would you return a wallet which held \$500 and the owner's home address?" exemplifies a typical question of such studies.

overall perspective from which one sees and interprets the world, and a collection of beliefs about life and the universe held by an individual or a group” (*The American Heritage Dictionary of the English Language* 2000), but perhaps Edmund Husserl’s explanation is more helpful:

A world-view is . . . essentially an individual accomplishment, a sort of personal religious faith; but it is distinguished from traditional faith, that of revealed religion, through the fact that it makes no claim to an unconditioned truth binding for all men and communicable to all men . . . (Husserl quoted in Naugle 1970/1938)

Prior to modernity, worldviews were largely inherited and assumed; achieved wide, almost universal, adherence; and changed very slowly (Wikipedia 2003). One of the features that distinguished a modern worldview from its predecessors was the very notion of worldview itself, so that according to Heidegger (1982; quoted in Naugle) “the fundamental event of the modern age is the conquest of the world as picture.” As shall be seen, our work suggests that the still-unfolding so-called “postmodern turn” represents yet another worldview paradigm-shift.

A few additional thoughts concerning worldview may be appropriate. First, a worldview is not quite the same thing as philosophy or even a philosophy of life. Where philosophy has aspired to be a timeless, universal, quasi-objective discipline about the nature of being as such, a worldview is better thought of, to paraphrase Kierkegaard (who preferred the more existential *lifeview*), *a way of being in the world* (Naugle 2002). Wilhelm Dilthey claimed that “every true worldview is an intuit(ive) . . . attempt to solve the riddle of life” (Naugle 2002).

4.5 What and Why the “Postmodern Turn?”

Elsewhere, we have explored in some depth both the character, and a number of the possible explanations for, the West’s ongoing and unfolding postmodern worldview shift (Norwine 2008, 2009). Briefly, the condition of postmodernity is one which appears to be new and different in a number of fundamental ways. To mention but a few examples:

- the nature of authority has turned dramatically away from both traditionality’s sage and sacred text and away from the objective empirical evidence of modernity to an authority which is essentially *self-referential*, i. e., based on individual personal experience;
- personal identity has become much “lighter,” neither inherited nor “discovered” in any permanent or vocational sense but a matter of very personal provisional and ephemeral “menu-choices”;
- “meaning” is intuited to be partly or maybe entirely a human creation;
- the ageless verticality of values, with God and then Reason at the apex, has given way to flat, horizontal valuescapes in which all paths are equally (un)privileged;
- and in sum, things no longer seem to quite add up or make sense: the everyday, lived-life human experience is one of a world of ceaseless flux driven as much by randomness as by the remaining non-negotiable “rules” (e. g., gravity).

We have argued elsewhere (see Bruner et al. 1994) that, based on the findings of our long-term studies of student worldviews, the postmodern turn is a significant one, at least an important variant. Postmodernity seems to be an odd admixture of (a) a bit of tradition (such as family); (b) a touch of late modernity; (c) an uneasy truce between ultra-modernity and anti-modernity; and (d) a taste of post-postmodernity. All of this may signal an epochal shift equal in importance to the beginning of the scientific age. Whatever the nature and degree of this turn, what has brought it about? There are at least five different but somewhat related possible answers to this key question.

1. Bell (1980), Inglehart (2005), and his colleagues at the University of Michigan claim⁵ that several generations of affluence in the Western, developed world caused a general reorienting of values and a worldview change. Physical and economic security now is taken for granted. So-called “lifestyle” values such as privacy, environment, and quality of life were elevated from secondary to primary status vis-à-vis the Maslow-scale hierarchy of needs.
2. Fukuyama (1999) argues that there has indeed been a paradigm-shift, but that the principal cause was the combined effect of advanced technology, especially the rapid pace of technological change, such that “freedom of choice . . . exploded.”
3. Harvey (2005, 1990) offers a Marxist economic periodization argument. He claims that the driving force is an economic shift from Fordist to post-Fordist with resulting sweeping cultural consequences such as the normalization of personal insecurity.
4. Florida (2008) says that what has been/is happening is the consequence of “creativity” arising as both a primary social driver and human need/expectation.⁶
5. Finally, Wolf (1982) and many others claim that there has in fact been no such major paradigm-change, certainly not one of an epochal nature; rather, what we are witnessing are “merely” the symptoms and effects of a mature or aging but still dominant worldview, modernity.

4.6 Popular Culture

Fareed Zakaria (2005) in *The Post-American World*, writes, “The world we’re entering will look like Bollywood. It will be thoroughly modern—and thus powerfully shaped by the West—but it will retain important elements of local culture.” This pre-occupation with the West, especially the United States, as well as the recognition of the interaction between the West and the developing world, is a constant theme in current public discourse about values.

Lixin Fan’s (2009) documentary film, *Last Train Home*, portrays the journey of one Chinese couple among 130 million workers who travel home for the Lunar New Year. The parents spend a few days with their two teenage children, who are being

⁵ Based on very impressive worldwide empirical research.

⁶ Which might well have required the conditions and consequences of affluence and technology proposed earlier by Inglehart and Fukuyama, respectively.

raised by their grandmother. The annual movement of 130 million people is a story in itself, but the focus in this chapter is on changing values. For example, tradition still is strong in propelling the workers on an arduous journey for the New Year celebration in veneration of ancestors and of farming the land. But modern technology breaks into the frame when cell phones are used or when sports fans tune in to news about the Beijing Olympics and Yao Ming in the National Basketball Association.

Equally relevant to the discussion of values is the clash between the daughter and her parents. The parents believe that they are working so their children can have a better future. The parents emphasize studies, but the daughter is rebellious and drops out of high school to join the peasant workforce in the cities. She seems to be more interested in hairstyle, clothes, and fashion . . . in expressiveness. She also spends money more freely.

Finally, the family's story must be set in the context of world economic forces. The clothes that the parents make are almost all for the export market. So which worldviews and values will be stronger in 50 years? Tradition? Expressiveness? Consumption capitalism? If one looks to China to see a vision of the future, then the picture is not always clear. Our research indicates that *family* will remain one of the prime values of the twenty-first century. Yet in *Last Train Home*, the parents live in one place and the children in another place, except for a few days each year. How then shall we define *family*?

Let us leave this question unanswered for the present and turn to some other issues, this time in the United States. When one enters a Starbucks coffee shop where a significant number of persons are occupied with their personal computers, one is greeted with a slogan on the door: "Take comfort in rituals." This slogan serves as a transition to another possible pair of values in the twenty-first century. First, *ritual* could refer to brewing, serving, and drinking coffee, of course. But notice some deeper levels of meaning. The coffee shop is a public space. Second, the consumption of coffee is done in *community*. The customers may not interact with one another with the zeal that the servers interact with the customers, but there is some vague sense of community that draws persons to the coffee shop.

In the West, apparently the local organic food market is another site of community in the twenty-first century. Christian Lander (2008) is the author of the book, *Stuff White People Like: A Definitive Guide to the Unique Taste of Millions*. His pointed humor opens up perspective on values, as some social and critical humor is able to do. In a blog, dated February 3, 2008, Lander wrote:

White people need organic food to survive. Where they purchase this food is as important as what they purchase. In modern white person culture, Whole Foods has replaced churches and cathedrals as the most important and relevant buildings in the community Many white people consider shopping at Whole Foods to be a religious experience allowing them to feel good about their consumption.

We see in farmers markets, Trader Joe's, and Whole Foods the values *ritual* and *community*, along with the suggestion that *religion* in the twenty-first century will be a variegated experience. To what extent then does popular culture shed light on the role of religion in Culture-shift?

To answer this question in part, it might be useful to look at some recent data on *religion* from public opinion polls conducted by various organizations. In response to the question—“How often do you attend religious services?”—between 23 % and 33 %, ages 18-29, answered “once a week.” A consistent 20 % answered that they never attended religious services (Taylor and Keeter 2009). If science replaced Christianity in the West, then has some new form of religion or spirituality replaced Christianity?

4.6.1 *Research on Values*

Turning to other values in the United States, several commentators have attempted to ascertain if American values are strong or if they are in decline. Harry J. Gray (1989) asserted that “America’s basic values have not changed.” For him, some of the most dominant of these personal and social values are: moral integrity, personal freedom, patriotism, work, and being practical/efficient. On the other hand, Daniel Yankelovich (1981) claimed that “America’s Values are Changing,” and not always in a favorable direction. Yankelovich argued that new values were replacing traditional values, as in the case of a self-fulfillment ethic replacing a self-denial ethic, or love of ideas replacing hero worship. Our own values research also addresses the matter of changing values, and we look to college students for the answers.

Taylor and Keeter (2009) reported that despite not having full employment, Millennials are happy, and they are confident that in the future, they will earn more than they need. Being a good parent was very important to 52 % of Millennials. The respondents (ages 18–29) believed that what makes their generation different are the use of technology, music, pop culture, liberal/tolerant views, and being smarter. The report argues that there are three important influences on the attitudes and values of a generation:

- life cycle effects,
- period effects, and
- cohort effects.

Period effects leave a deep and lasting impression on young adults. Our own research is focused on the worldviews of undergraduate college and university students. Not only do we agree that values are shaped during the young adult years, we also argue that college and university students are likely to be gatekeepers and leaders.

4.6.2 *What are Values?*

Roy D’Andrade (2008) defined values as “the goodness attributed to something important.” He argued that values are numerous and intercorrelated. He acknowledged that “values are essentializing constructs,” and that it might be important

to distinguish between personal values (How important to me?) and institutionalized values (How important to being a doctor or a teacher?). D'Andrade found that "large differences in personal values across societies do not exist." This finding was similar to the conclusion of Inglehart and Welzel (2005) in their book *Modernization, Cultural Change, and Democracy*. They concluded that values can be adequately summarized in two basic dimensions: the traditional/secular/rational dimension and the survival/self-expression dimension. Inglehart found that, around the globe, economic development was correlated with value change. Self-expression increases, when survival seemed secure. Thus, in addition to helping us to understand values, D'Andrade, Inglehart, and Welzel point to some international, global, or cross-cultural similarities.

Shalom Schwartz (Esmer and Pettersson 2007) presented six main features of values:

1. values are beliefs,
2. values refer to desirable goals,
3. values transcend specific actions and situations,
4. values serve as standards or criteria,
5. values are ordered by importance, and
6. the *relative* importance of values guides action.

According to Schwartz, there are seven cultural value *orientations* that form three cultural value *dimensions* [emphasis added]. The seven orientations, some of which overlap with the categories developed by other researchers, are: harmony, embeddedness, hierarchy, mastery, affective autonomy, intellectual autonomy, and egalitarianism. He combined these into the three dimensions: embeddedness versus autonomy, hierarchy versus egalitarianism, and mastery versus harmony. Schwartz offered the cautionary note that survey researchers must be careful in constructing items that are consistent with basic values because context and domain have a significant impact on meaning.

Several scholars have reported what might be called "postmodern values." A position close to our position can be found in the work of Neil Nevitte and Christopher Cochrane (Esmer and Pettersson 2007). In the context of their article on "individualization" in Europe and America, they report two variants: (1) "postmodern individualization" and (2) a set of more empirically oriented conceptualizations that they called "postmodern libertarians." The former type experiences "precarious freedoms," meaning that few traditions and few unconscious habits are available or recognized to guide choices. With nothing taken for granted, this postmodern individual faces a constant "cloud of possibilities." Thus, "freedom" leads to too much "choice," which leads to an "overload of decision-making capacities."

On the other hand, the "postmodern libertarian," according to Nevitte and Cochrane (2007), has a "broad conception of autonomy that extends well beyond freedom." Accompanying this stance is "an eroding willingness to make sacrifices for others." In a most provocative conclusion to this article, Nevitte and Cochrane (2007) wrote: "secular and religious America are becoming far more distinctive in their religious outlooks." In fact, "secularism may turn out to be more akin to religiosity than to the absence of religiosity." The notion that secularism = religion reminds us of a comment by theologian Harvey Cox (2006).

In an interview for the book, *Global Values 101* (Holbrook 2006), Cox (2006) stated: “I did not see any religious movement or other kind of movement that could challenge the enormous power that the market—the market as God—seems to have acquired in our time and our society.” This blunt assertion, one that places a theological spin on Karl Polanyi’s (1968) position that the market has become the dominant contemporary institution, was accompanied by a poignant cry: “Is there anything in the world, anything at all, that should be excluded from the category of commodity?” With Cox, we also see the awesome power of values and a Culture (with a capital C) that is not a metaphor for God, but is God.

4.7 The Five Phases of Our Research into Undergraduate Worldviews

Our approach has been consistent with prior longitudinal research on values across cultures and around the world. With Schwartz (2007), we share the approach of testing a theory. With Inglehart (1990), we share the belief that there is significant evidence that indicates that we are in a worldview shift toward a postmaterial or postmodern worldview.

However, let us back up and describe our research project in more detail before we discuss our findings in the final section. We began our work in 1990 to 1991, exploring to what extent we could detect postmodern values in undergraduates. We sought to test a values theory, namely that:

1. identifiable clusters of values were found that could be understood as worldviews, and
2. these worldviews could be distinguished as Traditional, Modern, or Postmodern.

The Traditional worldview can be understood as a solid but backward-looking set of values, based on what has been handed down from previous generations. In this worldview, Family is important, as is Duty, and Nation. The Modern worldview can be summed up in the two words: Science and Progress. The Modern worldview holds that the problems of society can be solved through science and technology. The Postmodern worldview represents a radical rejection of master narratives and Truth with an uppercase “T,” as seen in the statement “Every idea is equally valid.” The self-referential reigns. Self-expression is prized.

With this conceptual framework in 1991, we surveyed 1,600 undergraduates at three public universities in Texas. Phase 1 of our project found strong identification with some traditional values, such as “honor,” and modern values, such as “technology.” However, 50–70% of the respondents agreed with statements expressing two postmodern themes: (a) the radical equality of all ideas and (b) the elevation of personal choice.

In Phase 2 of our research project in 1992, we used a shortened form of the Phase 1 survey to explore the values of students outside the United States. The results of this international survey of 1,000 students around the world were largely in line

with the findings of the 1991 survey. Respondents expressed even stronger support for traditional and modern values. At the same time, we noted affirmation of some postmodern values.

We were struck with the strength of agreement, both in the US and abroad, with benchmark postmodern statements, such as “My opinion is as valid as an authority’s.” A strong majority and an almost identical proportions of students (68% of the respondents in the US and 69% of the international respondents) agreed with this statement. This type of statement seemed to capture both the freedom/autonomy dimension of postmodern values as well as one form of radical egalitarianism.

Led by Allen Ketcham, our research team tried to come to grips with methodological issues and the depiction of data. We tried to hone the use of benchmark statements. We grappled with how much we could generalize from the data, because our samples of students were not random, but structured, availability samples. Ketcham also experimented with a graphic display of data. This visual report enabled us to see a kind of “cluster” formation of values and slow (glacial) movement in the students’ responses.

Phase 3 in 2001–2002 focused on the self, personal identity, and personhood. This time, we added a worldview called “Transmodern” to the three previous worldviews (Traditional, Modern, and Postmodern). With respect to the self or personhood, the Traditional view of self was defined as “self-transcended” by other values. The Modern view of self was defined as “self-realization.” The Postmodern view of self was operationalized as “authority in an exclusively self-referential mode.” The new category, the transmodern view of self, was defined as emphasizing choice but, at the same time, allowing some input from outside authority.

The data from four public and four religious-affiliated institutions suggested that the undergraduates’ views of self remained largely traditional and modern. Again, there was some evidence of the self-referential, postmodern view of self. There was some support for the transmodern view of self, but we were not certain at that point where to go with the concept. Finally during Phase 3, we were intrigued with the data that showed that undergraduates at secular/public/state colleges and universities were more likely to accept a more radical version of postmodern values.

During Phase 4 in 2003–2004, we focused on “environmentalism” as a value. The question that guided us was: Is environmental well-being non-negotiable? In addition, the research team raised the possibility that perhaps environmentalism was emerging as an alternative worldview. We gathered responses from 1,076 undergraduates at 12 North American colleges and universities. The results of the survey indicated that most of the undergraduates were pro-environmentalism. However, they were not as ready to accept lifestyle changes, especially sacrifice, on behalf of the environment. Personal choice, a key postmodern value, remained strong.

In addition, we observed two significant patterns in the response data. First, students at the public and West Coast colleges and universities were the most environmental and also the most postmodern. Second, there was some support for as well as ambivalence about animal rights. If radical egalitarianism is central to the postmodern creed, then must pro-environmentalists extend rights to animals? In response to the item—“Animals have rights equal to humans?”—the students at public

universities were evenly divided. Approximately 44 % agreed and 42 % disagreed. At religious-affiliated institutions, however, only 11 % agreed and 82 % disagreed. We sense that this is a crucial item in our research project because it connects to the debate over “exceptionalism.” Are humans unique (Smith 2012)?

In Phase 5, conducted during the 2006–2007 academic year, we focused on religious diversity. The focus was on aspects of “manyness”: difference, plurality, toleration, and diversity. The sample was skewed intentionally to draw respondents mainly from more conservative or tradition-based colleges and universities.

It was not surprising that traditional values and modern values were affirmed in the survey. However, even in this sample skewed toward traditional institutions of higher education, respondents affirmed some postmodern values as well as values directly related to diversity and toleration. In response to the item—“All values are relative”—52 % agreed. In response to the item—“Religious diversity is better” [than homogeneity]—53 % agreed. A similar number, 53 %, agreed with the statement, “Tolerance is my highest value.” Fully 70 % agreed with the statement, “My faith is not for everyone.” What appeared notable to us was that the respondents believed that their beliefs were true, but not for everybody. We noticed some “split” votes too where the undergraduates were divided. For example, on the item—“Yahweh, Allah, and the Christian God are all the same”—37 % agreed and 33 % disagreed. We were left to ponder whether diversity and toleration indeed is a defining, quasi-sacred feature of postmodernism. We postulated that certainty itself was in decline.

4.8 Discussion of the Results of the Five Surveys

One word to describe the results of the five surveys conducted between 1991 and 2007 is “eclectic.” The data clearly show that undergraduates can and do hold traditional, modern, and postmodern values at the same time. A traditional value like “happiness” or “family” typically received support from approximately 90 % of respondents across the years. Technology was highly rated in the surveys, although there was some doubt if technology could address all the challenges of the twenty-first century. Simultaneously, a postmodern value, such as “Everyone’s point of view is equally valid,” received support from approximately 70 % of respondents.

Another word to describe the results of our five surveys is “hybridity.” The values of young postmoderns are hybrid. Anything goes, except that undergraduates do not want to have their freedom and choices disrupted. At times, it seems as if hybridity is carried to the edge of incoherence. At the edge of incoherence then, the postmodern worldview has little room for judgmentalism.

In retrospect, we should not have spoken about values changing in a postmodern direction in 1991. That judgment was an intuition and a bit premature in the current culture of demanding “evidence-based conclusions.” After 20 years, we now can say with more confidence that a postmodern shift is occurring. However, the shift is slow and may be slowing in the West. It might be more accurate to speak of an incomplete, ongoing shift.

Some of the defining postmodern values are: personal freedom, self-referentiality as the source of authority, diversity, toleration, environmental well-being, and lack of certainty, along with the avoidance of most judgmentalism. Young postmoderns literally inhabit this space. As we said at the outset, Culture with an upper-case “C” may include values from popular culture (with a lower case “c”) but is a deep and profound way of seeing, meaning, and being.

Do young postmoderns experience any unease about the jumble of values and the apparently non-linear logic of their worldview? While we found some evidence of this unease, it would be overstating the case to claim that unease is a central part of the postmodern experience. In reporting on behaviors in his classrooms, Norwine noted that contemporary undergraduates occasionally wander in and out, sometimes wear seemingly inappropriate clothing, and from time to time appear to be unaware of other frames of reference. Are these behaviors purely a function of being 20 years old and not 60 years old? To some extent perhaps, but one of the main findings of our research project is that what may appear to be a lack of awareness actually is a new worldview inhabited by increasing numbers of people.

If we are in the midst of a shift in worldviews from modernism to postmodernism, then the insights of Thomas Kuhn (1962) and Max Planck (1949) still might be relevant. In speaking about scientific revolutions (paradigm-shift), Kuhn noted that even severe and prolonged anomalies in a crumbling worldview do not cause scientists to “renounce the paradigm that led them into crisis.” Planck observed that the keepers of the old paradigm are never convinced but eventually die off, leaving a “new generation that grows up (only) familiar with the new one.” Young adults not only do not *know* the old paradigm, modernism, but they do not and cannot *live* it.

If self-referentiality is the prime source of authority, then a correlate may be that “It is all about me” (i.e., the self). Yet, even this conclusion seems a bit harsh, because young postmoderns seem to enjoy small groups of friends. They also invest significant time and energy in social networking, especially on online sites such as Facebook. What are we to make of the preference for small clusters of friends and the ubiquitous drive to communicate, albeit, some of the communication patterns seem like reporting and exhibition rather than two-way interaction?

Part of the answer is peer pressure, which is nothing new. Part of the answer is popular culture, which also is nothing new. However, if Karl Polanyi and Harvey Cox are correct, then what *is* new is that the Market is God. It is believed to be the source of all value. Accordingly, the market is deemed nothing but the aggregate appetites of billions of consuming selves acting on Kierkegaard’s aesthetic principles in contradistinction to our ethical ideals. We cannot underestimate the power of the Market in shaping values and worldviews. At the very least, the Market explains the speed of cultural change. The Market is a major force in speeding the acceptance of ever-changing technologies, communications, and ways-of-being. As evidence, we point to the ascendancy of Google in all of its incarnations.

In speaking of the Market, we are reminded of the analysis of David Harvey (1990): “Postmodernism is nothing more than the cultural logic of late capitalism . . . the production of culture has become integrated into commodity production generally.” In other words, Culture-shift (upper-case “C”) is evident in the commodification (lower-case “c”) of everything. The result is that “ethics” is submerged by

“aesthetics.” The technical processes of late capitalism, according to Harvey, have much to do with the transition to flexible accumulation, competitive individualism, and the problem of the absorption of overaccumulation. For our purposes, suffice it to say that his thesis about postmodernism and late capitalism merits close scrutiny because it offers another coherent view of Culture-shift.

We also must reckon with Harvey’s insights on freedom. We agree with Harvey that an extreme, almost incoherent, view of freedom is one of the distinguishing values of postmodernism. According to Harvey (1990), this type of freedom is seen in “Postmodernism’s total acceptance of ephemerality, fragmentation, discontinuity, and the chaotic . . . , Postmodernism swims, even wallows, in the fragmentary and the chaotic currents of change, as if that is all there is.” The problem with this type of freedom in late capitalism is: “For those left or cast outside the market system Their only hope is to somehow scramble aboard the market system either as petty commodity producers, as informal vendors, as petty predators, or as participants in the vast illegal trade of trafficking in drugs, guns, women, or anything else illegal for which there is a demand” (Harvey 2005). This dire prediction, published in 2005, seems almost prophetic.

If Harvey’s analysis is on target, then what is the remedy for this sad, unchecked but market-defined freedom? What astonished Harvey (2005) was “the impoverished condition of contemporary public discourse in the U.S., as well as elsewhere . . . the lack of any serious debate as to which of several divergent concepts of freedom might be appropriate to our time.” In our work over the past 20 years, we have tried to describe and to understand the worldviews of contemporary college students. In addition, we must admit a strong impulse to enter into a dialogue about values and Culture-shift. Where to begin? Harvey (1990) suggests that a place to start the dialogue is:

1. to explore contradictions and
2. offer “a counterattack of narrative” in which one positions “ethics against aesthetics.”⁷

Since this chapter began with an endorsement of the proposition that new attitudes give rise to new ways of life, it may seem odd to end it with Harvey, an historical materialist who maintains that new ways of life give rise to new attitudes. We suggest that this contradiction can be overcome in this way. Postmodern attitudes are not *produced* by late capitalism as a sustaining ideology or superstructure, as Harvey’s Marxism maintains, but they are *promoted* in the environment of late capitalism. Attitudes are like animal species that thrive or languish with changes in the environment. Homologues of postmodern attitudes can be found in antiquity, passing under such names as cynicism, Epicureanism, and Gnosticism, but these attitudes were maladaptive and so relatively rare until only recently. Unlike all earlier economic regimes, late capitalism selects for these attitudes when it rewards individuals who

⁷ Our own very tentative exploration of the transmodern concept mixes reporting with Harvey’s emphasis on ethics. We have noticed in our data that some undergraduates seem to want a reference point outside of self. Environmentalism, from this perspective, may balance self-referentiality with reference to and regard for Nature or Mother Earth. For some students, “God,” “religion,” or “spirituality” may serve as an outside reference point.

travel light and are not encumbered by commitments. Since attitudes are adopted, not inherited, successful individuals have rapidly spread these attitudes through the population through the population.

The key to this postmodern attitude is the absolute value placed on freedom defined as choice or autonomy. This is a relatively new way to understand freedom that stands in sharp contrast to the classical view that freedom meant unhindered progression towards one's *telos* or destiny. In the new definition, freedom is an absolute dictatorship of the will, whereas in the older definition an untrammelled will was one of the greatest threats to freedom. Postmodernity celebrates fragmentation, discontinuity, and ephemerality because this is the pattern of the capricious will, moving from one desire to the next without rational order, discipline, or plan.

The capricious will is nothing new. What is new under late capitalism is that the capricious will is everybody's darling, not the dangerous rogue that classical moralists warned us against. (Smith 2012)

Let us conclude this chapter with a few observations about our student-values project. First, we have some confidence that our surveys, despite their obvious shortcomings—we take heart in the saying, “Be approximately right rather than exactly wrong” (attributed to John W. Tukey)—help us understand the ongoing, incomplete, but potentially profound shift to a postmodern worldview in the twenty-first century. However, although we have endeavored to think on a global scale, we have not done enough research outside of the United States. We look to the valuable input from international colleagues to supplement, modify, and improve our findings, and we encourage more dialogue about shifting values and the implications thereof.

In conclusion, in what we see as a potentially monumental Culture-shift, post-modern values, such as self-referentiality, freedom, toleration, diversity, nihilism, and the like, are emerging, linked to widespread affluence, rapidly changing technologies and a powerful market mechanism. This cluster of new normative values can appear bewildering and frankly incoherent to those who (still) apprehend and comprehend existence through the worldview lens(es) of—to put it into a crude but convenient shorthand—“modern/scientific materialism” and/or “traditional religion.” For that matter, contemporary young adults themselves seem mostly not particularly self-aware vis-a-vis their distinctive way-of-being-in-the-world. Nevertheless, we believe that their century is likely to be a hinge century with respect to the outcomes of Culture-shift, climate change, and their confluence.

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Part II

Imagining a World: General Impacts and Implications

Here we begin our project of world-imagining. These chapters are about potential outcomes and consequences, effects and impacts. They are transitional in the sense of bridging from Part I, in which the processes of climate change and culture-shift are defined and detailed, to Part III where we focus our world-imagining lens onto four specific regions. Although place is an important element here, this section is mainly thematic: environment in Chap. 5; mobility and demography in Chap. 6; and a first consideration of the most probable, significant pros and cons, as well as benefits and liabilities of climate change and culture-shift for the world to come.

Michael Jennings begins this section with his elucidation of potential consequences of twenty-first century planetary warming. By addressing specific kinds of effects in terms of specific regional examples, Jennings provides expert and thoughtful “framing” guidance—a sort of “preview of coming attractions”—to all the chapters to follow, most particularly those of Part III.

Koko Warner lays out in Chap. 6 the choices and policy pathways chosen today to frame and manage human mobility in the context of climate change that will shape the population shifts and stability of major social-climate interactions in the coming decades and centuries. Research has substantiated the fact that environmental change is one of a larger set of factors that affect human migration and displacement worldwide. Warner makes a case for actively discussing human mobility in the context of the United Nations Framework Convention on Climate Change (UNFCCC) climate negotiations, and examines stepping stones like paragraph 14(f) of the Cancun Adaptation Framework and the Durban Platform. From 2012 and moving forward, research will continue responding to Party questions about migration and displacement, and operational organizations will offer insights about the implications of climate change on resilience and vulnerability of populations of concern. With the inclusion of climate-induced displacement, migration, and planned relocation in the Cancun Adaptation Framework, new windows of opportunity have opened for work on the issue. In the coming few years, policy makers will require new ways of thinking and complementary institutional strategies to address the needs of people affected by climate change.

In the chapter by Davenport, the author first discusses the prospect for an integrated study of climate change and culture shift. Second, a heterodox approach

to understanding the biophysical basis of economic productivity is presented. This approach takes as its underlying premise the idea that unimpeded consumption of fossil fuels will narrow the range of possible climate scenarios on Earth as humanity attempts to orchestrate its future out of the social and natural system states available. Third, data from the United States Department of Energy Information are examined as a means of bringing to light, at least, one of the immediate affects that a warming climate will have on American citizens, domestic energy consumption. Last, he offers several thoughts on what these observations perhaps “mean.” in a broader sense relative to looming environmental hazards and the existential imperatives associated with a potential planetary decline in ecological health.

We speak here, of course, about significant events that have yet to pass; therefore, we are without the advantage of hindsight. Moreover, any predictions made of a seemingly uncertain future attempt to place *the unthinkable* in stark relief to the experiential clarity through which we occupy the present-day world. The present provides facts about which we may be confident, whereas the future offers up only biased speculation echoes the proverbial sync. Yet, it is precisely this tendency to cast the future through a lens of (over)certainty based on the presumptive assessment of present conditions that poor judgment may casually be made. An unsympathetic reading would hold such false certainties to be a reflection of society’s hubris, while an apologist might point to some lack of imagination on the part of those still unswayed by the evidence. After all, evidential data abounds but the willingness to parley this information into a credible vision of the future, which is then adopted as a basis for any widespread response has been thus far unrealized.

For some critics, *the unthinkable* future is unsuited to serve as an impetus for present change because of the high level of abstraction involved. At an annual Nobel Laureates roundtable discussion hosted by the Milken Institute, past prize winner in economics Daniel Kahneman spoke of the difficulties associated with garnering support for climate change adaptation efforts. According to Kahneman, whose academic training is in psychology, “it [climate change] is completely abstract as far as the population is concerned. Nobody is feeling a thing. . . . It is one of those situations where one has to question whether the social arrangements we live by are adequate to the threat that we might face.” This section of the book attempts to overcome the limitations of abstraction by crystallizing a long-range view of at least some of the particular threats that people living in the future are likely to encounter. We seek to imagine life amidst a warming planet as a way of learning to preemptively cope with conditions which currently exist as only abstract ideas—no more than information printed on a page.

Learning fast often requires fast thinking intelligent systems, including us humans, to devise shortcuts to help expedite the process of making judgments despite limited information. These convenient shortcuts to finding solutions are termed “heuristics.” A heuristic devise may involve staged simulations, a way of imagining, which appeal to our capacity to foreshadow hypothetical yet probable events that are hitherto not available for immediate experience. Our lack of a shared history with future conditions, like a warming planet, represents a significant gap in our experiential archive. By imagining a future world after climate change and culture shift, we are providing

surrogate information, a simulated albeit slightly less visceral experience, to help develop a heuristic that will aid in processes of *a priori* learning. Accordingly, these *simulation heuristics* provide counterfactual information or alternative scenarios that fall outside of the realm of our ordinary, everyday, lived experiential world. The scenarios offered in Part II urge us to consider alternative outcomes or future ways of being-in-the-world that demand solutions, a concretization of responses.

As a futurist project, the creative faculties that underlie such otherworldly ponderings can provide intellectual scaffolding to the overarching need for self preservation—be it biological in nature or of the economic, political, and environmental systems that undergird our social reproduction. From a social psychological perspective, like that reflected in the work of Daniel Kahneman, the various scenarios outlined in this section represent perhaps the least desirable of conditions against which veering trajectories that lead to *near misses* or more favorable realities might be purposefully taken. A somewhat unintended byproduct of this exercise is how it may serve to minimize any future regret associated with a collective unfamiliarity with these potential episodes. Similarly, any anxiety produced by these simulation heuristics is not a goal of the project. However, it may serve as a basis for soliciting the support of what Kahneman calls *motivated doubters* or people who are not entirely convinced of the presence of global warming but nevertheless understand the far-reaching implications and potentially severe consequences of not enacting mitigation efforts should their current belief go disproven—should the unthinkable become more than merely an idea.

It is in relation to this idea, these future realities, that we ask readers to consider the following chapters.

Chapter 5

Field Notes from the Future: Environmental Conditions at Four Localities in 2100

Michael Jennings

Abstract Missing from the literature on climate change are descriptions of what the specific surroundings at places might be like in 100 years, given the significant environmental changes that are expected. Through a set of short narratives, this chapter attempts to preview environmental conditions in Lower Saxony and Bremen, Germany; Gilan, Iran; Xishuangbnanna, Yunnan, China; and the Edwards Plateau, Texas, United States. These descriptions of future conditions are interpreted directly from published and peer-reviewed climate data that are projected for the year 2100. Their purpose is to illustrate the type, magnitude, and extent of biophysical alterations that are likely to take place at a localized scale, given the trends in greenhouse gas emissions from human enterprise. Annual water balance charts compare the climate of 1990 with that of 2100 at each location. While the narratives cannot depict precisely what conditions will be like, for the first time they do provide a lens through which we can get a ground view of what it is reasonably likely.

5.1 Introduction

Earth's biosphere, that thin sliver of soil, water, and air lying between bedrock and outer space, contains all life known to us. Although always changing, the biosphere's history is marked by five major episodes of radical change—changes identified in the paleontological record by sudden large reductions in the diversity of life forms (species, genera, families, and even orders) and sudden large changes in Earth's climate. In all likelihood, the biosphere is now committed to a sixth major episode, one that will play out over the next millennium. At this moment we are rapidly leaving behind the climate of the Holocene—the climate of all human history since the development of agriculture. Although still at an early stage, the onset of radical global change is now clearly evident (Committee on America's Climate Choices 2011) and manifesting faster than the rate at which previous major changes in Earth's systems have taken place, with the possible exception of catastrophic asteroid impacts. Over the next century, the seasons that we are so familiar with, the seasons our social

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and economic systems evolved with, will be greatly altered. They will be replaced by new patterns of seasonality, geography, and intensities of rain, snow, warm, and cold (Williams et al. 2010). The change will not only affect annual seasons of water availability and food production; “unseasonal” and extreme weather events will become common. Multi-year periods of drought or heavy rains will become more pronounced. “Normal” weather will be harder to define. Those types of changes drive the major alterations to the natural world, a world which we take for granted. We humans have set in motion a course by which today’s landscapes of forests, grasslands, agriculture, and coastal zones, along with the geographic ranges of plants and animals, are being and will continue to be profoundly transformed.

By now, a very large number of scientific studies on the changes that can be expected and the probable responses of biota to those changes, provide strongly converging lines of evidence for the magnitude of environmental changes that we are most likely committed to worldwide. Several entirely new scientific journals have been founded in recent years that specialize in one aspect or another of the rich literature of global environmental change. The rapid rise of this literature ranges from improvements in understanding atmospheric chemistry and transport as well as the enormous radiative forcing properties of gases that occur at low concentrations in the atmosphere, to new understandings of deep ocean heat, and so much more. Yet still missing from the literature amid the phenomenally rapid advances in climate change science are generalized narratives describing what the environments at certain locations may be like in 100 years given the immense environmental changes that are coming at us.

This chapter is an attempt to realistically preview environmental conditions at locations in Europe, the Middle East, Asia, and North America (Fig. 5.1). These descriptions are speculative in that they take place in the future. But while speculative in specifics, they are synthesized directly from climate data projected for the year 2100 that are published in the peer-reviewed literature and widely accepted.

The purpose of the narrative cases that follow is to illustrate the type, magnitude, and extent of biophysical alterations likely to take place at a localized scale given trends in human population size, economies, land uses, and, more than anything, the consequent greenhouse gas emissions from human enterprise. These descriptions do not include details of standards of living, economies, social contract, political stability, population number, and the like. These are left to the reader to infer from the generalized environmental circumstances.

Before venturing into these future places though, it is important to present a brief prognosis of Earth’s current climate disruption.

5.2 The Prognosis

The general framework used in forecasting future climates is the Intergovernmental Panel on Climate Change (IPCC) “Special Report on Emission Scenarios” (SRES; IPCC 2000; Moss and Edmonds 2010). The framework is based on the amount and

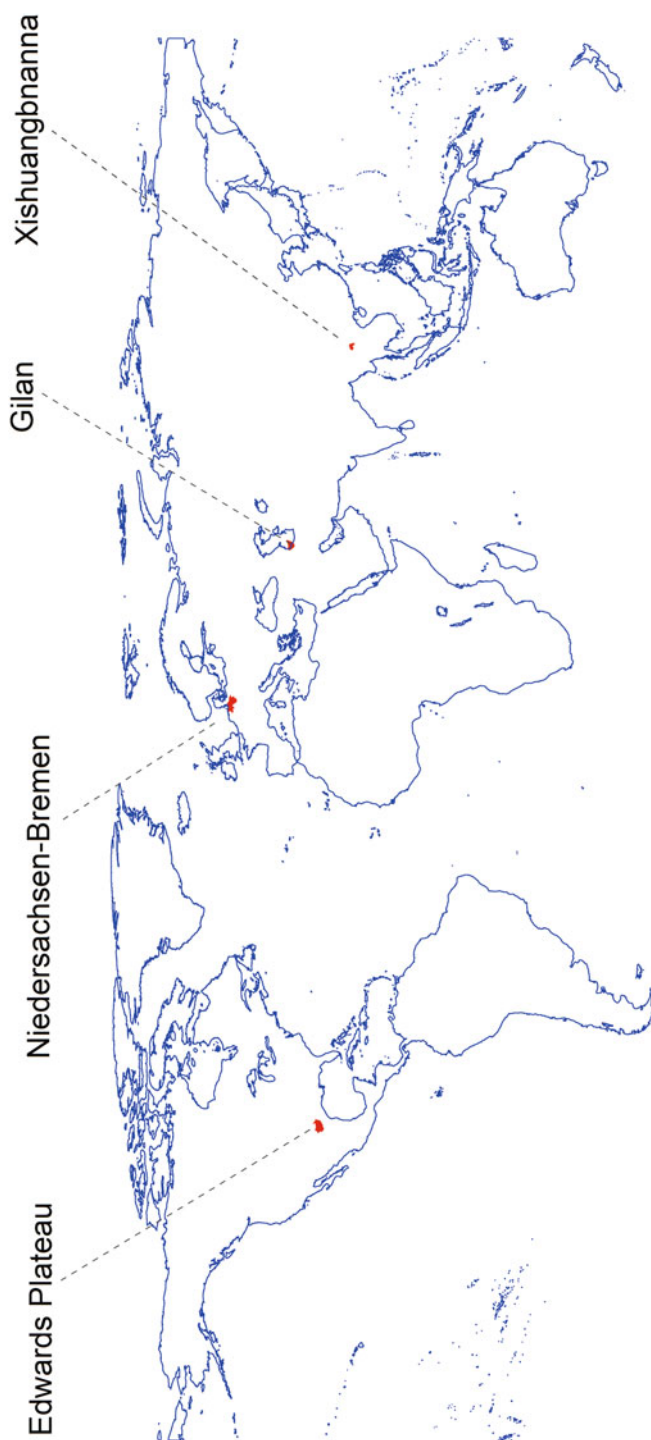


Fig. 5.1 Locations of the case studies

Table 5.1 IPCC (2000) future scenarios of human factors driving greenhouse gas emissions

Scenario family	A1			A2	B1	B2
Scenario group	A1B	A1T	A1FI			
Population growth	Low	Low	Medium	High	Low	Medium
GDP growth	Very high	Very high	High	Medium	High	Medium
Energy use	Very high	High	High	High	Low	Medium
Land-use changes	Low	Low	High	Medium/high	High	Medium
Oil and gas availability	Medium	Medium	High	Low	Low	Medium
Technological change	Rapid	Rapid	Rapid	Slow	Medium	Medium
Fuel mix	Fossils and non-fossils	Non-fossils	Oil and gas	Regional variation	Efficiency and dematerialization	Business as usual

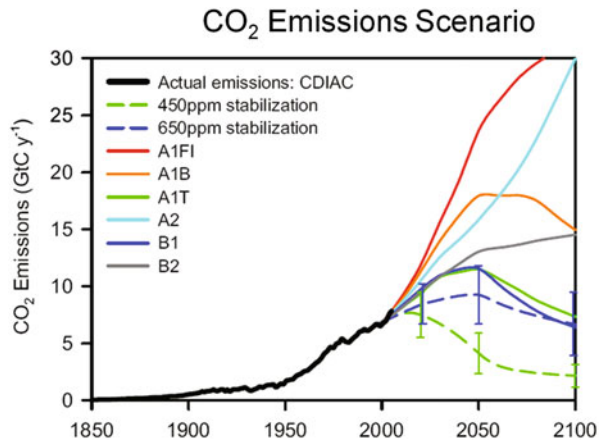
rate of change in the major factors that generate greenhouse gases, such as growth in human population, gross domestic product (GDP), energy use, and conversion of natural land to human uses, among other factors (Table 5.1). The value of the framework is in the comparative understanding it can provide about the different potential pathways of greenhouse gas concentrations in the atmosphere, thus the onset, magnitude, and severity of climate disruption under different sets of assumptions about future human behavior. Increases in atmospheric carbon dioxide (the most important greenhouse gas) from 1850 to 2005 and increases that are forecasted under different IPCC scenarios from 2005 to 2100 CE are shown in Fig. 5.2.

The most important factors in Earth's current climate disruption prognosis are:

- the lack of effective GHG mitigation response, and
- because of physical and biological properties of the biosphere, the longer mitigating actions are delayed, then the less likely it is that such actions can be effective at stabilizing Earth's climate and the more severe and irreversible the impacts (Solomon et al. 2009).

Another important factor in Earth's prognosis is that in 2007, when the IPCC Fourth Assessment Report (AR4; IPCC 2007) was published, an underlying expectation was that emissions levels would moderate under most of the future scenarios and that mitigation responses would be initiated. Because of this, most policy and research so far has stayed focused on the midrange SRES scenarios, such as A1B and B1 (Fig. 5.2; Table 5.1). In the years since 2007, however, no coherent or effective mitigation response has emerged, and the prospects for effective mitigation are dim and grow dimmer with each passing year (e.g., see Doyle 2011; Krauss 2011; Revkin 2010; Broder and Rosenthal 2010). The prognosis is made worse because of the likelihood that a variety of unstoppable amplifying feedback mechanisms have already been set in motion, e.g., ocean acidification, reduction in Arctic sea ice, release of tundra methane, and collapse of the polar icecaps. Evidence that these runaway processes

Fig. 5.2 Carbon dioxide emissions in gigatons per year, showing observed amounts from 1850 to 2005. Amounts predicted under the different IPCC (2000) scenarios are shown from 2005 to 2100. (Figure from Raupach and Marland 2007, reprinted with permission from the Proceedings of the National Academy of Science)



are in progress has become stronger as human-generated greenhouse gas emissions have continued an exponential increase of more than 3 % per year.¹ The exponential growth of greenhouse gas emissions actually puts Earth's current prognosis closest to the A1FI SRES scenario (Fig. 5.3). Yet, among the IPCC (2000) scenarios (Table 5.1; Fig. 5.2), A1FI represents the upper bound of predicted carbon emissions: the worst case scenario.

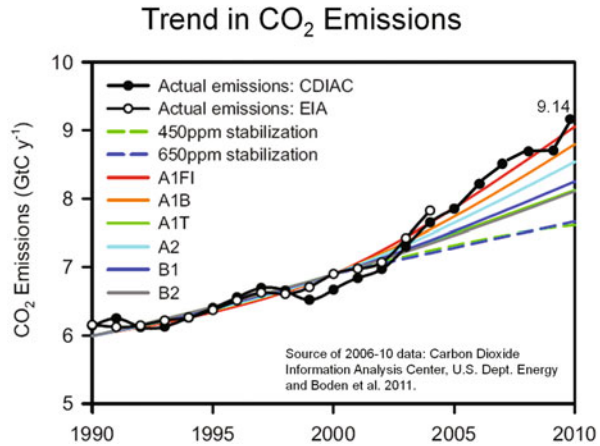
Corroborating Earth's A1FI worst case climate disruption prognosis is the climate modeling done by the MIT Joint Program on the Science and Policy of Global Change (Sokolov et al. 2009). This effort focused on strengthening those components of the overall forecast model that were the largest sources of uncertainties in the IPCC AR4 (2007). The areas of substantial improvements made by Sokolov et al. (2009) to global climate forecasting are shown in the list below.

- Increased resolution of the atmospheric model
- Improved the pelagic ocean model
- Implemented a sophisticated land system model
- Developed a more detailed and dynamic representation of economies
- Implemented a sophisticated land system model
- Used a new analysis of factors contributing to the uncertainty of emissions
- Used a more complete set of natural and anthropogenic forcings, such as carbon/nitrogen interactions

Importantly, the Sokolov et al. (2009) forecast of 21st century climate addresses emission levels in the absence of effective global mitigation policies. This approach reflects the results from attempts to forge multilateral greenhouse gas mitigation policy. It incorporates the fact that the ongoing exponential nature of greenhouse gas emission increases is rapidly decreasing the possibility that effective mitigation and stabilization can be achieved. Increases in surface temperatures by 2100 forecasted

¹ with the exception of a decrease of 1.4 % in 2009, reflecting the global economic downturn, but a meteoric 5.9 % increase in 2010 (Boden et al. 2011).

Fig. 5.3 Observed carbon dioxide emissions between 1990 and 2010, shown at a higher resolution than seen in Fig. 5.2 and with emission observations extended from 2005 through 2010. (The figure is based on Raupach and Marland 2007, reprinted with permission from the Proceedings of the National Academy of Science. Additional data are from Boden et al. 2011)



by the Sokolov et al. (2009) model turn out to be remarkably similar (on average $\pm 17\%$ depending on latitude) to increases forecasted by the Hadley A1FI model (Met Office, Hadley Centre 2006). Figure 5.4 compares 21st century surface temperature increases forecasted by the Hadley (2006) A1FI model and the Sokolov (2009) model at every four degrees of latitude.

Under the current A1FI trajectory forecasted by the Hadley model, the average surface temperature of Earth is expected to increase by $6.81\text{ }^{\circ}\text{C}$ ($12.25\text{ }^{\circ}\text{F}$) by 2100 over that of 1870 (the start of the Industrial Revolution) and $6.08\text{ }^{\circ}\text{C}$ ($10.94\text{ }^{\circ}\text{F}$) over that of 2000. Global averages do not, however, capture changes in the range of expected temperatures from place to place across the planet. The standard deviation of temperatures best expresses this fact. Globally, under the A1FI scenario, the standard deviation of surface temperatures rises from $0.5\text{ }^{\circ}\text{C}$ ($0.9\text{ }^{\circ}\text{F}$) in 2000 to $4.3\text{ }^{\circ}\text{C}$ ($7.74\text{ }^{\circ}\text{F}$) in 2100. The larger range in surface temperatures from place to place across the world in 2100 indicates the potential for steeper temperature gradients across Earth's surface, stronger flux in atmospheric mixing and therefore more violent weather events.

The single largest uncertainty about conditions in 2100 is how fast and in what way the ice sheets of Greenland and Antarctica will melt. The quicker they melt, the faster sea level will rise, flooding coastal zones of the world, the most densely populated places on the planet. The quicker they melt, the sooner the change in ocean temperature and depth (thus pressure) is more likely to release large amounts of methane (a potent greenhouse gas) trapped in submarine sediments, causing a magnifying feedback of yet even faster and greater warming. The quicker the polar ice sheets melt, the more immediate the prospect that the North Atlantic meridional overturning circulation between surface water and the deep ocean (the planet's heat distribution system) will be disrupted. Any one of these impacts would result in massive changes to the biosphere and trigger a cascade of the other amplifying feedback mechanisms.

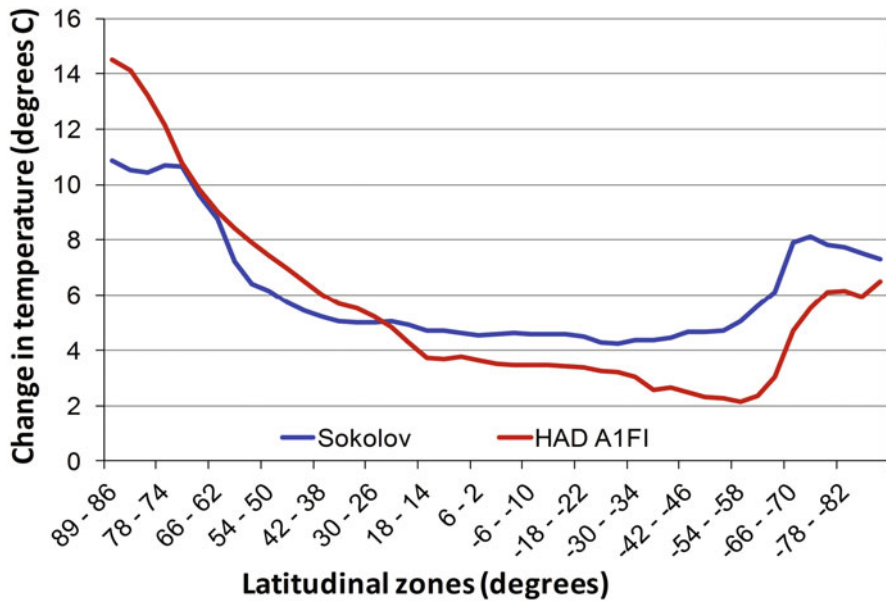


Fig. 5.4 A spatial comparison of the Hadley A1 FI and Sokolov et al. (2009) models showing changes in surface temperature that are expected across latitudinal zones between 2000 and 2100

A variety of studies conclude that warming at the poles ranging from 2.7°C (4.86°F) in Greenland (Gregory et al. 2004) to 5.8°C (10.4°F) in Antarctica (Lenton et al. 2008) would set in motion an unstoppable process of ice sheet collapse (also see Nicholls et al. 2011). The average temperature across Greenland rose by about 1.2°C (2.2°F) between 1870 and 2000 and is expected to rise another 14°C (25.2°F) by 2100 under the A1FI scenario. In Antarctica, the average temperature rose about 0.7°C (1.26°F) between 1870 and 2000 and is expected to rise another 3.2°C (5.8°F) between 2000 and 2100 under the A1FI scenario (Met Office, Hadley Centre 2006). The most recent study of polar ice sheet response to climate disruption indicates that were the global average temperature to increase by 3 to 6°C (5.4 to 10.8°F) by 2100 (in the A1FI scenario, the global average is 6.08°C (10.94°F)), a sea level rise of several meters by 2100 is not only likely but almost certain (Hansen and Sato 2012). A sea level rise of this magnitude in this century would beyond any doubt be catastrophic for humans and life on Earth as we know it.

5.3 Field Notes From Four Localities

In the stories that follow, the assumption is made that the polar ice sheets have not yet collapsed. Sea levels, however, will still rise and are represented in the storylines as is expected from some polar ice sheet and glacier melting along with thermal expansion

of the ocean water (Jevrejeva et al. 2012). In addition, an important compounding impact for the coastal zone is storm surge.

Unfortunately, few regional or local projections of 21st century conditions under the A1FI scenario and even global data are not readily available at localized levels of spatial resolution. Much of the information presented in the cases that follow is based on available A2 SRES (IPCC 2000) downscaled data (Tabor and Williams 2010). The point here is to let readers know that many conditions described probably underestimate the magnitude and severity of impacts that can be expected by 2100. In addition, it is less than optimal to portray effects of the current climate disruption episode in terms of average global temperature or even monthly averages of temperature and precipitation. Many of the most severe impacts will manifest by extreme events: increases in the range of variability in particular climate factors, for example, highest temperatures of the warmest month, number of days above 40 °C (104 °F), total precipitation of the wettest month, or precipitation seasonality.²

5.3.1 Europe 2100: Niedersachsen and Bremen, Germany, and Vicinity

In the winter of 2099–2100, northern Germany did not really undergo any freezing conditions. A few frosty nights occurred locally but certainly no sustained periods below freezing and no snow. Days in Bremen were cloudy and grey with average 24-hour winter temperatures of 4.5 to 5.5 °C (40.1 to 41.9 °F) across the region. A century ago, the average was –0.3 °C (31.46 °F) in Bremerhaven, –1.9 °C (28.58 °F) in the city of Bremen, and –1.8 °C (28.76 °F) in Hanover. The wind seemed to never stop last winter, driving the heavy rain, and at times, making it dangerous to be out in it. Then the really big storms, the hurricanes, come in off the sea with winds of 200 km/hr. The area endured two in the past 10 years, completely destroying the buildings and trees in their path.

Although somewhat less average precipitation occurs, these days (Fig. 5.5, Bremen Annual Water Balance) when it rains, it will be a heavy downpour. The sudden heavy rains then flood what used to be farmland, making the fields indistinguishable from the overflowing Weser and Geeste Rivers. Most of Bremerhaven was abandoned when the dykes and pumps, after years of building and reinforcing, failed once and for all during the great storm of 2092. The shipping terminals and cargo yards have been inoperable for some years. The coastline is all changed now as the sea has risen more than a meter in the last 150 years. The Jade Estuary now covers much of Wilhelmshaven and extends east into what used to be Bremerhaven and south to Wiefelstede. The coastal towns of Cuxhaven, Otterndorf are now abandoned.

The barrier islands of Wangerooge, Norderney, and the others are gone. Without the islands, the storms, coming one right after the other January through March, hit

² e.g., the standard deviation of weekly or monthly precipitation expressed as a percentage of the mean of those estimates.

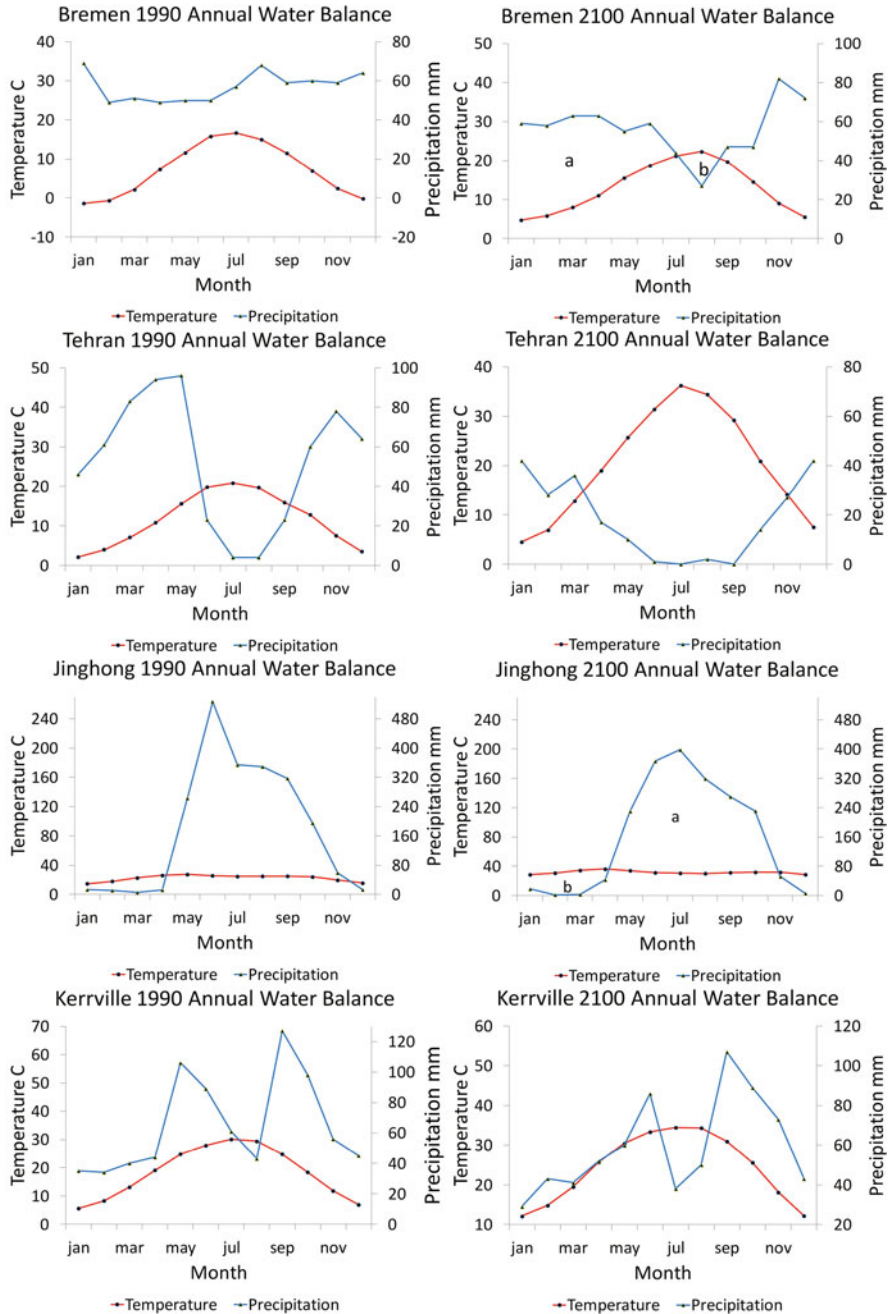


Fig. 5.5 Annual water balance in 1990 and 2100 in each of the four localities. Periods when precipitation exceeds temperature, for example, the area labeled “a” in the Bremen 2100 chart, are mesic and soil moisture for vegetation is ample. Periods when temperature exceeds precipitation, such as the area labeled “b” in the Bremen 2100 chart, are dry and soil moisture for vegetation is a limiting factor. (Data are derived from the HadCM3 model data (Met Office, Hadley Centre 2006) based on the IPCC (2000) A2 senario (Tabor and Williams 2010))

the coastline with full force. The surge of water driven before the storms pushes saltwater several kilometers inland, eroding the soil and leaving salt behind. The sea water has intruded into our groundwater too. Wells near the new coastline now produce brackish rather than fresh water.

Along coastlines across Europe, like here, millions of people have been displaced and now live in hastily built, crowded, and often miserable new inland cities. Here in the States of Niedersachsen and Bremen, Hanover and the city of Bremen are terribly overcrowded and sprawling. Elsewhere, portions of Amsterdam, Barcelona, Copenhagen, Dublin, Genoa, Hamburg, Helsinki, Lisbon, Liverpool, London, Marseille, Naples, Rotterdam, Stockholm, and Venice as well as smaller coastal cities and towns, became inundated and to some extent, depopulated. It's not just the rise of sea level due to the thermal expansion of seawater and the addition of liquid water from melting glaciers and polar ice caps, but the impacts from storm surge have been enormous as the storms have increased in size, intensity, duration, and frequency. The centers of most of the big cities maintain control to some extent with massive sea walls and gigantic pumps, but few people go there anymore.

The livestock that once grazed the pastures here are mostly gone, some swept away by the floods, but most were sold because the pastures are flooded in the winter, and it is almost impossible to make hay in the summer.

This summer has been unbearably hot and dry. It finally poured some and cooled down to the high twenties at night. The problem is, when it does manage to rain, it comes down so hard it damages the crops and vegetable gardens. We have to cover our gardens now against the heavy rain but the wheat and sunflower farmers are helpless. Every year, the hail storms come. While they occur in localized areas, they can decimate the crops. Besides, the new grain smuts have reduced the yields a lot in spite of new varieties and sprays. Widespread crop failures seem to happen every few years. If it is not a flood, it is a drought; if it is not a drought, it is a new disease or insect pest.

Since almost everybody grows gardens and forages for wild food these days, many have come down with encephalitis, which is carried by the ticks. Ticks and mosquitoes are everywhere from March through October. At least people here are not yet suffering from malaria, dengue, and cholera like those in the Mediterranean region.

Many of the birds that migrated along the Wadden Sea coast have not been seen in a long time. The pintails, mallards, and teals are still around, along with herring and common gulls. But the curlews, turnstones, knots, plovers, avocets, and oystercatchers no longer appear. In the summer, the stench from algae in the brackish lakes can be smelled from kilometers away. The terrestrial biodiversity of the region is very different than what it was. Missing now are the European treefrog, European otter, Eurasian red squirrel, white-tailed eagle, greater spotted eagle, corn crake, little bustard, and some of the bats, to name a few. Migrating songbirds haven't been seen in years.

Only the old people remember when the Harz Mountains were covered by conifers. Ever since the area stopped getting snow in the winter, the forest succumbed to beetles and disease. During the drought of 2057 to 2070, most of the standing dead trees

and the remaining live conifer forest burned and the ecosystem never recovered. Today, the mountains are a mix of grassland with some open juniper woodlands and alder shrubs. It rained hard in those mountains last winter, over 100 mm (3.94 in.) in February alone, with most of it falling during a five-day storm. A century ago, the February precipitation in those mountains totaled about 45 to 50 mm (1.77 to 1.97 in.), with most of that as snowfall. Quite a few towns in the area have been damaged beyond repair because of chronic, severe flooding. Many people lost their lives when the dam at Osterode am Harz was overtopped by a massive flash flood and then failed.

5.3.2 *Middle East: Gilan, Iran, and Vicinity*

Along the southwest coastal plain of the Caspian Sea, the summer heat wave sent temperatures into the fifties. Nobody goes outside in the middle of the day. Business starts up at 5:00 in the morning and shuts down by 10:00 a.m. The work may start again around 7:00 in the evening and carry on for a few more hours. But even at night, the air only cools down to the low 30s. Many of the older people are dying from the heat. Others spend their time remembering when July temperatures only rarely got above 30 °C (86 °F), and you almost always needed a blanket at night. But plenty of water is available thanks to all the impoundments that have been constructed throughout the Talysh and Elburz Mountains over the last several decades. That does not necessarily mean that summers are dry and humidity is low. On the contrary, the atmosphere is always heavy and sticky. The stored water is used mostly to grow rice. The impoundments are needed because not only does almost all of the precipitation occur during the winter, but when it does rain, it comes in violently torrential downpours. So a lot of reservoir space is required all at once. The impoundments also control the massive flash floods.

It is not that it rains all the time in the winter either, it does not. Some winters, the rain never comes. But over the years as the rain has gotten more sporadic, yet at the same time intense, the dams are less and less able to hold back the sudden floods. The reason for this is partly because the waterlogged hillsides are collapsing more often, filling the reservoirs with silt. Last November, the city of Rasht was heavily flooded when the region received more than 8 cm of rain in just 3 or 4 h. The impoundments in the mountains are often overtopped in the winter and the rivers frequently flood from November through April.

The floodwater, of course, suspends pathogens and chemicals from the soil, latrines, sewers, and sewage treatment plants, exposing those who come in contact with it as well as contaminating drinking water. Cholera has become common here. Mosquitoes breed year-round in the standing water, rising in huge swarms. We use mosquito nets at night and spray a lot to control them, but malaria has become all too common in the last few decades. Fortunately, we still have access to medicine. What we lack is a good treatment for is West Nile virus, which is killing more and more people.

The increased rainfall, however, has not raised the level of the Caspian Sea. The level actually fell by 10 m (32 ft) over the past century. Even though more rain occurs, we have an even greater amount of evaporation because the air is so much warmer—thus all that humidity—and the Caspian has shrunk. In places, the shoreline is 500 m (1,640 ft) out from where it was 50 to 80 years ago.

It is just as well the shoreline is further away from the infrastructure and farms because the storms hit the southern shore with a force that would be unimaginable to our predecessors. The beaches have eroded into small bluffs. The altered shoreline makes little difference to most people now since the fishing industry collapsed. Sturgeon have not been caught in years. There was a time when their roe was worth more than gold. Some shipping still occurs, although the harbor at Bandare Anzali had to be rebuilt to accommodate the new water level. One of the main problems with the sea these days is the thick carpet of algae that now persist year-round. Tons of algae are deposited on the beaches and against the bluffs where it rots. Some say you can even smell it in Tehran when the wind is right. The southern end of the Caspian has become a dead zone. Boating now is difficult for all but the largest vessels because of the thick continuous mat of algae. Boating is dangerous because ferocious unforgiving storms can come up within minutes.

In spite of the very different climate in Gilan today from 50 or 80 years ago, some remnants of what had been the species-rich mixed deciduous forests of the Talysh Mountains are surviving at higher elevations. The chestnut-leaved oaks, ironwoods, Persian silk trees, and date-plums can still be found in ravines and sheltered pockets. Even some of the understory shrubs are there: Alexandrian laurel, ilex, perennial broom, and smilax. Sadly, none of the oriental beech forests still exist. And gone are the subalpine steppes, dwarf shrubs and oriental oak. Most of Talysh Mountains are now open shrublands. Many of quite diverse set of herbaceous plants that occurred throughout the ancient Hyrcanian region³ were relicts from the Paleocene, some 55 million years ago. Few have survived the sudden environmental changes of the last century.

Gone are most of the migrating songbirds, the warblers, flycatchers, larks, tits, and redstarts. Most of the shorebirds have disappeared too: the lapwings, plovers, avocets, stilts, oystercatchers, thick-knees, turnstones, sandpipers, curlews, and godwits that used to migrate through or winter here in massive flocks, along with the storks, cranes, spoonbills, swans, pelicans, grebes, and loons, which went missing several decades ago. The raptors have also disappeared: buzzards, eagles, vultures, griffons, falcons, and goshawks. We can only speculate why the birds disappeared, but clearly it was worse for the species that migrate. Many of the small mammals still survive, even some of the bats, though Blasius's Horseshoe Bat is presumed extinct. Gone too is the Eurasian lynx, brown bear, goitered gazelle, and long-clawed ground squirrel. More than half of the fauna have become extinct or extirpated in the last century.

A lot of effort is going into keeping the forest remnants that do still exist. In their day, during the early part of the 21st century, our grandparents dismissed out of hand the idea of human-caused global climate disruption. Now many of them, those who

³ the Caspian was called the "Hyrcanian Sea" by the early Greeks.

have themselves managed to survive the turbulent years since then, are desperate to preserve nature's genetic stock. The old folks always talk about replanting the forests. Everybody is sensitive to what has happened elsewhere. People left Tehran in large numbers in the 2070s because of the heat. The air became so hot and dry for so much of the year that, with the extreme evapotranspiration (Fig. 5.5, Tehran Annual Water Balance) and the high cost of water pumped from the north, most of the city's shade trees and what used to be luxuriant landscapes are no longer possible, making it even hotter yet.

Elsewhere in the region: Most of the buildings in Riyadh and Abu Dhabi these days are underground as the outside temperatures can be lethal during the day. In Cairo, the average July temperature has gone from 26 °C (78.8 °F) during the decade of the 1990s to 34 °C (93.2 °F) during the decade of the 2090s. The fact that those "averages" belie is the spikes of extreme heat waves, heat that kills. Although the Nile continues to flow, its seasonal hydrology above Nasser Lake has shifted to a narrower peak discharge period: from about 800 million m³/day during in September to less than 100 million m³/day between January and June. Unfortunately most the Nile Delta agricultural land is now either flooded by the Mediterranean or so saline and waterlogged as to be useless. Alexandria is permanently flooded and has been abandoned, as have many parts of Gaza City, Ashdod, Tel Aviv, Beirut, Antalya, Izmir, and even some of Istanbul and Kuwait City, just to name of few of the former centers of 20th century population.

5.3.3 *Southeast Asia: Xishuangbanna China, and Vicinity*

By late February, everybody was astounded and worried that the Lancang River (Mekong River) had gone dry in the reach where the river enters the Jinghong Dam reservoir, 36 km upriver from Jinghong, in Xishuangbanna (pronounced "Sísóng-pännǎ") Prefecture of Yunnan Province. Even though drought had become more frequent in the last several decades and the region had become a lot drier, this had never happened before. The only available surface water now is in the reservoir, the top end of which is just on the north side of the Mengyang nature reserve. Downstream, some water is still being released by the dam for hydroelectric generation, but it is minimal because nobody knows just how long the drought will last. It could easily stay dry until April, but what if the summer monsoons fail? After all, the seasons are not really predictable anymore, not like they were at the beginning of the last century. Fortunately, the reservoir is full from last year when Xishuangbanna and all of Yunnan suffered months of unprecedented nonstop heavy rain, causing persistent flooding and many massive mudslides. Unfortunately quite a bit of the reservoir's volume filled with silt, so the amount of water behind the dam this year is deceptively small. With several centuries of soil erosion and degradation throughout the rugged Lancang River Basin, whatever soil that still exists on the hillsides has little water holding capacity.

The swings between floods and droughts have become deeper and more prevalent in recent decades, but now, at the beginning of the 22nd century, it seems that this region stands at the threshold of an entirely new type of climate. It is not just the exaggerated and unpredictable wet periods and dry periods (when they were regular they were referred to as seasons), but also that for several years in a row a monsoon can be more like a protracted typhoon. Then for several years, little rain will fall during what used to be the monsoon season. Now, since glaciers no longer exist and very little snowfall occurs in the Himalayan or Hengduan Mountains, the hydrology of the region's rivers responds only to the rain, which always comes down hard and fast, making the rivers prone to flash floods. The rivers sometimes rise so fast from intense storms in the headwater areas that people using the rivers or on the banks are all too easily swept away.

These days, the landscape of Xishuangbanna is mostly grassland. Only a few hundred years ago, it was an unimaginably rich rainforest. Less than 100 years ago parts of Xishuangbanna were among most important biodiversity hotspots in one of the greatest "megadiverse" countries on the planet. The rainforest habitats and their biodiversity were replaced with rubber trees on the slopes and tobacco on the flat land mostly during the 20th century. We have some idea of what it was like because the nature reserves still exist (Mangao, Nabanhe, Mengyang, Menglun, Mengla, and Shangyong, which together cover 4,589 km²). Although their natural vegetation has changed, they still harbor some of the flora and fauna that existed from before the climate changed. Probably because the evapotranspiration is so extreme now due to the high temperatures—an average of 30 °C (86 °F) in July with highs in the 50s even though almost 400 mm of precipitation still occurs (Fig. 5.4, Jinghong Annual Water Balance)—many of the tropical evergreen broadleaf tree species have been replaced by palms and bamboo. The situation worsens by the irregular timing and character of the seasons along with wildfires driven by high winds during the droughts.

But wild elephants still roam in the reserves. For their survival it is a good thing that the Jinghong Dam reservoir sits adjacent to the larger reserves. Sometimes the elephants are seen wading in the shallows. Very sadly though, most of what was some of the richest biodiversity in the world has disappeared. Some of the monkeys are still around, but many species, such as the snub-nosed monkey, agile gibbon, Bornean yellow muntjac (a deer species), Anderson's squirrel, red-throated squirrel, and Chaotung vole succumbed to extinction 20 or more years ago. Extinct too are the red panda, jungle cat, sun bear, yellow-throated marten, Chinese ferret-badger, yellow-bellied weasel, marbled cat, fishing cat, spotted linsang, and Asiatic black bear, to name some.

Of the 400 bird species that occurred in Xishuangbanna at the beginning of the 20th century, only about 150 are still here. Some birds are only known from old lists, others are remembered by those who are old enough and still able. Just to recognize a few of those wonderful, now lost creatures who once brought joy and graced us with their presence: the Chinese francolin, lesser whistling duck, little grebe, cinnamon bittern, pied falconet, peregrine falcon, Himalayan griffon, grey-faced buzzard, ruddy-breasted crake, Sarus crane, northern lapwing, little ringed plover, pheasant-tailed jacana, river tern, Asian emerald cuckoo, spot-bellied

eagle-owl, orange-breasted trogon, pied kingfisher, blue-bearded bee-eater, Oriental pied hornbill, coppersmith barbet, rufous-bellied woodpecker, eared pitta, Burmese shrike, bronzed drongo, thick-billed warbler, golden babbler, and the short-tailed scimitar-babbler.

Many of the hundreds of fish species that once lived in the Lancang River are also gone. Some say the legendary giant catfish are still there, but we never see them in the market. Gone are most of the barbfish, freshwater sharks, loaches, redbills, and glassfish, among so many others.

One of the species that has increased a lot in the last few decades in Xishuangbanna is *Homo sapiens*. In the year 2000, close to 55 million people lived in the coastal zones of nearby Guangxi and Guangdong provinces. By 2030, about 100 million people lived there. But as the typhoons became stronger and larger, more and more people found it impossible to recover from the damage. Now several typhoons, including one or two Category 5s, will hit the South China coast in each year. Back in the 2080s when this began happening one year after the other, many people left the coastal area, which is one reason why the population of Xishuangbanna has increased so much. Another reason is that many people living on steeper slopes in rural parts of Yunnan are dislocated each year because of hillsides collapsing. Still others living in valleys were forced to relocate because of floods. There have been many deaths in the last 50 years from these events. In Viet Nam, Hai Phong, Ha Long, Quang Ha, and Mong Cai are mostly flood damaged with fewer people still living there. In Guangxi and Guangdong, Sunwu, Wangzhu, Fangchenggang, Qi Shazhen, Bhihai, Haikou, Zhanjiang, Xiashan, Shabazhen, Macau, and Shanwei are flooded and in places, abandoned. The flood wall around Hong Kong still holds, but few people have stayed there. With the infrastructure of the coastal zone so damaged and the crowding of inland cities like Jinghong, cholera, dengue, typhoid, and malaria are everywhere. As the death rate has risen, the birth rate has declined precipitously.

5.3.4 North America: Edwards Plateau, Texas, USA and Vicinity

In early August when Hurricane Fay hit where Freeport used to be, the former city had been under tidal influence for 12 years. It was another Category 5 with sustained winds of 180 km/hr. There was not much damage in the coastal zone counties of Brazoria, Matagorda, Wharton, Colorado, and Fayette because there is little infrastructure and few people left after decades of heavy storms, hurricanes, and floods. At the beginning of the 21st century, about 18 million people lived in the Gulf Coastal Zone (CIESIN 2005), which is the area under the influence of coastal storms and flooding extending from the Texas-Tamaulipas border to the Florida Keys. The population of the coastal zone peaked around 2070 at about 40 million. Today, very few people are able to live within the coastal zone on a long-term basis because of the frequency and intense destructive force of the storms along with the 1.5 m (almost 5 ft) rise in sea level accompanied by storm surge flooding, which with a hurricane like Fay can be more than 5 m (18 ft). The same pattern of population decline occurred

across the combined Gulf and Atlantic coastal zone—from the Texas-Tamaulipas border to the Maine-New Brunswick border.

More than 90 million people lived in the Gulf-Atlantic Coastal Zone in 2000 (CIESIN 2000) and just under 210 million at the peak in 2072. In the 28 years since then, more than 200 million people have been dislocated from the Gulf-Atlantic Coastal Zone.

Fay tracked inland to the northwest along the Colorado River. By the time it hit Austin, 272 km (169 miles) and almost a day later, the hurricane had subsided to a Category 2. It became a tropical storm from there and dissipated out over the Edwards Plateau, dumping 32 cm (12.6 in.) of water in 10 h onto the scrubby eroded land, causing widespread severe flooding. While the flooding brought Edwards Plateau residents and business to yet another standstill, people have become inured to such events. Just four months earlier, a family of tornadoes spawned across the Plateau with one reaching F4⁴, decimating the city of Jarrell and a stretch of Interstate 35. Jarrell took an F5 hit in 1997, but back then, tornadoes greater than F1 were uncommon in this region. These days on the Edwards Plateau there are several greater than F2 each year.

In the last 30 years, more and more houses, offices, and shops have been built underground. The reason is not solely due to the storms and tornados though. The average July temperature in Kerrville is 34.5 °C (94.1 °F). The area frequently experiences temperatures of more than 58 °C (136 °F) during the prolonged heat waves and droughts. With much higher temperatures and less rainfall, water in the ponds, lakes, and rivers of the region evaporates quickly (Fig. 5.4, Kerrville Annual Water Balance). The region's domestic water supply is provided first by recycling all wastewater, and second by pumping as much runoff as possible into the Edwards Aquifer for storage. Massive impoundments are needed to store the runoff because the rain comes in such sudden, violent, storms. Little of the discharge from the Colorado, Guadalupe, Medina, and Nueces Rivers reaches the Gulf anymore. Access to and cost of water went from being a touchy subject a hundred years ago to being ultra-regulated today, since potable water is the most expensive basic cost of living item in the region. Wasting water on anything but direct consumption by humans or livestock is a punishable offense.

The landscape of the Edwards Plateau today is made up of a mosaic of sparse shrub and annual xerophilic forb-grass vegetation. Along the region's geographic moisture gradient, running from wetter in the southeast to dryer in the northwest, shrubs are more prevalent to the southeast and forb-grass vegetation to the northwest. The long periods of drought made it impractical to graze cattle here decades ago. Today, the land that can be grazed is grazed by goats since they will browse the shrubs and

⁴ An F1 tornado causes *moderate damage* with winds of 117 to 180 km/h (73 to 112 mi/h); an F2 tornado causes *considerable damage* with winds of 182 to 253 km/h (113–157 mi/h). An F3 tornado causes *severe damage* with winds of 254 to 332 km/h (158 to 206 mi/h). An F4 tornado causes *devastating damage* with winds of 333 to 419 km/h (207 to 260 mi/h), and an F5 tornado causes *incredible amounts of damage* with winds above 420 km/h (261 mi/h) (Fujita 1971; NOAA Storm Prediction Center 2011).

require less water than cattle. The landscape had already been extensively altered during the 19th and early 20th centuries from its earlier condition of oak and juniper woodlands thinning to savanna mixed with mesquite and acacia. The wonderful species richness of grasses included Texas grama grass, three-awn grass, mesquite grass, buffalo grass, little bluestem grass, Texas winter grass, hairy grama grass, and muhly grass. Gallery forests that occurred along the creeks and rivers, had bald cypress, sycamore, and black willow. Alterations to the biota since the current period of accelerated climate disruption have been even greater than the changes that took place during the 19th and early 20th centuries. A century ago, much of the Edwards area was rangeland and improved pasture mixed with woodlots and some cropland used for growing cotton and sorghum. Virtually all of that type of landscape was lost during the deep droughts of 2050s through the 2080s. When most of the vegetation burned, the rangeland plant communities, planted pastures, woodlots, and croplands ultimately never recovered. A combination of roads, farmsteads, grazing patterns, and patterns left from the fires resulted in an extensively fragmented landscape along with the extirpation of almost all but those generalist species that can tolerate both seasonal and multiyear drought yet have an ability to grow and quickly reproduce after periods of rain.

The cities such as San Angelo, Kerrville, and Brownwood grew dramatically in the 2070s and 2080s with the resettlement of the several million people displaced from the coastal zone. Those were boom times on the Plateau. Real estate prices went up, a lot of new infrastructure was built, and great progress was made in water management and conservation.

The natural heritage that once made this region biologically unique and precious, existing as it did for thousands of years as the membrane between the New World tropic and the temperate realms, is gone forever. Extinct now are the Texas salamander, Cagle's map turtle, Townsend's big-eared bat, ferruginous hawk, red-headed woodpecker, Bell's vireo, Sprague's pipit, golden-cheeked warbler, chestnut-collared longspur, and the painted bunting. Extirpated from the Plateau because of the change in climate over the past century are the salamanders (such as the tiger and northern slimy), most of the toads (including green, Baird's, Texas, gulf coast, Woodhouse's), the frogs (northern cricket, Strecker's, robber, cliff chirping, Great Plains narrowmouth, and couch's). The northern river otter, eastern fox squirrel, southern flying squirrel, eastern cottontail disappeared during the long droughts when most of the shade trees died. Gone too are the grebes, ducks, herons, shorebirds, ibis, cranes, cuckoos, anis, the northern saw-whet owl, kingfishers, woodpeckers, virios, bluebirds, nuthatches, wrens, and warblers. The Edwards Plateau today is biologically impoverished.

The 680,000 hectares once devoted to improved pasture and rowcrops are now largely lifeless compared to what they once were. The soil of this former woodland-savanna-grass-shrubland is about one quarter as productive in net primary productivity (or NPP, the ecosystem equivalent to GDP) as it was just a hundred years ago. Under climate disruption of the last century, the ecosystem became less resilient to disturbances, which increasingly occurred at levels of intensity and geographic extent beyond what for thousands of years had been the normal range of variation.

The disturbance regimes (combinations of fire, herbivory, and burrowing) required for these ecosystems to function are now themselves missing, resulting in greatly decreased soil organic matter, widespread soil erosion and soil compaction, along with a reduced water holding capacity of the soil and the capability for nutrient cycling.

5.4 Epilogue

A common problem with land cover maps rendered from satellite images is that, on occasion, an observer will pick out a single location on the map that they are personally familiar with and, for example, declare that the vegetation at that location is in fact forest, not woodland. Then on that basis, they will pronounce the entire data set erroneous and of no value. This ignores appropriate applications of the land cover data at given spatial resolutions and misses the point of modeling the occurrence of some feature or set of conditions at certain scales, whether across space or time. It ignores the importance of synthesizing general patterns that such data are able to capture and incorrectly assumes that all maps must have infinite accuracy to be valid or useful. So may be the case with the projections made in the above scenarios. These storylines cannot depict exactly what conditions will be like in Bremen, Gilan, Xishuangbanna, or the Edwards Plateau in the year 2100. Rather, from interpretation of forecasted climate and other data, they provide a lens through which we can view what is reasonably likely or probable.

If anything, these scenarios are perhaps conservative in their portrayal of the amount of environmental change expected between the early and late 21st century due to human caused climate disruption, as discussed in the prognosis. The single most important uncertainty is how fast the ice sheets of Greenland and Antarctica will degrade. Should the polar ice sheets collapse:

- climate disruption would accelerate because of changes in the albedo of large areas of Earth's surface
- there would be significant alteration to ocean currents and the distribution of heat across the biosphere
- thus changes to hurricane and cyclone size, intensity, and tracking, and
- the sea level would rise by several meters.

Under this condition, the amount of coastal flooding portrayed in the above stories seems trivial. Our understanding of just how polar ice sheet degradation and other major amplifying feedback mechanisms will unfold is still limited. One recent important insight, however, is in how overall warming is likely to proceed. Rather than an even rise in global temperature over the coming decades, climate disruption is more likely to follow a step function of roughly a decade of little change and then several years of rapid change. This is due to the dynamics of ocean circulation and the sequestration of surface heat to the deep ocean (Meehl et al. 2011).

The losses of species described in the storylines is speculation based first on assuming that those species already threatened with extinction will not survive, second

that endemic and specialized species are more vulnerable to extinction or extirpation because of climate disruption than generalist species, and third that migratory species are more vulnerable than non-migratory species. This scenario does not include the downstream ecosystem impacts from the losses of species—interactions among species such as predator-prey, symbiosis, and nutrient cycling. These effects, however, will be far deeper and wider than merely noting the losses of large portions of regional fauna. The impacts of new species that will invade to occupy new niche spaces are yet unknown and not addressed in these stories, but those effects on ecosystem functions and structures will be considerable.

So the inevitable question arises: what is the possibility that the conditions presented in the above scenarios can be avoided? First, it must be recognized that replacing the world's fossil fuel baseload electric generating capacity of 13,674,797 GW⁵ along with world fossil fuel non-electric industrial heat production of 12,208,071 TJ⁶ (International Energy Agency, Statistics & Balances for 2008) is simply not realistic in the near future—and this says nothing about transportation energy. In short, the political potential of achieving adequately effective global mitigation of greenhouse gases before unstoppable feedback mechanisms are unleashed (and some are already in motion (i.e., Shakhova et al. 2010)), is, at best, low.

While every effort should continue to be made to mitigate greenhouse gas emissions, however slim the chances of success, substantially greater investments should be made in developing easy to understand, data-driven portrayals of future conditions so that citizens, governments, businesses, and other institutions can better grasp and come to terms with the conditions that are most likely in order to better prepare for and adapt to a very different world.

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⁵ as of 2008; about 80 % of all electric generating capacity.

⁶ 92 % of all non-electric industrial heat production

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Chapter 6

Getting From Here to There: Policy Pathways to Address Human Mobility in the Context of Climate Change

Koko Warner

Abstract The central message of this chapter is that the choices and policy pathways chosen today to frame and manage human mobility in the context of climate change will shape the population shifts and stability of major social-climate interactions in the coming decades and centuries. Empirical evidence is emerging about the interaction of climatic variables today with factors that affect migration decisions: livelihood and food security, personal safety, protection of assets, and expectations about opportunities in the future related to climate change. Climate science is also providing modeling results of future impacts with increasing levels of certainty. Thus a gap is notable between what we are beginning to understand about climate variability and human mobility today and longer-term climate change and population distribution in the future as well as human mobility. This chapter makes a case for actively discussing human mobility in the context of the United Nations Framework Convention on Climate Change (UNFCCC) climate negotiations, and it examines stepping stones like Paragraph 14(f) of the Cancun Adaptation Framework and the Durban Platform. The chapter lays out possible ways forward in terms of initial steps to operationalize some of these nascent policy areas. These policy areas can help contribute to pathway decisions that allow for a smooth(er) transition over time from present climatic variability and human mobility regimes, to population distribution in specific areas of the world in the future as some areas become less habitable or uninhabitable according to current standards.

6.1 Introduction

Today, a growing body of literature points to the linkages between environmental factors—particularly climatic conditions—with human mobility, ranging from voluntary migration, disaster-related displacement, and relocation (Jaeger et al. 2009; Warner et al. 2009a; Black et al. 2011). The mechanisms of environmentally induced

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migration are beginning to be understood for current climatic, social, and economic conditions (Black et al. 2011; Renaud et al. 2007; Bogardi and Warner 2008). However, little is known about how the climate situation will change in the future in terms of rates and magnitudes of change. Some science suggests that absolute limits exist for human adaptation to climate change. Sherwood and Huber, for example, found that an average temperature change above 7 °C (12.6 °F) would cause intolerable heat stress for mammals (including humans). Even before such a temperature increase would be realized, however, other climate-related impacts could contribute to migration and other mobility pressures. Additional scientific observations, such as that from the 2009 report of the U.S. Global Change Research Program, predict that temperatures over mid-latitude land masses could be higher than forecasted average global temperature increases. For example, non-coastal areas of the United States could face changes between 5 and 6 °C (9 to 10.8 °F) under current emissions pathways (“business as usual”) by the end of the 21st century. Such temperature increases would be accompanied by more extreme events that could displace people, such as those living in low-lying coastal areas: sea level rise, desertification, glacial melt, and water stress, among others (Romm 2011). Such trends raise questions about how the current framing of environmentally induced migration, areas of origin and destination, and policy responses may evolve in the future (Graeme 2011; Findlay 2011).

Section 6.1 examines the gap between what we know and how we currently address human mobility and climate change as well as the policy pathways that may open in the near future to pave the way towards stable, managed human mobility in coming decades under more notable climatic shifts.

Section 6.2 will examine some of the scientific literature about limits of adaptation, physical impacts of climate change on vulnerable areas of the world and the meaning of these changes for human mobility, drawing on existing recent peer-reviewed literature. It then turns to the question of what policy pathways are available within the context of the climate policy arena to make progress in managing climate change-related human mobility. Section 6.4 examines how the discourse between mitigation and adaptation has shaped the emergence of human mobility as a theme under the UNFCCC. Section 6.5 examines Paragraph 14(f) of the Cancun Adaptation Framework—the first time human mobility has ever appeared in the context of climate change as an internationally agreed-upon framework and with links to finance and operations. It then explores the meaning of the recent COP17 in Durban for implementation of Paragraph 14(f) as well as emerging discussions on loss and damage and a next attempt to get a legally binding international agreement on climate change towards 2015. Section 6.6 compares the treatment and potential for creating policy around human mobility under the UNFCCC and other policy fora. Lastly, Sections 6.7 and 6.8 summarize and offer final reflections for policy makers.

6.2 The Importance of how Human Mobility is Framed in Climate Policy

6.2.1 New Conceptualization of Adaptation and Societal Transformation

Paragraph 14(f) of the Cancun Adaptation Framework couches human mobility within the realm of adaptation to climate change and subtly introduces the thought that adaptation may require societal transformations over the longer term. This suggests that adaptation may be understood not only as marginal changes in the way people live in certain locations:

14. Invites all Parties to enhance action on adaptation under the Cancun Adaptation

Framework, taking into account their common but differentiated responsibilities and respective capabilities, and specific national and regional development priorities, objectives and circumstances, by undertaking, inter alia, the following:

. . . .

(f) Measures to enhance understanding, coordination and cooperation with regard to climate change-induced displacement, migration, and planned relocation, where appropriate, at national, regional, and international levels;

6.2.2 Paradigm Shifts Around Human Mobility

Mobility in the context of the UNFCCC is acknowledged as having a link to climatic change and framed as a phenomenon to be managed. It provides a technical-level (rather than controversial political dialogue) stepping stone for transitions between immediate-term use of existing approaches to necessary longer term paradigm changes about population shifts, governance of borders and mobility, and livelihood viability and planning in certain regions, etc.

6.2.3 Policy and Operations

Paragraph 14(f) has significance for implementation. As the institutional arrangements for adaptation continue to be shaped, human mobility (and the other areas mentioned in the Cancun Adaptation Framework) will expand from a topic for discussion towards a topic for policy and operations. This will have meaning for development cooperation (particularly around livelihoods), humanitarian and disaster risk reduction work, and urban and rural planning.

6.2.4 *Climate Finance*

Paragraph 14(f) frames human mobility as part of a wider range of measures that can be funded under the emerging climate finance regime to assist vulnerable countries in adjusting to current and expected climatic changes. Depending on how parties articulate their adaptation needs, human mobility-related activities will be eligible for climate finance, ranging from managing migration, preventing or reducing displacement, and where appropriate, undertaking planned relocation.

6.2.5 *Influence of Other Policy Fora and Discussions on Migration*

Finally, Paragraph 14(f) provides an opportunity to further articulate policy options at appropriate levels (sub-national, national, regional, and international) and along the spectrum of human mobility. The presence of human mobility in one policy forum (UNFCCC) has and will continue to influence discussions in other arenas, including the UN Security Council, the Global Forum on Migration (GFMD), the high-level dialogue on migration, and regional fora among others.

6.3 *The Longer Term: Possible Impacts of Climate Change on Population Shifts Away From Threatened Areas*

There are limits to adaptation, both social and physical, and it is possible with a medium level of certainty that the social limits of adaptation will be reached much earlier in time than the physical limits. There will be impacts of climate change in heavily populated areas. We know that a broader array of climatic factors affect migration decisions, ranging from impacts on assets and physical safety¹ to food security, livelihood security, social cohesion, and cultural intactness for both rapid-onset weather events and longer term climatic processes like sea level rise, desertification, glacial melt, shifting rainfall patterns, etc.

Figures 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7 and 6.8 illustrate some of the expected long-term climate change impacts and their potential implications for population distribution and human mobility in the interim period.²

The science around climate change impacts and the potential interactions with human systems is compelling and underscores the message that choices made today

¹ Particularly extreme weather events.

² These maps were published in Warner et al. (2009b), where more in-depth analysis and methodologies for creating these maps are laid out. These policy reflections can be found in Martin and Warner, made to the Global Form on Migration and Development (GFMD), November 2010. All references for the facts presented in these paragraphs can be found in Warner et al. (2009a).

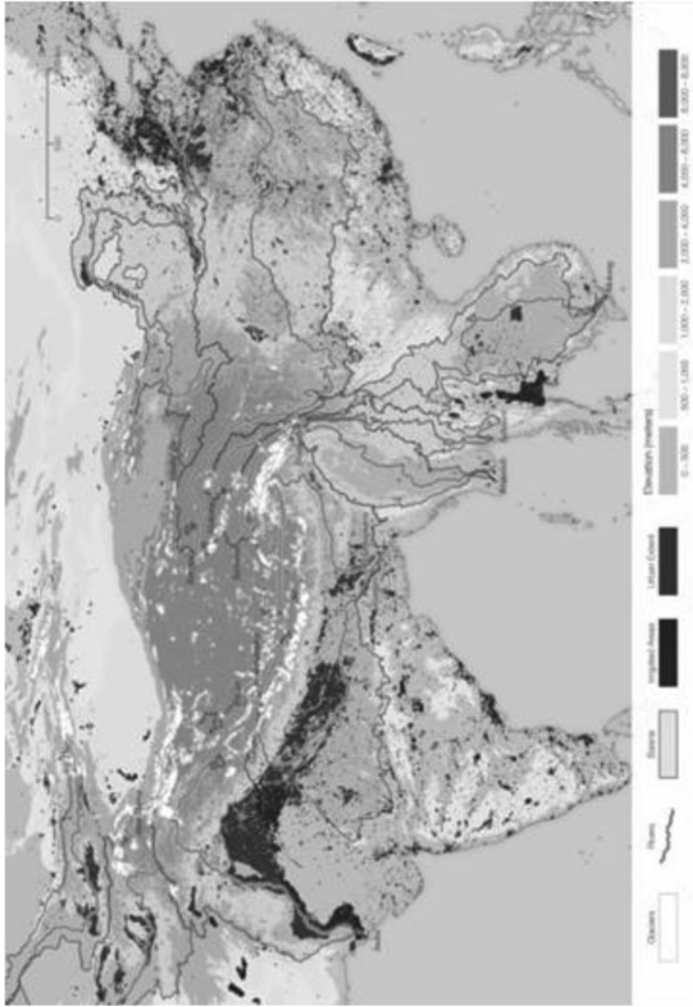


Fig. 6.1 Glaciers, freshwater in Asia. The map depicts glaciers in the Himalayas and the major rivers that flow from them. These rivers support large irrigated areas and major population centers yet the glaciers that feed them are in retreat. Reductions of river flows will affect irrigated areas, but the potential for migration out of agricultural areas is hard to predict and will depend on adaptation responses such as dam construction and more efficient irrigation technologies. Broader impacts on food security for this highly populous region could be significant. In the absence of diversification and adaptation/mitigation measures as water resources gradually diminish, agriculture livelihoods will become unsustainable, and people may be forced to leave. Paradoxically, measures to store water and ward off a water crisis related to shrinking glaciers could result in further displacement and resettlement.

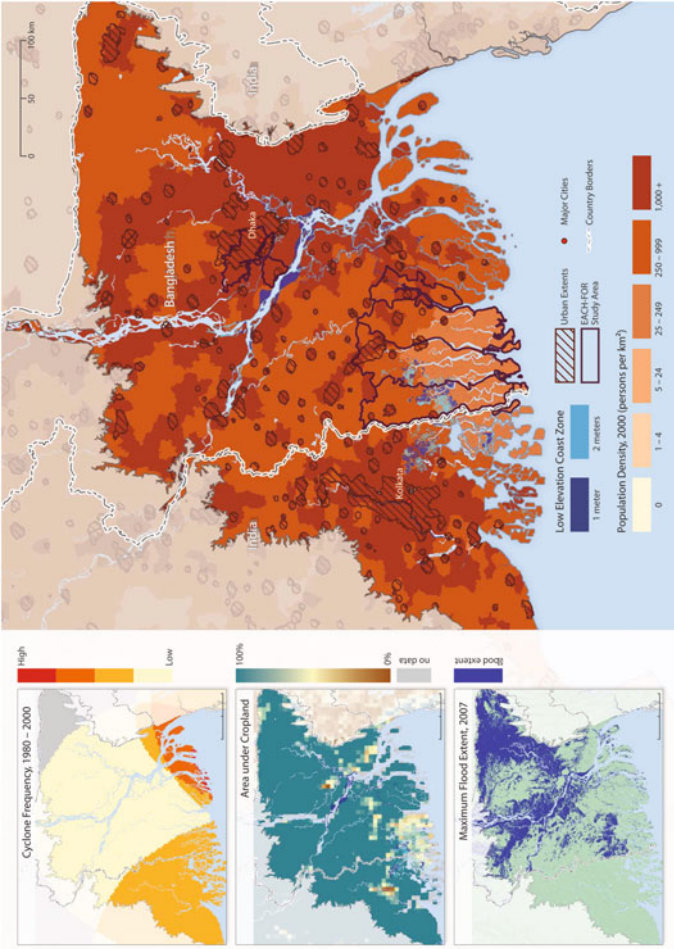


Fig. 6.2 Ganges Delta, population density, SLR. The main map depicts areas of sea level rise at 1 and 2 m on a population density map with urban extents delineated. It also shows the regions of the EACH-FOR study areas in the lower delta. The Ganges Delta supported a population of 144 million in 2000, out of which 9.4 million lived in areas that would be inundated by a 2-m sea level rise. The *top left* inset map shows those areas most frequently impacted by tropical cyclones. *Low elevation* areas in the southeastern corner of the delta are most affected. The *bottom left* inset map depicts the area affected by the 2007 flood. The *middle* inset map shows the distribution of agricultural lands. The delta has 8.5 million hectares acres (ha) of agricultural lands, of which 486,000 ha would be inundated by a 2-m sea level rise. In the Ganges Delta, living with varying water levels is a way of life. Migration, particularly towards coastal urban centers, has emerged as a coping mechanism when extreme events endanger life and livelihoods. With projected sea level rise, combined with the possibility of more intense flooding and storm surges, migration may become a necessity for many communities, at least for parts of the year.

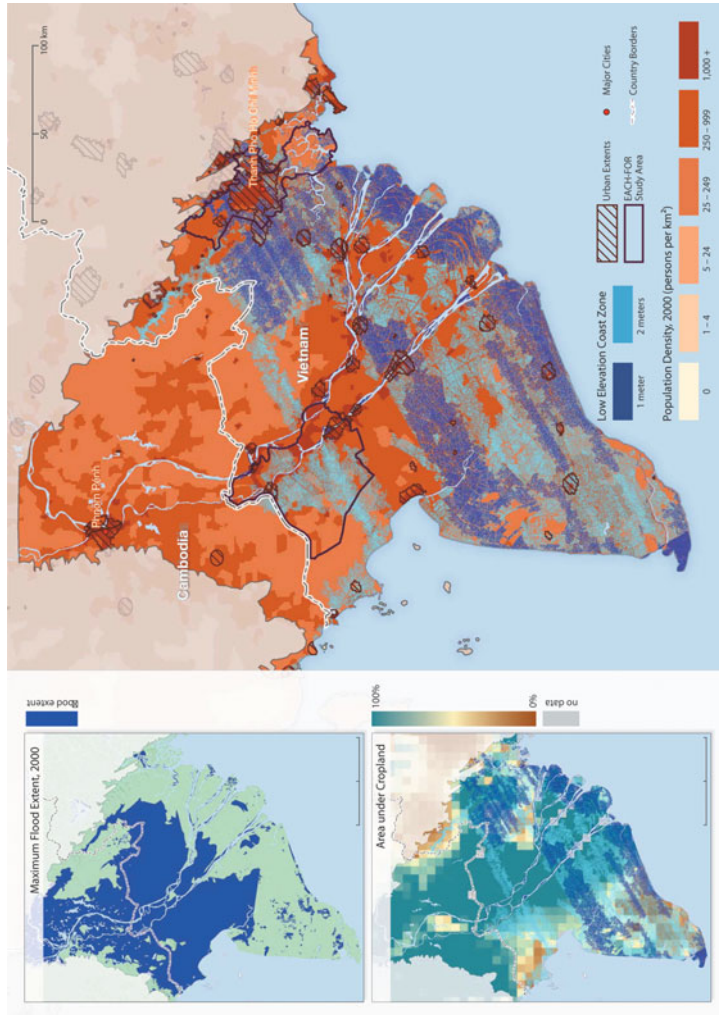


Fig. 6.3 Mekong Delta, population density, SLR. The main map depicts areas of sea level rise at 1 and 2 m on a population density map with urban extents delineated. It also shows the regions of the EACH-FOR study areas. The Mekong delta supported a population of 28.5 million in 2000, out of which 14.2 million lived in areas that would be inundated by a 2-m sea level rise. The *upper left* inset map shows the area flooded in the year 2000 when unusually widespread monsoon floods deluged nearly 800,000 km² of land in Cambodia, Vietnam, Thailand, and Laos. The inset map below it shows the distribution of agricultural lands. The delta has 3 million ha of agricultural lands, of which 1.4 million ha would be inundated by a 2-m sea level rise. Resettlement programs are already underway in some areas of the delta, and could become more widespread under certain sea level rise scenarios.

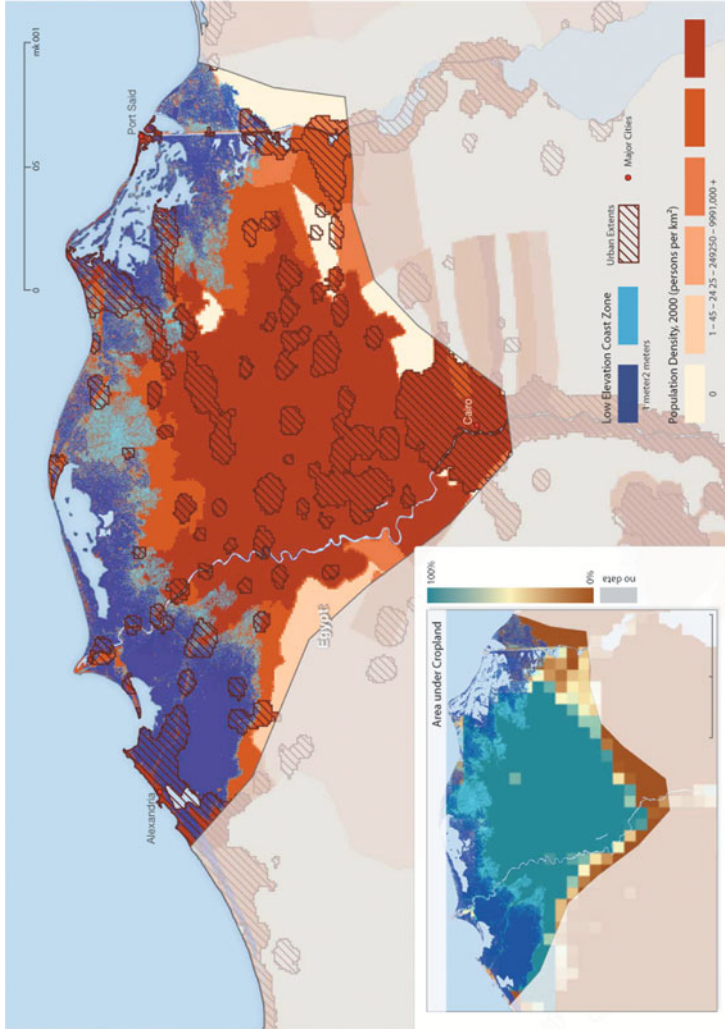


Fig. 6.4 Nile Delta, population density, SLR. The main map depicts areas of sea level rise at 1 and 2 m on a population density map with urban extents delineated. It also shows the boundary of the Nile Delta. The Nile Delta supported a population of 40.2 million in 2000, of which 10.7 million lived in areas that would be inundated by a 2-m sea level rise. The inset map shows the distribution of agricultural lands, of which 518 thousand ha would be inundated by a 2-m sea level rise. These processes could compress people into a smaller livable area and contribute to deteriorating living standards.



Fig. 6.5 Maldives, population and infrastructure, SLR. A sea level rise of 1 m would inundate infrastructure and threaten living areas. This would pose a threat to the tourism industry that comprises the most important income source for the Maldives, but this is not the only risk. Maldives' government has identified a number of vulnerabilities: land loss and beach erosion, infrastructure and settlement damage, damage to coral reefs, agriculture and food security, water resources, and lack of capacity to adapt (both financial and technical). The newly elected president of the Maldives, Mohamed Anni Nasheed, made international headlines in 2008 when he announced the "Safer Islands Plan," which includes internal resettlement from smaller, less populated islands to larger islands with better natural protection and enhanced coastal defenses. The plan even addressed the possible relocation of all the Maldives population to another country such as India or Iceland.

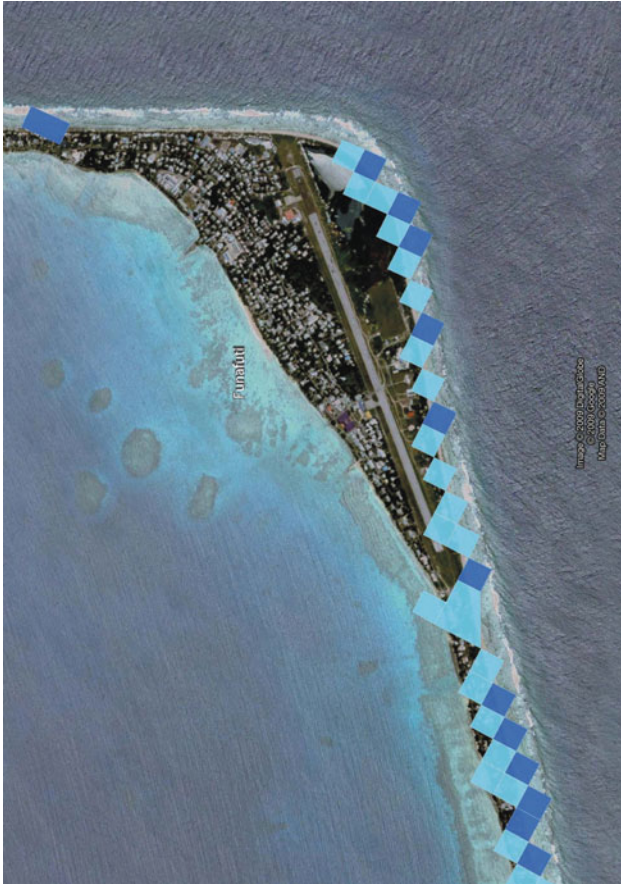


Fig. 6.6 Tuvalu, population and infrastructure, SLR. As one of the smallest and most remote low-lying atoll countries on earth, Tuvalu exemplifies a country whose existence is threatened by sea level rise. Tuvalu's territory covers over 750,000 km², yet only 26 km² is dry land with no point more than 5 m above high tide. Its low elevation makes Tuvalu highly vulnerable to sea-level rise, storm surges, "king tides," and other climatic events that affect the entire population of the country. All Tuvaluans live on the coastline. Tuvalu's environmental problems are further compounded by water shortage, waste disposal, and demographic pressures. Local knowledge of global warming is variable, but increasingly frequent saltwater flooding, accelerated coastal erosion, and worsening agriculture provide day-to-day evidence of a changing environment. The adaptive capacity of many Tuvaluans is already exceeded with storm surges and king tides. With the possibility of sea level rise of 1 m this century, even if the surface area is not completely submerged, the question arises how long people there can remain and lead normal lives.

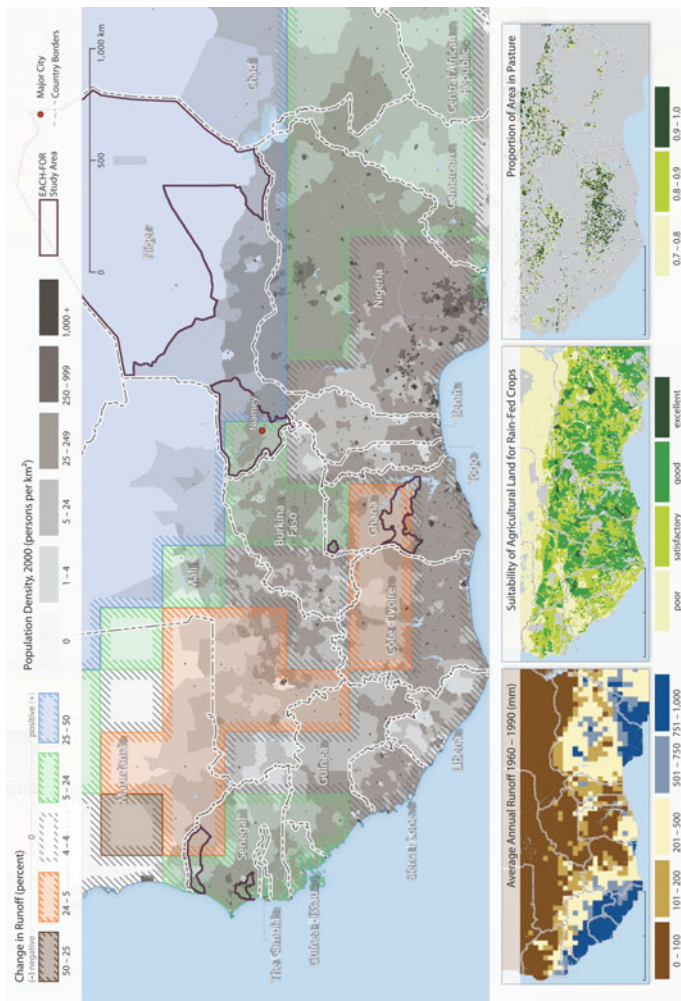


Fig. 6.7 West Africa, population and precipitation in 2080. The main map depicts projected declines in runoff by the year 2080 superimposed on population density. Runoff is a measure of water availability, and represents the amount of rainfall that runs off the land surface after accounting for evaporation, plant transpiration, and soil moisture replenishment. The maroon outlined areas depict EACH-FOR study areas. The *lower left* inset map shows average annual runoff for the 1960–1990 period, a baseline against which future declines are compared. The *center* inset map provides the area suitable for rain-fed agriculture, which largely reflects the population density map. The *right* inset map shows pasture lands distribution, an important livelihood for many in the Sahel. In this region of scarce water resources and high climate variability, any decline in runoff or change in rainfall patterns will adversely affect the livelihoods of subsistence farmers and pastoralists. Projected drying trends in a context of poverty, inequality, limited diversification options, and erratic government support could contribute to transform current patterns into a more permanent, long-term dynamic.

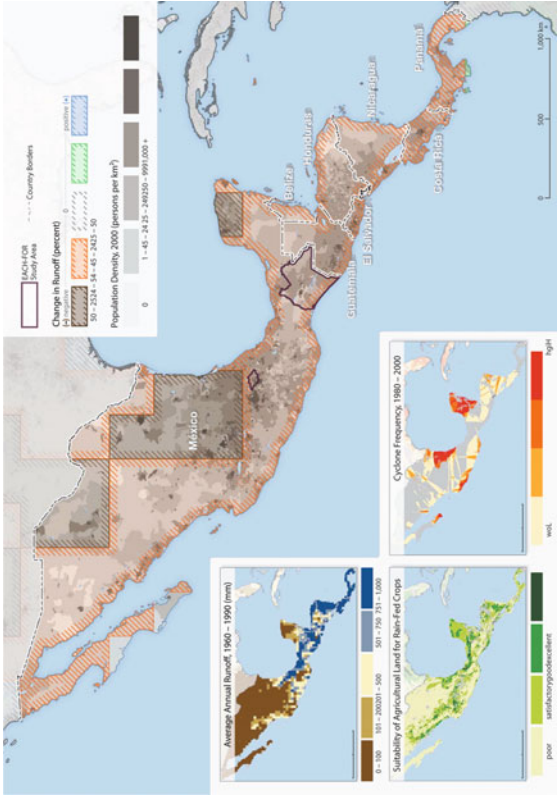


Fig. 6.8 Central America, population and precipitation in 2080. The main map depicts projected changes in runoff by 2080. Runoff is a measure of water availability and represents the amount of rainfall that runs off the land surface after accounting for evaporation, plant transpiration, and soil moisture replenishment. Mexico and Central America will be widely affected by declines. The map also outlines the Mexican states of Tlaxcala and Chiapas, where EACH-FOR conducted research. The *top left* inset map shows average annual runoff for the 1960–1990 period, a baseline against which future declines will be applied. The *bottom left* inset map shows lands suited for rain-fed agriculture that will be particularly affected by progressive drying in the region. Circular, temporary, and seasonal migration has traditionally been a means of coping with climate variability in these areas, and permanent internal and international migration out of areas dependent on rain-fed agriculture is a distinct possibility. The inset on the lower right depicts cyclone frequency in the 1980–2000 period. Some models show the number of category 4 and 5 hurricanes increasing in the Caribbean.

will have profound medium and longer term consequences towards the end of the 21st century and beyond. The remaining sections of this chapter focus on the policy space of the climate negotiations, noting that many other relevant policy fora exist where decisions will have implications for human mobility in the context of climate change.

6.4 Discourse Between Mitigation and Adaptation in the UNFCCC: How Migration Entered the Discussion

Two strands of discussion have emerged about impacts of climate change on human society. The interaction of these two strands has shaped how human migration and displacement appear in the Cancun Adaptation Framework—the first time ever appearance in an agreed upon outcome of a Conference of the Parties at COP16 (Dec. 2010).

The dialogue on climate change impacts reaches back decades, characterized by an emphasis on avoiding the causes of climate change first and threatening polluters with liability (polluter pays principle) from the early 1990s to the mid 2000s. A second strand of discussion was introduced around the time of the IPCC Fourth Assessment report in 2007 and the release of the Stern Review. Scientists and policy makers began to concur that some impacts of climate change may already be manifest, and adaptation was therefore a necessary complement to mitigation in order to cushion the blow to society from some of the expected impacts of climate change.

6.4.1 Mitigation: Compensation and Avoiding Unacceptable Impacts of Climate Change

To understand the treatment of migration and displacement, one must understand a larger discussion around impacts of climate change, which was framed mostly by a discourse between the Alliance of Small Island States (AOSIS) and industrialized countries. The early 1990s to the early 2000s was marked by an emphasis on mitigation, the collective reduction of greenhouse gas emissions linked to changes in global temperature increases. This period saw the creation of the Kyoto Protocol, carbon markets, the Clean Development Mechanism, and other measures.

Against this background, one better understands the position of the Alliance of Small Island States and the idea that States harmed by loss and damage related to climate change could seek compensation to rehabilitate their societies ideally to pre-anthropogenic climate change conditions. AOSIS had articulated this proposal since the early 1990s, framing it as a kind of “insurance” against a wide range of climate change impacts. The early focus was on cautioning high emitting countries about the financial consequences of not curbing their emissions (e.g. polluter pays principle). The spectre of liability and possibly needing to pay unsaid amounts of money to compensate “sinking island states” or other countries facing a range of catastrophic

climate-related impacts made this strand of argument controversial. Human migration and displacement were not mentioned in official texts at this time, but AOSIS and other allies emphasized that sea level rise, which can lead to displacement, could drastically change the existence of low-lying countries and was politically unacceptable.

A range of possible outcomes, including human migration and displacement, glacial melt, desertification, etc., were framed as “negative” and beyond the realm of adaptation. Avoidance was the only acceptable approach, and some Parties (least developed countries, AOSIS, and other vulnerable countries) championed the 1.5 °C goal.

6.4.2 Adaptation: Pragmatic Approach to Understand and Facilitate Good Practice in Site-Specific Ways

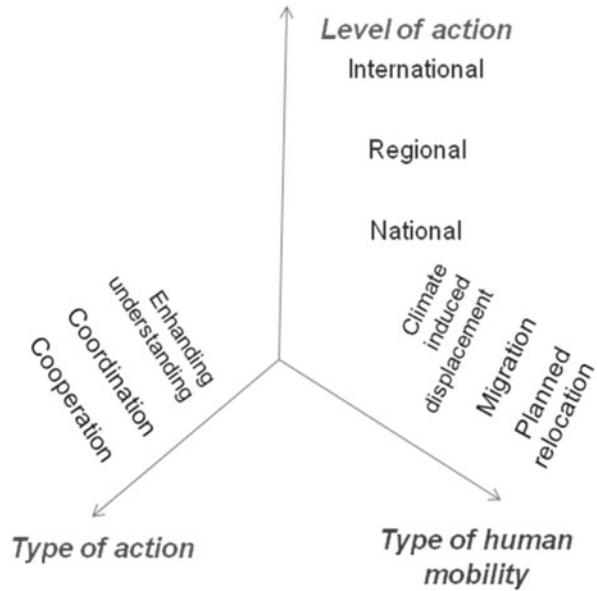
By the mid-2000s and certainly with the publication of the IPCC 4th Assessment Report in 2007, the process reflected an emerging realization among scientists and policy makers that emissions targets may be too low to prevent climate changes. Hence, it would be necessary to also discuss adaptation and issues around negative impacts of climatic change on human society. This realization contributed to discussions about the need for adaptation finance and activities that would help countries to adapt, particularly those most vulnerable to the negative impacts of climate change.

Thus by the 2007 COP in Bali, Indonesia, an action plan emerged to include adaptation in what was at the time planned to be a road towards an internationally binding agreement before the end of the first commitment period of the Kyoto Protocol. The principle of “common but differentiated responsibility” emphasized that every country—whether Annex 1 or Non-Annex 1, whether industrialized or developing—had a role in addressing adaptation.

Although the Bali Action Plan contained an entire section about (disaster) risk management as well as loss and damage associated with climate change, possible association with compensation or liability was a cause for discomfort for industrialized parties. Some parties tried to subsume this section into other sections, cut it from the discussions, and otherwise avoid discussions related to proposals around compensation for loss and damage. This strategy required delicate steps, as adaptation, in the lead-up to Bali and subsequently, gained momentum, particularly among many G-77 and China parties whose agreement would be necessary later in matters related to the larger hoped-for legally binding agreement that was planned to be concluded in Copenhagen at COP15. It was intended that adaptation would receive funding, and the principle of common but differentiated responsibilities was repeatedly invoked. Parties suspicious of “compensation” may have wanted to maneuver the issue of loss and damage out of the process; however, they needed to build consensus with the mass of countries that anticipate experiencing loss and damage in the future.

By the Copenhagen climate talks (Dec. 2009), leaders of industrialized countries pledged resources “approaching” 30 billion USD for fast-track financing by 2012,

Fig. 6.9 Possible types of measures related to Paragraph 14(f) that could emerge



and 100 billion USD per annum from 2020 onwards. The issue was how to move away from the compensation/liability strand of discussion to some other framing of adaptation that would be in harmony with the emerging institutional infrastructure around climate finance and governance.

6.5 Human Mobility and the Cancun Adaptation Framework—Opening a Space for Finance and Action

The topic of human mobility has appeared for the first time in a decision of the Conference of the Parties of the UNFCCC. The issue is couched in pragmatic, solution-oriented terms under adaptation, reflecting the realization of parties following the IPCC’s 4th Assessment Report that stated the impacts of climate change are highly likely and may already be manifesting themselves in different regions of the world.

Migration, displacement, and planned relocation are featured in the Cancun Adaptation Framework as technical issues in a part of the text that highlights a list of activities that may qualify for adaptation funding in the future. This presentation attempts to explain the potential importance of the first time ever agreed upon text on migration, displacement, and planned relocation in the UNFCCC climate negotiations process.

At COP16, parties decided to accept the draft text, which contained several key elements for adaptation, including the Cancun Adaptation Framework and the Paragraph 14(f) on migration and displacement. To reiterate, Paragraph 14(f) reads as follows (Fig. 6.9):

14. Invites all Parties to enhance action on adaptation under the Cancun Adaptation

Framework, taking into account their common but differentiated responsibilities and respective capabilities, and specific national and regional development priorities, objectives and circumstances, by undertaking, inter alia, the following:

....

(f) Measures to enhance understanding, coordination and cooperation with regard to climate change-induced displacement, migration, and planned relocation, where appropriate, at national, regional, and international levels;

The question arises now about the kinds of activities that could emanate from the inclusion of migration and displacement in the Cancun Adaptation Framework. The text itself outlines kinds of activities (enhanced understanding, coordination, cooperation), types of human mobility (displacement, migration, planned relocation), and levels of addressing the issue (national, regional, and international).

6.6 Meaning of Durban for Implementation of Paragraph 14(f) and the Cancun Adaptation Framework

Durban (17th Conference of the Parties of the UNFCCC, COP17) provided three notable milestones that will have relevance for overall impacts of climate change on society, which are reflected in some measure in environmentally induced human mobility. These are:

- In spite of low expectations, COP17 achieved a roadmap towards a legally binding international agreement.
- COP17 secured a second commitment period for the Kyoto Protocol, which will be the engine in getting the process down the road.
- COP17 achieved a series of key decisions to operationalize the Cancun Agreements, including finance, arrangements for the Adaptation Committee, and others.

This section focuses on point three: progress in operationalization of the Cancun Agreements and what that may mean for the implementation of activities under Paragraph 14(f). From Durban onwards, areas in the current UNFCCC talks where human mobility may play a role include the newly-created AWG-DPEA, the Adaptation Committee, Adaptation Finance, and the SBI Work Program on Loss and Damage.

In 2012, the arena to watch will be the development of the Adaptation Committee, Green Climate Fund, and the SBI Work Program on Loss and Damage. These areas will seek input on specific research insights, especially for the IPCC 5th Assessment Report and for decision makers working on adaptation, loss and damage, and related areas in the climate negotiations (the Durban platform). The areas will also focus on ideas for guiding thinking around activities of the Adaptation Committee, such as what kinds of activities might be considered for support, lessons learned in the past, and seeking coherence in policy and action. They will also consider a set of guiding principles or policy analysis options associated with migration, displacement, and planned relocation related to the implementation of Paragraph 14(f) (Fig. 6.10).

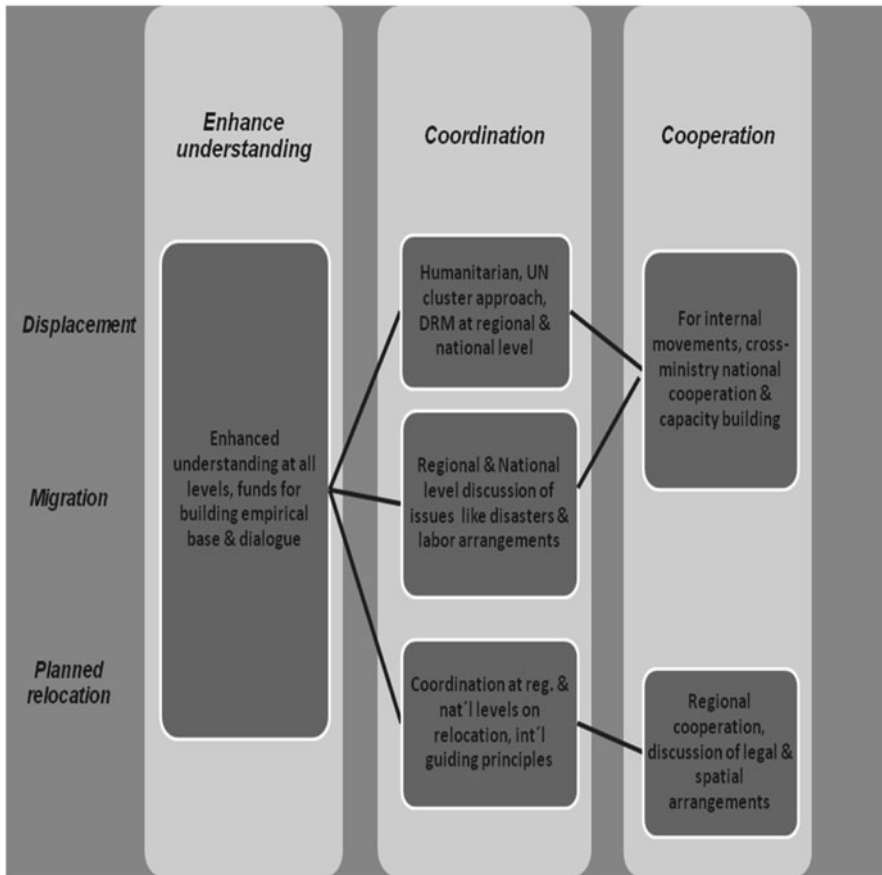


Fig. 6.10 Assessment of possible types of measures that could and have already partially emerged in 2011 in relation to Paragraph 14(f)

Enhanced understanding will likely be an activity happening at national, regional, and international levels. If the current pattern continues, it is likely that funding for building the empirical base (research, case studies, etc) will come from bilateral sources as individual countries call for specific studies and dialogues (conferences, meetings). This has already been the case with the Nansen Conference, hosted by Norway in June 2011, which focused on climate-induced displacement, and several research projects supported by various European and Asian governments and organizations, looking mostly at migration, but also displacement. Regional and international dialogue about research findings are also expected, particularly with the 2014 5th Assessment Report of the IPCC, which will feature at least one chapter reviewing migration and displacement in the context of adaptation to climate change.

It is expected that coordination efforts on displacement will continue along current humanitarian organization lines through the UN cluster approach and under

the auspices of disaster risk management. These will likely continue to be financed through humanitarian assistance channels, at least in the short term. Coordination efforts will happen at all levels but particularly at the regional and national levels. Coordination on voluntary migration is less clear, but it may begin to be discussed at international and regional levels. Individual countries may choose to address whether tools like Temporary Protection Status (TPS) may be broadened or altered to include a variety of environmental processes beyond natural disasters (typically rapid onset events). Planned relocation is possibly the least developed area of coordination at this point, but it will likely emerge in the medium term as countries begin thinking through potential consequences of mitigation and adaptation projects that may require population relocation. These kinds of coordination measures will be needed at the regional and national levels. At the international level, guiding principles may be needed, such as those now available for development project-related relocation. International expert discussions have already begun on the topic, such as two Bellagio roundtables in 2010 and 2011 on displacement.

In the medium to long term, when human mobility related to climatic change is expected to become more apparent, operational cooperation will be needed at the national and regional levels to manage flows of people. Where movements (displacement, migration, relocation) are internal, cross-ministry national cooperation and capacity-building may be needed. These kinds of activities may be funded through existing bilateral channels or potentially through the emerging climate finance architecture. Where movements occur in border areas, regional cooperation may be necessary. Examples of regional labour migration agreements may be models for the future, but they may take some time to design and implement.

6.7 Comparison of UNFCCC Discussions on Mobility (Technical) With Other Fora

UNFCCC discussions on human mobility have come largely through the lens of environmental and climate science, such as the IPCC 4th Assessment Report and empirical evidence about weather-related impacts and human society. The discussions have taken place mostly at a technical level among delegates who tend to work in Ministries of Environment, and in some cases, Development or Foreign Affairs. While the discussions have been largely technical in nature, the wider UNFCCC process is one of “high international relations,” featuring growing public awareness, major interests such as energy and development, and a commitment of new funding to help vulnerable (mostly developing) countries to transform energy systems and adapt to anticipated impacts. The UNFCCC process is less focused on political implications of migration and other forms of human mobility, and it may provide a unique channel for new thinking and action on the topic area.

The issue of migration and displacement is one of many in discussions on adaptation, and adaptation is only one of an array of complex issues dealt with in the negotiations. Given the treatment of migration and displacement as topics that can

be difficult in other political contexts, some may be surprised to learn of the non-controversial position of Paragraph 14(f) in the Cancun Adaptation Framework. This reflects the situation of current discussions that are dominated by political and “architectural” considerations: the form of climate finance, the continuation or reshaping of mitigation targets, the shape and functions of bodies like the Adaptation Committee.

“Content” issues and guidance on what activities need to be implemented occur at a more technical level in the negotiations and can receive less political attention regardless of the significant implications for national policies and practice within adaptation, adaptation funding, etc. A handful of delegates from particular parties—both Southern and Northern—have championed the issue where it has been complementary to other positions on adaptation with the support of research and humanitarian organizations. These technical-level adaptation (AWG-LCA) delegates have moved the topic forward in the UNFCCC agenda as well as at home. With this in mind, the major negotiating blocks place relatively little emphasis on the topic, while allowing their technical-level delegates to work and refine the issue areas. The overarching positions of party groups, therefore, largely reflect wider lines on adaptation.

Many of the existing arenas for discussions of human mobility are political and feature state reluctance to support anything more than dialogue regarding cross-border movements of people. The UNFCCC process has positioned human mobility more in technical terms; in fact, it “flies under the radar screen” of the higher-visibility issues, such as emissions reductions and climate finance. Yet there are interactions and coordination of advocates participating in these different fora that contribute to synergies. For example, the most important message for states coming out of both COP16 and GFMD is that they need to increase the range of adaptation alternatives available to vulnerable populations. Such options should reduce vulnerability in the short, medium, and long run as the overall objective. In the context of migration and displacement, options should contribute to the prevention of forced migration and displacement. Further, in situations where displacement is unavoidable, assistance and protection must be provided to those who are or will be displaced. States and humanitarian organizations should also begin thinking of scenarios where facilitating human mobility in all its forms may be an adaptation strategy to climate change or “better than the alternative” in cases where few positive options may remain. The UNFCCC process has the potential to begin discussions around current practices and institutions and expand thinking about where they may need adjustments in the medium and longer term under different climate change scenarios.

6.7.1 Summary

These two parts of the dialogue—mitigation and adaptation—fundamentally shaped how migration and displacement became couched within adaptation and ultimately will pave the way for future thinking about issues like governance, funding, and management of migration, displacement, and planned relocation. Perhaps of greater long-term significance, the recognition of human mobility within the UNFCCC

process has helped spur UN, regional, and national discussions of finding stable trajectories for societal transformations—security and notions of borders, population shifts in particular regions, and moving from current adaptive practice to those practices which will be appropriate in the future—within changing climate regimes.

6.8 Policy Reflections

Our decisions today will determine whether migration becomes a matter of choice amongst a range of adaptation options or merely a matter of survival due to a collective failure to find alternatives.

Research has substantiated the fact that environmental change is one (Warner et al. 2008; Lazcko 2008; Black et al. 2011) of a larger set of factors that affect human migration and displacement worldwide. Processes, such as natural disasters and shifts in climate patterns that may bring glacial melt, sea level rise, and desertification, are and will increasingly affect migration and displacement. Some of the most vulnerable regions include areas like low-lying islands and deltas, coastal areas, areas dependent on glacial-fed water systems, and those subject to persistent drought. Field-based research suggests that most environmentally induced migrants and displaced people will move within their own countries. Some movements will resemble familiar migration and displacement patterns, but other movements will likely occur under emergency circumstances or complex humanitarian crises, particularly where climate change exacerbates natural hazards, such as cyclones and communal violence.

This chapter outlined a process by which research and the humanitarian community helped bring these issues to the UNFCCC climate negotiations process. In 2008, a combination of factors contributed to drawing policy maker attention to migration and displacement in the context of climate change. From 2012 and moving forward, research will continue responding to party questions about migration and displacement, and operational organizations will offer insights about the implications of climate change on resilience and vulnerability of populations of concern. With the inclusion of climate-induced displacement, migration, and planned relocation in the Cancun Adaptation Framework, new windows of opportunity have opened on the issue. States now ask what kinds of activities they could undertake to start getting prepared.

Policy makers need to take a holistic approach to this emerging issue that addresses both the drivers in origin areas³ and the pull factors in destinations.⁴ Some of the following policy perspectives could help shape activities around climate-induced displacement and migration.⁵

³ e.g., livelihood insecurity, environmental hazards, conflict, demographic pressures, gender inequality, etc.

⁴ e.g., demand for labor and aging of the population.

⁵ These policy reflections can be found in Martin and Warner, made to the Global Forum on Migration and Development (GFMD) November 2010.

- Foster adaptation alternatives to prevent displacement.

Human mobility can be part of the strategies to help people adapt to climate change. It can be an effective way to manage the risks associated with climate change when done voluntarily and with appropriate planning. However, displacement, especially when it is not orderly and insufficiently managed, can be an indicator that adaptation is failing if few other realistic options exist for people (move or perish, distress migration).

- Support disaster risk reduction and conflict mediation strategies while strengthening humanitarian responses.

If governments do not take action to reduce the risks that people face from acute crises arising from natural disasters and competition over resources that lead to conflict, they will be called upon to help later. Then the problem will be much more difficult to address. Invest today in resilience building strategies designed to preempt uncontrolled crisis situations.

- Where possible, help people stay through sustainable rural and urban development.

In many cases, climate induced displacement can be avoided by ensuring livelihood security for affected people both in rural and urban areas. Up to 25 % of the world's population today are farmers, with higher percentages in many developing countries. Climate change will take its toll on the ability of these people to feed themselves and their families in the future. When livelihoods fail, people may experience forced migration or displacement.

- Where necessary, in cases of no longer avoidable loss and damage, help people go in safety and dignity

Paragraph 14(f) notes the possibility that planned relocation may be part of future adaptation scenarios. In cases where movement of human populations is the best or possibly only adaptation strategy, effective policy responses can help ensure that movements are orderly and safe. Policies should avoid situations where people are forced to move (distress migration) or move in emergency situations. Policies should aim to ensure that displaced people do not become more vulnerable.

- Identify guiding principles, effective practices, and institutional frameworks to help governments in developing appropriate laws, policies, and programs to address environmentally induced internal and international migration.

Current laws, policies, and institutional arrangements are inadequate to deal with the complex movements of people. Of particular concern is the possibility that large numbers of people may be rendered stateless if rising sea levels inundate island countries and low-lying, densely populated delta areas. Guiding principles are needed today to shape thinking about how to manage potential larger-scale relocation in the future.

6.9 Summary

Policy makers today face a series of choices that will profoundly affect our immediate activities central to jobs and economy, particularly around forms of energy, and the medium and longer term interactions between human society and our earth systems. The latter state is expected by many climate scientists to include warmer average global temperatures of between 2 to 4 °C (3.6 to 7.2 °F) or even 6 °C (10.8 °F) and expected the changes in physical systems, such as ocean warming and acidification, productivity of major grain crops with implications for food security, sea level rise, and coastal inundation, changes in fresh water regimes and the distribution of fresh water (seasonality, glacial melt, etc.). As climate change is an endogenous variable interacting with other major factors, such as population change, technological advances, etc., much uncertainty exists about these interactions. Yet the expected physical impacts in the future does suggest that areas of the world may become less or uninhabitable for human society as we know it today.

Whether facing migration, relocation, and resettlement or more gradual population shifts over the longer term, policy makers today must understand the broad consequences of their decisions or inaction today. These choices will mark the pathways ranging from a world of stability and greater humanity, or scarcity and worsening human condition. In the coming few years, policy makers will require new ways of thinking and complementary institutional strategies to address the needs of people affected by climate change.

Author's Notes This paper originated from a talk given by Koko Warner on 6 January 2012 at a Brookings Institution event, part of the Brookings—London School of Economics project on internal displacement. The event was held in Washington, D.C. and was entitled “Climate Change Adaptation in a Post-Durban World” http://www.brookings.edu/events/2012/0106_climate_change_adaptation.aspx.

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Chapter 7

The Good, the Bad, and the Ugly: Thoughts on Possible Outcomes

John Davenport

Abstract Earth and life scientists examine various environmental topics with an interest in understanding historical and present day changes in the biogeochemical systems which provide the planetary context for the existence of life. Alternatively, social and behavioral scientists investigate a broad range of environmentally related subject matter from the perspective of how individuals, institutions, and societies conceive of and impact natural systems. Articulating between these domains of knowledge are those engaged in humanistic and more generally, humanities-based research with an attendant focus on ideas growing out of the philosophy of science. In this chapter, I attempt to accomplish three primary objectives. First, the prospect for an integrated study of climate change and culture shift is discussed. Second, a heterodox approach to understanding the biophysical basis of economic productivity is presented. This approach takes as its underlying premise the idea that unimpeded consumption of fossil fuels will narrow the range of possible climate scenarios on Earth as humanity attempts to orchestrate its future out of the social and natural system states available. Third, data from the United States Department of Energy Information are examined as a means of bringing to light, at least, one of the immediate effects that a warming climate will have on American citizens, the ability to artificially cool their home environments. Last, I offer my own thoughts on what these observations perhaps “mean” in a broader sense relative to looming environmental hazards and the existential imperatives associated with a planetary decline in ecological health. This discussion includes ideas on how “the good life” may be redefined as a consequence of the dual drivers of climate change and culture shift as well as the potential for human growth and development amidst such challenging times. Throughout the chapter, a partial synthesis and incorporation of ideas presented in Chaps. 2–6 is provided. Within the broader narrative issued by this text, the following chapter serves as a bridge between the book’s first and second halves; between the world as it has been continuously re-imagined and as it promises, however tentatively, to someday be.

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7.1 Introduction

Dost thou not see the little plants, the little birds, the ants, the spiders, the bees working together to put in order their several parts of the universe? And art thou unwilling to do the work of a human being, and dost thou not make haste to do that which is according to thy nature?—But it is necessary to take rest also. It is necessary. (Aurelius 1991)

Keeping pace of broad scale trends in climate change and a perceptible shift in the dominant cultural condition represents a long-term, and needless to say, demanding project. Ascertaining any synergies arising between these two mutually constitutive factors requires that the thresholds of disciplinary boundaries and the traditional domains of knowledge they house be crossed. Whether explicitly stated or implicitly given throughout this text, all contributors agreed to a certain amount of collective wayfaring away from the intellectual confines ordinarily associated with academic specialization. Such is the nature of edited volumes centered on broadly conceived topics of both professional and popular interest. The emergence of climate change as a contemporary issue of increasing relevance runs parallel to (some might argue, grows out of) overarching concerns about the forces of globalization, including, as fellow contributors have discussed, the ongoing processes of industrialization. Geographers have long been well positioned to take up such integrative ways of asking questions about isolated elements of the world, be them human or physical phenomena, while purposefully reassessing their findings relative to global trends.

More recently, the rubric of human-environment interaction has developed within geographic research, thus providing investigators somewhat of a liminal space in which to work toward the consolidation of exceedingly fragmented shards of knowledge. Yet as Aspinall relates, the cumulative results have been less than conclusive:

Despite all the calls, implementation of a unified geography, or even a unified physical geography, remains elusive. In the absence of a conscious choice for unification, it might happen as a necessary by-product of responses to growing demands for whole systems understanding to deal with human and environmental issues in an integrated way. (Aspinall 2010)

Climate change and culture shift combined present the type of human-environmental issue out of which an integrated inquiry might provide the “necessary by-product” needed to realize this elusive unification. Moreover, it is increasingly clear that “issues associated with human population growth and food, water, energy, and environmental issues provide an imperative to understand not only how environmental and human systems operate as a coupled system but also to understand how they could operate” (Aspinall 2010). This imperative is both prescriptive and prognosticative in nature. The knowledge needed to address coupled human and natural systems indicates a challenge to not merely one particular type of geographer or even scientist but rather humanity as a whole. Climate change and culture shift is a contemporary yet intergenerational environmental issue that will transcend the present era, with the former component remaining indifferent to the civilization from which either a more or less adequate response will be forged and implemented.

In Chap. 3, climatologist Gerald North parsed apart the effects of human action from environmental processes that are thought to be a natural part of Earth's planetary cycle. The author's focus on evaluating climate data based on long-term observations of atmospheric systems provided a rigorous scientific basis for making credible and informed predictions concerning the likelihood of future outcomes impinging upon the well-being of social and natural system. Historically speaking, our verified and documented understanding of biophysical systems has not always been so complete. Nor has our ability to distinguish between human versus non-human drivers of environmental systems. The means to analyze complex and dynamic behavior across Earth systems arose, in part, from the capacity of our species to systematically test reasonable hypotheses by repeatedly comparing data—evidence obtained from the world—with expected outcomes produced by predictive models. By employing an iterative process of refining the parameterization of models based on large data sets, which represent continuous observations spanning extended time scales, a clearer picture of past, present, and future conditions most likely to occur is assembled. These conditions are the outcomes that humanity will necessarily have to respond to as its shared future continues to unfold.

It is according to this mosaic or series of pictures, including impending outcomes, that North and others have given us compelling reasons to ask difficult questions concerning the viability of biophysical systems to last into the future. Indeed, if hindsight indicates that the Holocene has been “a relatively benign time in climate history—ideal for the development of civilization,” then foresight remains a key ally in determining what course of action best ensures a quality of life in which neither the costs to human, animal, and plant life are too high, nor the material benefits necessary to stave off widespread suffering are too low (North 2011). Knowledge is instrumental to this effort, just as it has been over the course of human history toward slowly elevating our daily activities beyond those required for mere survival. Physicist and futurist Michio Kaku recalls an earlier time in the history of science and more generally of ideas when, aside from the lyrical recantations and oral transmissions of preliterate cultures, themselves pivotal steps in the ascendancy of human affairs, the physical constraints posed by glacial activity loosened their effect on the biosphere:

Before ten thousand years ago, humans lived like wolves in packs, foraging for scraps of food in small, isolated tribes. There was no accumulation of knowledge or science. There was no written word. Humanity was preoccupied with one goal: survival. Then, for reasons we still do not understand, the Ice Age ended, and humans began the rapid rise from the ice to the stars. However, this brief interglacial period cannot last forever. (Kaku 2005)

Although planetary physics, including a thorough understanding of orbital eccentricities and patterns, has given us a more complete understanding of the primary factors contributing to (inter)glaciations, Kaku's observations concerning the advent of scientific inquiry and the finite nature of the present interglacial period are accurate. The scientific field and the accompanying body of knowledge it has produced developed out of this environmental context, however impermanent a condition it proves to be, alongside innumerable other cultural, social, economic, and, lest we add, spiritual

achievements. While our experience of the realities that this knowledge has helped produce is nevertheless “real,” this observation should be tempered with the idea—borrowed from Buddhist phenomenology, a philosophical framework contributing to the development of this chapter—that nothing exists apart from the specific conditions out of which it is found. That is, everything including humanity and its *Being-in-the-World* is “conditionally real” when properly understood. Accordingly, effects precede causes. This realization gives pause for one to contemplate the durational nature of the biophysical context in which human consciousness arose and subsequently finds itself pondering climate change in the first place. Furthermore, the durational nature of system states brings into focus a topic of exceeding importance relative to our discussion of perpetuating conditions that are conducive to the habitability of life on Earth, energy flux.

In the years following World War II, scientists involved in climate research began to focus less on a limited number of parameters, such as relative humidity and temperature, and instead opted to investigate the key mechanisms of energy and moisture exchange (Gregory 2000). This shift in research priorities came in part as a consequence of the need to understand process-response systems as they related to human activity occurring within Earth’s boundary layer and interface. Mapping flows of energy, mass momentum, and ecological information through various Earth surface systems became an overriding concern of climate scientists and many environmental scientists alike (Gregory 2000). By measuring fluxes within and between Earth systems and adapting the field of bioenergetics, with its attendant focus on fermentation, photosynthesis, and respiration, scientists attempted to formulate a type of geo-cybernetic study of Earth (Gregory 2000). The building interest in examining environmental systems through the explanatory framework of energetics was greatly advanced through the work of a growing cadre of ecologists who were slowly populating both academic departments in the natural sciences and government agencies charged with the task of maintaining the integrity of North American ecosystems. One intellectual offshoot of this development came in the form of Lynn Margulis’ primary contributions toward developing serial endosymbiosis theory (SET), which uses cytoplasmic systems as a foundation for devising multi-scalar models that help explain a variety of phenomena ranging from cells to the biosphere (Stafford 2007).

Whatever the “unverifiable future” might bring, whichever climate scenario prevails in the future, first principles will serve as the foundation upon which emerging realities assemble themselves. In support of the aforesaid historic movement toward the scientific study of ecological energetics Odum and Odum (1976) proposed three principles of energy flows. These principles were presented in the publication *Energy Basis for Man and Nature* (1976). Given our preceding discussion of energetics and human adaptation to climate change, it is perhaps the third of these principles which holds the greatest potential for commenting on the current situation. According to Odum and Odum’s (1976) third principle, also known as the maximum power or minimum energy expenditure principle, systems that survive are those that use energy best. Here, “best” is best understood as the capacity of a system to develop itself without tremendous amounts of energy expenditure being transferred to the external environment as dissipative heat loss and atmospheric pollution. Or, as Kaku

relates, in a more critical and somewhat cautionary tone, an “advanced civilization will find much more efficient ways to develop rather than to create copious quantities of waste heat that threaten their existence” (Kaku 2005). Advances in nanotechnology are often given as one innovation that might potentially correct such wasteful practices. However, delays in developing alternative energy sources remains a more fundamental concern for those focused on creating an energy economy that can carry civilization into the twenty-second century and beyond. Allowing society’s shortcomings in asserting this cause to go unacknowledged *and* not recognizing the role of nature’s economy in exacting its own corrective measure are two sides of the same coin. We may for awhile idly toss the diversionary piece about, but eventually and inevitably so the piper must be paid. Alluding to such a relationship between energy and equity are Commoner’s (1972) admittedly dated yet timeless ecological laws which state that: “(1) everything must go somewhere, (2) nature knows best, and (3) there’s no such thing as a free lunch, because somebody somewhere must foot the bill.” Relative to these three laws, two questions concerning climate change and culture shift remain unanswered: Who shall sit at the proverbial table? Who amongst us will pay the ultimate price?

7.2 Comfortable with the Evidence

The results of research carried out by Emory University primatologist Franz De-Waal suggest that the traits of altruism, empathy, and compassion in chimpanzees and bonobos are hardwired into their genetic makeup. Likewise, selfless behavior among wolves—the same creatures that, lest we forget, humans lived like some ten thousand years ago prior to the advent of agriculture—is commonly directed toward injured and thus threatened members of the pack. The salient point to be taken from these examples is not that the social lives of chimpanzees and wolves are identical or somehow interchangeable with humans despite genetic similarities between the former and us, but rather that when hard times befall us, we are capable, if not normatively inclined, to share in shouldering the burden encountered by individuals at risk. When more broadly conceived such biologically influenced virtues indicate a more fundamental basis for reciprocity between people and institutions be them public or private. This observation does not necessarily admonish the view held by some that humans are by their very nature inherently competitive. It does raise important questions, however, concerning the tension between self-referential behavior associated with post-modern worldviews and the kind of self-sacrifice perhaps needed of society in order to minimize the risks or exposure assumed by many nearby and geographically distant members of our species. One particular topic related to climate change and culture shift which lends itself well to a discussion of shared-sacrifice is the ongoing debate over energy prices via private cap-and-trade versus public taxation of carbon expenditures. If it is indeed true that the majority of people want to express goodwill toward each other, then understanding what type of system is most conducive to allowing such action to transpire is of utmost importance.

World energy flux/worldview flux, home heating and cooling costs or intellectual development; each pair of terms represents a comparative set of multi-scalar ideas uniting, figuratively or otherwise, the universal with the particular, the individual with society, the cellular with the biosphere. Within the cytoplasmic system of nested entities here on Earth our symbioses—the reality of our interrelatedness—and their accompanying limits continue to reveal themselves. One such limit sure to have a profound effect on the well-being of natural and human systems, including the practical matter of maintaining a reasonable quality of life, is home energy costs. From 1999–2003, on average, a total of 688 U.S. citizens lost their lives due to human health issues related to natural heat exposure (Center for Disease Control 2006). This number includes in many instances individuals existing on modest earnings who spend a disproportionate percentage, oftentimes more than 10%, of their annual income on household cooling and heating expenses. These figures are likely to rise given North's projections of a 2 ppm increase per year in atmospheric carbon dioxide¹ and the upward inertia in temperature over the latter half of the current century and beyond.

This observation is consistent with North's (2011) and others' findings that "we can expect the global average temperature to increase by somewhere between 2 and 5 °C (3.6 and 9 °F). The low end of this range is not too serious, but the high end could be disastrous." Averting disaster is not a speculative and ephemeral matter that is well removed from the immediate concerns of ordinary citizens. True to the geophysical context out of which civilizations arose nearly ten thousand years BP, yet entirely different in terms of societal context, present day survival depends squarely upon the capacity of the current political-economic system to effectively and (one might argue) equitably distribute the basic resources necessary for the continued existence of the greatest number of people for the longest time. It is true there are many more of us now than there were then and we increasingly depend on one another despite a finite and shrinking nonrenewable resource base. However, broad scale human suffering should NOT be taken as the *de facto* consequence of humanity's historical rise in cultural complexity and demographic transition. One constitutive part of finding alternative lifeways that minimize human suffering is to first acknowledge not only the evidence outlined by North in Chap. 3 but also the climate scenarios provided by the IPCC. The potential extremes these scenarios identify represent the very existential limits beyond which narcissistic tendencies wrongly suggest we might someday safely tread. Moving into the future, temperature extremes may be more of an ordinary fact of life than a rare occurrence. Greater regularity in the onset of environmental stressors which challenge the epigenetic rules governing the resilience of ecological system, including our human presence within them, may alter the physical context in which survival is sought. A reasonable human response to such developments will be to seek comfort.

¹ With little prospects for a net decrease considering current inaction among primary polluters, e.g., United States, China.

7.3 Global Climate Change and Domestic Energy Consumption

Heterodox approaches to understanding economic productivity attempt to diversify traditional formal theories with models inclusive of biophysical factors which account for the environmental costs (e.g., atmospheric pollution, stress to natural and human systems) associated with the “creative destruction” of nature. Among this mixture of approaches is “a thermodynamic perspective that emphasizes the production of goods,” rather than an orthodox view of the production of goods and services as being solely dependent on labor and capital (Cleveland et al. 1984). In reality, goods, services, capital, and even labor itself are derivatives of nuclear energy provided by the dynamo that is our sun. All productivity on Earth is a function of the chemical conversions taking place within this star and the physical maintenance, via decreased entropy, of planets orbiting its radiant energy (Cleveland et al. 1984). The energy it provides here on Earth is, at least for now, free. Energy conservation here on earth, as it relates to the use of endemic, finite, and hence precious nonrenewable resources, is an important topic when assessing the long-term viability of economic systems. The productivity of an economic system may be measured according to how many goods and services it creates within a given timeframe. In addition to providing the consumer base with durable goods a second function of economic productivity is to adequately generate and effectively distribute services at an affordable price. This includes the marketing of utilities, primarily gas and electric, for domestic consumption.

The success experienced by the United States and much of the developed world, especially since the mid-1900s, in supplying large segments of the population with affordable utilities has resulted in higher living standards for many. Today, the long term viability of the requisite energy consumption needed to proffer such conditions has been brought into question. Such criticism, not entirely new in itself, is informed by the expected climate scenarios and changes in the energy economy most likely to result from greater regulation of carbon-based emissions. Cleveland noted this much nearly one-quarter of a century ago on the heels of the 1970s energy crisis and OPEC’s manipulation of the global oil market:

Our ability to cope with any economic contingencies will depend on the ability of our economic models to account for the biophysical constraints on human economic activity, and on the ability of our citizenry to accept and adapt to the realities of physical constraints imposed on our economic possibilities. (Cleveland et al. 1984)

The reality of increased regulatory measures, whether driven by market-based incentives or tax-based penalties, will make itself felt across the economic landscape in ways that are still being articulated. As cap-and-trade and taxation-oriented mechanisms are further refined and implemented, more accurate analyses of how the carbon economy is ultimately shaping economic production will emerge (Avi-Yonah and Uhlmann 2009; Ellerman 2003; Gross 2006; Keohane 2009; Murray et al. 2009; Paltsev et al. 2007; Stavins 2007, 2008a, b). This is especially important for understanding the future prospect of delivering high quality, energy efficient, environmentally friendly, reliable, utility services for households to cool and heat their

homes. Consequently, we are in need of new economic theories to help inform energy policy toward responding to the pressing challenges associated with climate change. This observation is consistent with Cleveland's imperative that "economic theory and policy must incorporate the physical properties of resources if economic predictions are to be accurate and economic policies effective" (Cleveland et al. 1984).

The physical properties of fossilized carbon in all of its derivative forms must figure into policy decisions concerning the advancement of social equity amidst the broader issue of climate change mitigation. Domestic fuel consumption is the lifeblood of virtually any model of economic production because "the human economy uses fossil and other fuels to support and empower labor and to produce capital. Fuel, capital, and labor are then combined to upgrade natural resources to useful goods and services" (Cleveland et al. 1984). Useful services, including the alteration of environments to create more habitable living conditions (i.e., a higher standard of living), require this conversion of fuel to generate power for a requisite amount of work to be achieved. The physical properties of the type of fuel used to produce such results determines, in part, the nature of ecological information introduced into the environment from which fuel-as-matter was originally extracted. Because of the laws of thermodynamics and the first principles on which they are founded "economic production can therefore be viewed as the process of upgrading matter into highly ordered (thermodynamically improbable) structures, both physical structures and information" (Cleveland et al. 1984). Thus, adapting to climate change means purposefully altering the flow of ecological information into Earth's biosphere; itself a nested yet closed cytoplasmic system in terms of the requisite matter present and available for producing future upgrades.

Although the majority of energy expenditures in the United States are associated with the transportation and industry sectors of the economy, domestic energy consumption that is provided for by electrical utilities represents an important index of the standard of living achieved by a given household. The inability of a household to purchase enough energy to maintain a comfortable environment, whether by heating or cooling expenditures, is termed its "fuel poverty" (Lloyd 2006). The fuel poverty term offers an alternative approach to traditional measures of poverty and well-being among at risk populations. As a term which helps inform our understanding of living standards in the United States and abroad it "combines the elements of access and consumption of energy in order to examine how these relate to the well-being of households" (Pachauri and Spreng 2003). According to Pachauri and Spreng, "examining well being in terms of both these dimensions—access to clean and efficient energy sources; and sufficiency in terms of the quantity of energy consumed, could be an important complementary measure of poverty" (2003). By including equitable access to energy as one among many factors contributing to poverty, such a diverse measure approaches other indices like the human development index (HDI) used to calculate extra-monetary constraints that impact developing nations (Pachauri and Spreng 2003).

Here in the United States and relative to our discussion on culture shift, the idea of fuel poverty may be used to provide a more lucid picture of the actual risks and vulnerabilities that promise to impinge upon the quality of life of many residents

who either can't afford or must properly budget for increasing expenses as climatic conditions worsen. Elsewhere in Great Britain, fuel poverty is defined as the need to contribute more than 10 % of one's annual household income to all fuel use, including heating fuel used to maintain a "satisfactory heating regime" (Lloyd 2006). Satisfactory is taken here to mean room temperatures of 21 °C (69.8 °F) in primary living areas and 18 °C (64.4 °F) in secondary rooms that are more infrequently occupied. According to Lloyd's calculations, time frames of occupancy range from 9–19 h per day depending on the work or full-time education status of residents (Lloyd 2006). In developed countries in particular, fuel poverty also applies to the cooling energy consumed amongst residents of warmer climatic zones. Understanding the dynamics of this fuel economy is critical to any attempt at ascertaining how and why people move in and out of poverty, in part, as a result of the biophysical constraints placed upon them. Additionally, it stands to reason that clarifying the determining factors behind widespread poverty is an important step toward reducing the human suffering that often accompanies life amidst increasingly stressful conditions.

The following three tables provide data from 2005 related to

1. total energy consumption and expenditures,
2. average expenditures for air-conditioning by equipment type, and
3. average cooling degree days by equipment type in the United States.

Note that cooling degree days are a means of relating each day's temperatures to the varying demand for fuel, including coal fired electrical power, to cool both commercial and residential building space. Given thermal models and cooling expenditures based on current building efficiencies, one may extrapolate from these figures the increased number of households that might fall below the fuel poverty line as climatic conditions change. Of course, the effects of climate change will vary across individual climatic zone, as will the viability of solutions needed to address a possible increase in fuel poverty among each region's residents. This does not mean that catastrophic outcomes are a necessary consequence of a warming climate. Indeed, nearly one-quarter of a century ago, Schipper and Lichtenberg found that Sweden had achieved roughly the same standard of living as the United States while using only two-thirds as much energy per capita (Schipper and Lichtenberg 1976). These numbers are impressive given the geographic context in which Sweden has achieved such results: "The climate in Sweden is more severe; the number of degree-days, weighted by population distribution, is close to 9200 in Sweden, comparable to the value in North Dakota, whereas the weighted US average is approximately 5500 degree-days" (Schipper and Lichtenberg 1976). The comparison between Sweden and the United States draws on an understanding of fuel poverty as it relates to energy used for heating. Yet, other comparisons might be drawn between American household expenditures on air conditioning and households in climatically equivalent nations exhibiting greater efficiency standards and cost effectiveness.

At least two of the household characteristics outlined in Table 7.1 deserve closer attention. First, the high energy consumption and expenditures per square foot of building space for the bottom four household income categories, ranging from less

Table 7.1 US total energy consumption and expenditures, 2005. (Source: Energy Information Administration 2005, Office of Energy Markets and End Use, Forms EIA-457 A-G of the 2005 Residential Energy Consumption Survey. Data tables were adapted by author)

Household characteristics	US households (millions)	Floorspace per household (square feet)	Energy consumption			Energy expenditures		
			Total US (quadrillion btu)	Per household (million btu)	Per square foot (thousand btu)	Total US (billion dollars)	Per household (dollars)	Per square foot (dollars)
Total	111.1	2,171	10.55	94.9	43.7	201.07	1,810	0.83
<i>Household size</i>								
1 person	30.0	1,671	2.12	70.7	42.3	38.69	1,288	0.77
2 persons	34.8	2,297	3.36	96.4	42.0	64.30	1,847	0.80
3 persons	18.4	2,324	1.91	104.1	44.8	36.86	2,004	0.86
4 persons	15.9	2,460	1.72	108.4	44.1	33.47	2,111	0.86
5 persons	7.9	2,539	0.92	117.1	46.1	18.05	2,288	0.90
6 or more persons	4.1	2,246	0.51	123.8	55.1	9.68	2,370	1.06
<i>2005 household income category</i>								
Less than \$ 10,000	9.9	1,393	0.73	73.7	52.9	13.40	1,353	0.97
\$ 10,000–14,999	8.5	1,430	0.64	76.2	53.3	11.97	1,417	0.99
\$ 15,000–19,999	8.4	1,518	0.66	78.8	51.9	12.13	1,448	0.95
\$ 20,000–29,999	15.1	1,709	1.29	84.9	49.7	23.97	1,584	0.93
\$ 30,000–39,999	13.6	1,937	1.18	86.2	44.5	22.84	1,674	0.86
\$ 40,000–49,999	11.0	2,314	1.04	95.0	41.1	19.81	1,803	0.78

Table 7.1 (continued)

Household characteristics	US households (millions)	Floorspace per household (square feet)	Energy consumption		Energy expenditures				
			Total US (quadrillion btu)	Per household (million btu)	Per square foot (thousand btu)	Total US (billion dollars)	Per household (dollars)	Per square foot (dollars)	
\$ 50,000–74,999	19.8	2,361	1.97	99.2	42.0	38.15	1,924	0.81	
\$ 75,000–99,999	10.6	2,939	1.19	112.4	38.2	23.27	2,197	0.75	
\$ 100,000 or more	14.2	3,311	1.85	130.5	39.4	35.51	2,507	0.76	
<i>Income relative to poverty line^a</i>									
Below 100 %	16.6	1,400	1.33	79.8	57.0	24.72	1,485	1.06	
100–150 %	12.9	1,583	1.04	80.7	50.9	19.97	1,548	0.98	
Above 150 %	81.5	2,421	8.18	100.3	41.4	156.37	1,918	0.79	
<i>Eligible for federal assistance</i>									
Yes	38.6	1,598	3.21	83.1	52.0	60.12	1,559	0.98	
No	72.5	2,475	7.34	101.2	40.9	140.95	1,944	0.79	

Because of rounding, data may not sum to totals

^a Below 150 % of poverty line or 60 % of median state income

than \$ 10,000 to \$ 29,999, suggests that significant improvements in existing infrastructure are needed. Note that members of these income categories represent that segment of the overall population perhaps least likely to possess the capital needed for such home improvements. Second, the parallel increases in both energy expenditures and floorspace per household, as one moves from lower to higher household income categories, indicate a growing appetite among more affluent Americans for both living space and the energy demanded to maintain these ambient environments. Also note that a growing portion of this space currently sits empty or unoccupied as a result of the recent rise in default rates on home mortgages. The above trends seem to indicate that lower income households across the United States are characterized by low energy efficiency standards, while higher income households might be described as gluttonous in terms of their energy consumption compared with the rest of the population.

Table 7.2 reveals regional trends and variation in the average household expenditures for air-conditioning alone according to equipment type. Figures for the South and West census regions, which represent 64.9 million or over half of the nation's 111.1 million total households, are of particular interest to our discussion of the different effects exhibited by various climatic zones in the face of global change. Given the disproportionate impact that climate change will have across the subtropics and especially mid-latitude desert or arid environments and the highly urbanized nature of existing populations throughout the South and West regions, the risks posed by such a large scale transformation are certainly worth examining. As typically is the case both aged populations and young children represent those segments of society that feel the brunt of the effects of extreme environmental conditions. This is evidenced by the higher than average mortality rates that these groups exhibit during punctuated heat and cold spells. Fuel poverty, for these groups at least, is truly a life-or-death matter rather than merely an issue of comfort.

Table 7.3 illustrates the spatial variability of environmental conditions in terms of the average number of cooling degree days, a standard way of relating each day's temperatures to the varying demand for fuel. The five climatically distinct areas, which have been organized according to the 30-year average of the annual heating and cooling degree-days from 1971–2000, help bracket the number of households subjected to a comparatively higher or lower number of days in which cooling and heating fuel is most needed. These data represent in essence the environmental pressures or physical parameters that help govern the economic behavior of individual households. Nearly one-fifth (22.8 million) of all American households lie within a geographic area which experiences 2,000 or more cooling degree days per year. The West South Central division in general and Texas and Florida in particular represent states whose significantly large populations and difficult climatic characteristics indicate major energy sinks. These observations should inform any future analysis of the effects of climate change on the American public, whose high rates of energy consumption, across all income levels, perhaps foreshadows their capacity or incapacity to adequately respond to the pressures associated with a warming climate.

Given the above data, two things are apparent: (1) America's housing stock must be improved, and (2) current to future rates of energy consumption must be addressed.

Table 7.2 US average expenditures for air-conditioning by equipment type, 2005. (Source: Energy Information Administration 2005, Office of Energy Markets and End Use, Forms EIA-457 A-G of the 2005 Residential Energy Consumption Survey. Data tables were adapted by author)

	US households (millions)	Total US using any air-conditioning equipment (millions)	Type of air-conditioning equipment (dollars per household)			
			Any air- conditioning	Central system ^b	Window/wall units ^c	
<i>Total</i>	111.1	91.4	276	335		136
<i>Census region and division</i>						
Northeast	20.6	16.3	176	257		131
New England	5.5	3.7	98	193		74
Middle Atlantic	15.1	12.6	199	266		154
Midwest	25.6	23.4	154	181		80
East North Central	17.7	15.9	145	173		78
West North Central	7.9	7.5	174	197		87
South	40.7	38.9	405	448		216
South Atlantic	21.7	20.7	370	409		160
East South Central	6.9	6.6	280	313		164
West South Central	12.1	11.7	539	596		321
West	24.2	12.8	235	283		84
Mountain	7.6	4.3	394	418		161
Pacific	16.6	8.5	155	194		73
<i>Four most populated states</i>						
New York	7.1	5.3	197	301		169
Florida	7.0	7.0	597	617		360
Texas	8.0	7.7	634	689		364
California	12.1	6.6	177	214		71
All other states	76.9	64.9	216	260		113

Table 7.2 (continued)

	US households (millions)	Total US using any air-conditioning equipment (millions)	Type of air-conditioning equipment (dollars per household)		
			Any air-conditioning	Central system ^b	Window/wall units ^c
<i>Urban/rural location</i>					
(as self-reported)					
City	47.1	37.7	279	348	140
Town	19.0	15.9	244	297	134
Suburbs	22.7	19.8	319	361	122
Rural	22.3	18.0	253	306	139
<i>Climate zone^a</i>					
Less than 2,000 CDD and—					
Greater than 7,000 HDD	10.9	7.6	90	115	48
5,500–7,000 HDD	26.1	20.9	138	176	87
4,000–5,499 HDD	27.3	23.4	206	239	147
Fewer than 4,000 HDD	24.0	17.9	252	281	136
2000 CDD or more and—					
Less than 4,000 HDD	22.8	21.7	572	613	326

Because of rounding, data may not sum to totals

^a One of five climatically distinct areas, determined according to the 30-year average (1971–2000) of the annual heating and cooling degree-days. A household is assigned to a climate zone according to the 30-year average annual degree-days for an appropriate nearby weather station.

^b In the 2005 RECS, 1.5 million housing units reported having both central and window/wall air conditioners. They are included in this column.

^c In the 2005 RECS, 1.5 million housing units reported having both central and window/wall air conditioners. They are *not* included in this column.

Table 7.3 Average cooling degree days by equipment type, 2005. (Source: Energy Information Administration 2005, Office of Energy Markets and End Use, Forms EIA-457 A-G of the 2005 Residential Energy Consumption Survey. Data tables were adapted by author)

	US households (millions)		Cooling degree days per household				Total US not using any air-conditioning equipment
	Total US using any air-conditioning equipment (millions)	Total US	Type of air-conditioning equipment			Total US not using any air-conditioning equipment	
			Any air-conditioning	Central system ^b	Widow/wall units ^c		
<i>Total</i>	111.1	91.4	1590	1729	1873	1386	939
<i>Census region and division</i>							
Northeast	20.6	16.3	1069	1104	1107	1103	935
New England	5.5	3.7	726	764	865	739	646
Middle Atlantic	15.1	12.6	1193	1204	1142	1247	1138
Midwest	25.6	23.4	1152	1169	1180	1139	969
East North Central	17.7	15.9	1082	1096	1105	1074	961
West North Central	7.9	7.5	1310	1324	1322	1331	1013
South	40.7	38.9	2354	2370	2424	2132	2014
South Atlantic	21.7	20.7	2224	2254	2347	1761	1608
East South Central	6.9	6.6	1906	1907	1906	1910	1882
West South Central	12.1	11.7	2842	2836	2855	2765	3013
West	24.2	12.9	1209	1598	1757	1114	766
Mountain	7.6	4.3	1771	2440	2576	1321	871
Pacific	16.6	8.5	954	1171	1215	1078	723
<i>Four most populated states</i>							
New York	7.1	5.3	1151	1178	1015	1222	1075
Florida	7.0	7.0	3494	3492	3491	3502	Q
Texas	8.0	7.7	3061	3047	3050	3036	3392
California	12.1	6.6	1044	1295	1338	1171	744
All other states	76.9	65.0	1389	1474	1560	1268	923

Table 7.3 (continued)

	US households (millions)	Total US using any air-conditioning equipment (millions)	Cooling degree days per household				Total US not using any air-conditioning equipment
			Total US	Type of air-conditioning equipment			
				Any air- conditioning	Central system ^b	Window/wall units ^c	
<i>Urban/rural location</i> (as self-reported)							
City	47.1	37.8	1706	1882	2102	1443	996
Town	19.0	15.9	1467	1596	1754	1267	799
Suburbs	22.7	19.8	1586	1676	1765	1258	959
Rural	22.3	18.0	1451	1585	1651	1444	900
<i>Climate zone^a</i>							
Less than 2,000 CDD and—							
Greater than 7,000 HDD	10.9	7.6	607	695	727	641	408
5,500–7,000 HDD	26.1	21.0	992	1028	1066	975	846
4,000–5,499 HDD	27.3	23.4	1324	1385	1392	1373	956
Fewer than 4,000 HDD	24.0	17.9	1444	1665	1687	1574	799
2000 CDD or more and—							
Less than 4,000 HDD	22.8	21.7	3214	3195	3222	3037	3576

Because of rounding, data may not sum to totals

^aOne of five climatically distinct areas, determined according to the 30-year average (1971–2000) of the annual heating and cooling degree-days. A household is assigned to a climate zone according to the 30-year average annual degree-days for an appropriate nearby weather station.

^bIn the 2005 RECS, 1.5 million housing units reported having both central and window/wall air conditioners. They are included in this column.

^cIn the 2005 RECS, 1.5 million housing units reported having both central and window/wall air conditioners. They are *not* included in this column.

^Q = Data withheld either because the Relative Standard Error (RSE) was greater than 50 % or fewer than 10 households were sampled.

Low energy efficiency standards among US households are, in part, a vestige of poor policy formulation under the Federal Housing Authority (FHA) prior to the energy crisis of the 1970s. The housing stock that grew out of that phase of governance is today a culprit in the present-day combating of energy waste. In terms of overall energy consumption among the US consumer base, diminishing high quality resource abundance may offer an unwelcome check on current rates of consumption. This realization is consistent with our previously discussed biophysical theory of economic production, which “emphasizes the economic importance of changes in the quality and availability of fuel and other natural resources faced by the United States” (Cleveland et al. 1984). Indeed, the much desired growth, productivity, and technological change touted by many as the keys to a resurgent economy are dependent on the energy return on investment (EROI) for fuel related resources. A fuel’s EROI is “the ratio of gross fuel extracted to economic energy required directly and indirectly to deliver the fuel to society in a useful form” (Cleveland et al. 1984). Furthermore, “at an absolute minimum, the aggregate EROI for fuels must be greater than 1 for an economic system to function, and probably much greater for it to grow” (Cleveland et al. 1984). Yet, as Cleveland also warned nearly three decades ago “we should also plan for the contingency that new high-EROI sources might not be found” (Cleveland et al. 1984).

Today, the search for new high-EROI sources continues in the face of elevated levels of atmospheric carbon and despite the externalities that their chemical conversions produce. The environmental cost associate with the consumption that grows out of such biophysical economic production is not distributed evenly across the world’s population. According to Chow, “residents of the poorest 10 % of countries consume less than one barrel of oil equivalent per year per capita, whereas their counterparts in the richest 10 % of countries consume over 60 times as much” (Chow et al. 2003). Such disparities in energy consumption are not limited to the upper and lower tenth-percentile of developed national economies. Among developing nations, “on an annual per-capita basis, the middle income countries use four times as much energy as their low-income counterparts” (Chow et al. 2003). These trends suggest that as nations become wealthier, in general, the amount of energy they consume dramatically increases:

Between 1980 and 2001, worldwide consumption of petroleum, coal, and natural gas increased by 22, 27, and 71 %, respectively. Concurrently, annual world carbon dioxide (CO₂) emissions from the consumption and flaring of fossil fuels, implicated as the predominant cause of global climate change, increased from 5 billion to 6.6 billion metric tons carbon equivalent, with relatively steady increases occurring for all income groups. (Chow et al. 2003)

Some projections indicate that fossil fuels will remain competitive and in sufficient supply over the next half-century to keep pace with global consumption. What remains unanswered is whether renewable sources of fuel will be developed at a rate required for transition into a more carbon-neutral state of economic productivity. The high EROI of fossil-based fuel sources and lack of a coherent strategy or concerted effort to effectively stabilize greenhouse gases make it likely that the current economy will operate according to the social constraints of labor and capital than

any observation of the physical characteristics of its chosen fuel source. Thus, one can both calculate and speculate on what may come first, (1) our reaching the lower margin which marks the unprofitability of burning fossilized carbonates or (2) the upper threshold of atmospheric carbon concentrations that promise to diminish the quality of life here on Earth beyond that which civilization has experienced during the Holocene. Perhaps humans themselves, like the goods and services they produce, are “thermodynamically improbable” within a world full of inherent limits and parameters. This does not mean that our success within the history of carbon based life forms is necessarily an impossible undertaking. However, this observation underscores the stark realization that, as an infantile species, efforts at managing our home environment will be met with both numerous opportunities for development *and* unavoidable budgetary constraints.

7.4 Redefining the Good Life

The notion that humanity is somehow exempt from the risks posed by natural hazards, including those associated with changing climatic conditions, draws on a belief in the idea of exceptionalism. This idea elevates the status of *Homo sapiens sapiens* above that of other sentient creatures on Earth. Here, humans are understood to be a unique phenomenon possessing their own normative set of attributes that somehow differs or is indeed superior based, in part, on metaphysical speculation about the origin of their development. This “difference,” itself viewed as evidential proof of humans’ high stature in the world and by extension exclusionary of other beings, stands as a fundamental premise upon which Western worldviews are erected, modified, and continually remade to support the underlying assumptions of material progress. Total immersion in this set of underlying assumptions, when combined with a pernicious sense of entitlement common to post-modern worldviews, works to create a personality type or mode of *Being-in-the-World* that defies the observation of existential limits. Furthermore, the distinct type of frustration felt by those exhibiting a false sense of security, derived from self-assured notions of exceptionalism developed over geologically brief periods of unprecedented levels of comfort, brings to the social world a certain type of narcissist that proved increasingly common in the modern era, the new poor. According to Eric Hoffer, “it is usually those whose poverty is relatively recent, the ‘new poor,’ who throb with the ferment of frustration. The memory of better things is as fire in their veins. They are the disinherited and dispossessed who respond to every rising mass movement” (Hoffer 2002). The specter of affluence often haunts those who grow blindly accustomed to its fickle graces. As a consequence of this dynamic, the changing fortunes experienced by some may, during more austere periods, translate into shifting socio-political allegiances. Yet, as Hoffer observes, this has not always been the case:

So long as those who did the world’s work lived on a level of bare subsistence, they were looked upon and felt themselves as the traditionally poor. They felt poor in good times and bad. Depressions, however severe, were not seen as aberrations or enormities. But

with the wide diffusion of a high standard of living, depressions and the unemployment they bring assumed a new aspect. The present-day working man in the Western world feels unemployment as a degradation. He sees himself disinherited and injured by an unjust order of things, and is willing to listen to those who call for a new deal. (Hoffer 2002)

New deals are not always postulated in the incremental form of contractual agreements or labor negotiations. Indeed, in the event of widespread hardship caused by global warming, the type of new deal which some social factions may call for and certain opportunists might demand could be unfeasible, logistically prohibitive, or simply inoperable outside of the political imaginary. As a partial response to the perceived unjust order of things, more tangible social, political, and economic solutions may be preempted by the reactionary logic and perhaps more disruptive behavior associated with rising mass movements. The geographical and cultural contexts in which deteriorating conditions could ripen the potential for conflict would differ, but the role of collective memory in fueling a common discourse of resentment promises to remain a defining trait among disparate cases across the developed world. Past beneficiaries of national virility might serve as central figures and vocal critics in the dialogue on economic retraction and cultural decline.

Central to the development of these sentiments and their outward expression are the biophysical economic forces that limit the consumptive behavior of specific actors. In particular, the future scarcity of high EROI fuel sources and the associated potential for inflating the cost of basic resources, including home fuel costs, may significantly affect the nature and intensity of debate as it carries from the proverbial chamber to the public square. This particular chapter in the American experience may be simultaneously written elsewhere around the world where the forces of globalization and economic integration make Helsinki and Honolulu more connected in financial terms and Athens and Atlanta closer in cultural life than the distances between them might otherwise suggest. As might have been predicted, America's recent sneeze helped send already faltering segments of Europe into the throws of illness. Initial intimations at the synergistic results of this relationship have already been demonstrated during violent street protests in Athens, as ongoing efforts by the European Union to prop up the Greek economy and implement a national austerity plan face a mixed reception.

Returning to the broader issue of shifting cultural sensibilities and a more dominant postmodern condition, one is tempted to ask how the aforementioned dynamic may come into dialogue with the need to formulate and administer a coherent strategy for dealing with climate change and the associated pressures they will place on societies. What role will nation states play in continuing to serve the immediate needs of their citizens? Conversely, who or what constellation of socio-political arrangements might a discontented populous serve upon considering their most basic interests left unguarded? Postmodern worldviews have as, at least, one defining characteristic the notion that many traditional institutions which compose the body of civil society are no longer deemed worthy of either their patronage or sympathies. Accordingly, the good life is more closely associated with economic markers than the transcendent qualities of civil society including compassion, charity, and shared sacrifice. This view is reflected in Swearer's observation that "our modern economic culture

has also had a generally deleterious effect on classical moral values and religious worldviews and on traditional ways of understanding human existence and what constitutes the good or happy life” (Swearer 1997). Complementary to this idea is the longstanding and established view that stoicism and its classical virtues of moderation, steadfastness, reason, and thoughtful deliberation—however foreign they may be to a postmodern future—will serve well those living through such uncertain, poverty stricken, and comparatively bad times.

7.5 Living Through the Bad Times

No longer wander at hazard; for neither wilt thou read thy own memoirs, nor the acts of the ancient Romans and Hellenes, and the selections from books which thou waste reserving for thy old age. Hasten then to the end which thou has before thee, and, throwing away idle hopes, come to thy own aid, if thou carest at all for thyself, while it is in thy power. (Aurelius 1991)

The durational and indefinite nature of good times can potentially lull into complacency an otherwise responsive and imaginative outlook. Such illusions and their attendant idle hopes and desires cloud the better judgment of individuals and nations capable of, yet reluctant to, presciently act in the world. Conversely, bad times often serve to focus one’s resolve toward seeking out and materializing comparatively better futures. By enacting such realities the productive capacity of living things is called forth. These observations are relevant to both the stoic’s and Buddhist’s understandings of what it means to *be-in-the-world*. They are, in one sense, two kindred responses to the need for locating one’s power amidst challenging conditions while opting to govern one’s actions when goals are reached and expectations surpassed. Together these senses of illusion and reality constitute the social milieu in which conscious beings create their own collective geosophies. With human consciousness came the power for humanity to transform the natural world, and with such power came the setting up of goals and the proliferation of intentions needed to achieve them.

This process of mutual transformation presents humanity’s *Being-in-the-World* as a spatio-temporal path, a progression of fluid and unfixed ecological forms, along which the immediacy of specific needs prompted the improvisation of skill sets. There were times in which distinct forms that benefited the continuation of the process were incorporated toward achieving intermediary goals that were, in part, constitutive of broader aims that went above and beyond mere survival. Depending on the environmental conditions it was faced with, consciousness focused on devising the cultural adaptations necessary to address the particular problem at hand. It was, at some deep level, pragmatic in nature. Moving from metaphysical speculation on the essence of consciousness to a Buddhist oriented view, Eckel asks the question “is it better to walk the road like a diligent pilgrim with your eyes fixed firmly on a distant goal or to step off the road and allow your consciousness to merge with some part of the natural world” (Eckel 1997)? Shared sacrifice is arguably both a

virtue and a goal within the context of long term human growth and development. The skill set required for arrival at that destination and the merger with nature, as suggested above, is already available in the present historical moment. Although Eckel is concerned here with the aims of individual actors, one might extend this question, as Hoffer has done, to societal goals including the perfection of a national ideal:

The measure of a nation's potential virility is as the reservoir of its longing. The saying of Heraclitus that 'it would not be better for mankind if they were given their desires' is true of nations as well as of individuals. When a nation ceases to want things fervently or directs its desires toward an ideal that is concrete and limited, its potential virility is impaired. Only a goal which lends itself to continued perfection can keep a nation potentially virile even though its desires are continually fulfilled. The goal need not be sublime. The gross ideal of an ever-rising standard of living has kept this nation fairly virile. (Hoffer 2002)

Reading the collective consciousness of a nation, its ethos or zeitgeist if such a thing may be detected, provides a glimpse of the deepest desires, hopes, and aspirations that populate the popular geographies told to and about itself. These geographic imaginaries prompt the renewal and intensification of national virility. The physical expressions of such virility manifest as identifiable behaviors including, for example, the overconsumption of energy resources which exacts a broader impact on the world. National procreation in the spirit of market domination—taken here as an indicator of the Godly power to intervene on nature's economy by altering global energy flux—exerts its own worldview on the collective body of humanity. It is a worldview that denies the efficacy of Commoner's third law of ecology, concerning the nonexistence of a free lunch. Compare this with Buddhist perspectives including the practice, among those initiated into the monkhood, of receiving alms—a socially significant event in which the indefinite liminality it represents is likened by some to death. In addition to their observance of limits according to the precepts of rational thought, Buddhist monks receive alms with full knowledge and awareness of the social networks of production from which the extended community's offering is made. When based on merely outward appearances the acceptance of alms might suggest that sustenance is provided at no cost or is simply free. However, a more symbolic view of the exchange suggests that their lunch is anything but free. This is owed to the realization among those who are fed that the underlying shared sacrifice which made their meal possible was collectively offered in support of the monk's ongoing spiritual development. It is homage paid by the community out of a sense of interdependence between themselves and those who have admirably and sacrificially, for the sake of reducing suffering, relinquished their selfish desires.

Rough parallels may be drawn between the receiving of alms, often simply a bowl of rice, and a renewed vision of eco-spirituality, consumption, and the environmental costs exacted on members of the world community, many of whom are the traditional poor, who "foot the bill" by shouldering the ecological burden upon which an individual's or a nation's "reservoir of longing" is continually filled. This vision holds potential for helping to foster more environmentally friendly life ways. According to Swearer, "the compatibility between the Buddhist worldview of interdependence

and an ‘environmentally friendly’ way of living in the world, the values of compassion and nonviolence, and the example of the Buddha’s life-style and the early *sangha* are cited as important contributions to the dialogue on the ways to live in an increasingly threatened world” (Swearer 1997). In this sense, cultivating one’s own inner transformation away from pervasive selfishness and greed is the penultimate step towards realizing true compassion for the natural world. Along this figurative path grows a clearer understanding of precisely the kind of freedom both Heraclitus alluded to and Siddhartha Gautama first spoke of. It is a conception of freedom thoroughly imbedded in the precepts of the Eightfold Path, by way of the Four Noble Truths, concerning “right attitude.” Attitude is understood here to encompass one’s personal approach to not only nature but life itself. Hence, Phra Prayudh identifies three erroneous beliefs common to Western worldviews which underlie environmental destruction: “wrong attitudes toward nature, fellow human beings, and personal life objective” (Swearer 1997).

Attitudes help inform one’s actions. Accordingly, the countless actions making up one’s life represent not isolated events but rather a succession of effects that precede the causes which precondition and continuously undergird further action of a similar or dissimilar nature. As such, personal life objectives determine, in part, the intentionality through which lived action, as life course, is orchestrated, executed, and ultimately brings the *world-into-being*. This broadly illustrates the dynamic inherent in the interpenetration (+) of the human (H) and the natural (N). In more esoteric terms it is instructive of how one might conceive of mind and matter coalescing. Thus, choices include the decisions one makes over how to not only act but also think in, of, and about the world. In Buddhist phenomenology thought is considered tantamount to action, as each term serves as gravitational counterpoint to the other in terms of formulating a discourse. Accordingly, thought is action and action is karma; therefore, thought itself becomes karmic in nature. In terms of environmental thought and action, “a Buddhist environmental ethic is hence a ‘virtue ethic,’ one that asks not just which specific actions are necessary to preserve the environment but, more deeply, what are the virtues (that is the precepts and perfections) we must cultivate in order to be able to act in such a way” (Sponberg 1997).

Although freedom may be considered more of a condition than a virtue, taking seriously one’s freedom—from the perspective of recognizing, understanding, and appreciating its fundamental basis not as a secondary product of the free market but rather an underlying condition upon which free enterprise is premised—is perhaps a virtuous view of its fundamental meaning. The illusory culture which transmogrifies freedom, as merely acting upon one’s consumptive rights to maintain the national virility needed for the ongoing fulfillment of desires, is neither becoming of a thoughtful and deliberative society nor advisable for the maintenance of democratic ideals. This claim is not intended as a wholesale condemnation of the pursuit of free enterprise. It is instead a frank realization of the remarkable discrepancies that have emerged between traditional measures of individual and national affluence and the cheapened and ubiquitous version of material progress so gleefully embraced by modern charlatans of “the good life.”

Some might argue that our national culture, having at times become virtually indistinguishable from consumer culture, has tended to accentuate the negative aspects of America's entangled relationship with nature. Rather than honoring or paying tribute to the successful episodes of environmental stewardship laid down by the American preservation and conservation movements, their underlying ideals have been muted from the public discourse on what American culture could be. Serving as counterpoint to this idea is Parkes' more optimistic reminder that "there is no necessary contradiction between a simple life lived lightly on the earth and a rich life in refined culture" (Parkes 1997).

7.6 Seeing Beauty Amidst Ugly Circumstances

Are we exceptional or do the existential limits of our *Being-in-the-World* imply a beginning and an end to the duration of our longing? More radical voices embrace the idea that we, as either a nation or species, are not only unexceptional but at our very root are destined for destruction. Accordingly, our national virility is considered expressive of both human folly and more fundamentally our viral nature. For more radical voices the only adequate response to mitigating against climate change lies in an intentional dismantling of the entire global economic order. Indeed, nearly four decades ago John Berger, amidst the market fluxuations of the 1970s, stated that the intellectual pursuit of art in the modern era² should rightfully be directed at bringing down capitalism (Berger 2003). This is in many but not all instances the kind of "speaking truth to power" of which Berger and his present-day sympathizers opportunistically speak.

It is reasonable to claim that the aims of their research schema are perhaps equally an imposter in the academy as the frequently criticized goals of techno-scientific and entertainment industry related research clusters. The irony present in the observation that one group produces the necessary means for the ongoing creative destruction of nature, while the other group simultaneously discredits the very scientific apparatus that provides objective evidence of environmental degradation is not lost on the author. Of greater importance to our current discussion of culture shift is the idea that the inherent tension present between dueling scientific and postmodern worldviews both complicates the likelihood that America's wealth of land grant universities can properly carry out their institutional missions given such vastly different aims among their faculty. True, universities rightfully serve as repositories for a diversity of ideas and viewpoints. However, to actively work in direct opposition to crudely characterized notions of capitalism and science seems, at least, inconsistent with promoting the greater good.

Resorting to some ill-conceived and nebulous idea that economic collapse will somehow decrease rather than alarmingly increase human suffering is tantamount to

² And one may safely extend this to the entire academy in lieu of the Humboldtian model's focus on the humanities.

promoting limitless and unchecked material progress as a panacea for the widespread deliverance of environmental justice. According to Berger's logic, such counterrevolutionary cohorts wish for a time when without contradiction they would be right. These factions increasingly include the postmodern new poor whose emphasis on self-referential behavior and the desire to avenge past grievances demonstrates the shortsightedness of their intellectual project. Jiang comments on this intellectual pitfall noting that, "psychological analysis without the search for spiritual growth can lead to narcissistic self-obsession. . ." (Jiang 2006). Psychological analysis is taken here to have an implicit aim toward strengthening the ego, as Freud popularized, compared with the transcendentalist project recommended by Jung, as a healthy component of human growth and development. The transcendentalist project stands as one potential avenue for steering one's sensibilities away from the kind of self-referential outlook that is referenced above and discussed in greater detail throughout this book.

In this chapter, I have attempted to bridge the first and the second halves of the book by drawing from a heterodox approach to understanding the biophysical basis of economic productivity and its environmental costs. This biophysical approach is in some ways suggestive of the need for a complementary ecospirituality that calls for a new national experience rooted in a collective acknowledgement of the karmic activity underlying whichever ugly circumstances may befall us as a result of the ongoing shift in dominant culture and already changing climate conditions. Given the evidence and arguments presented in the first half of this book, the outlook does not always look promising. However, with a proper attitude, the future may turn out to be a beautiful experience in terms of the thoughts/actions taken to foster the best possible outcomes needed by those living through such trying times. In terms of Buddhist phenomenology, Lusthaus provides a metaphorical account of this karmic economy at work in the production of new life experiences: "Just as a plant develops from its roots unseen underground, so do previous karmic experiences fester unseen in the mind; just as a plant sprouts from the ground when nourished by proper conditions, so do karmic habits, under the right causes and conditions, reassert themselves as new experiences" (Lusthaus 2002). This includes habits of self-interest, belief in an enduring self, and narcissistic self-attachment. From an eco-spiritual perspective, this effect of karmic inertia in our collective consciousness will help govern how we and others' experience the world some 50, 100, or even 200 years down the road. The geophysical basis of climate change makes this so since the zenith of global warming may exhibit a delayed arrival based on the principle of ecological sensitivity. Consequently, it stands to reason that someday, in some form or fashion, many members of our species will come to understand their true nature, as the stoic Marcus Aurelius recommends, whether in a silent moment of finally receiving alms or amidst a frenzied and restless continuum of heated debate.

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Part III

Imagining a World: Specific Regional Impacts and Implications

This section is for me this book's heart, it's reason-to-be. Here we attempt to imagine four specific world regions downstream of our two great change-agents. We do so based on what we “know” as the term is understood in science (Part I), and what we think we know (Part II). We do so with an emphasis on expected outcomes as reflected in actual lived-lives of ordinary humans circa 2100.

The four regions¹ treated here include many of the world's largest conurbations, e.g., Houston, Milan, Baghdad, Karachi, and Shanghai. If in that short list there is a “bias,” it is an accent on the subtropical and the near-subtropical. The world's subtropics encompass latitudes $\sim 25^\circ$ – $\sim 40^\circ$, which includes southern USA and Europe, most of the Middle East, and much of the southeastern quarter of the continent of Asia as well as significant portions of northern Australia and southern parts of South America and Africa.

Why such a bias? To begin with, culture-shift will surely play a significant role in determining the future of these areas, none more strikingly in the Middle East and Asia, regions very different but similar in this respect: the story of the unfolding clash of the values and assumptions of traditionality, modernity, and postmodernity already well into middle chapters in Europe and the USA, has only begun to be written.

Still, these heavily populated areas receive special attention² here even more because they are very likely to prove highly vulnerable to twenty-first century climate change, perhaps more so than any other significantly populated part of the globe other

¹ Alone among these four regions, two received particular attention. First, the future Middle East is the subject of two separate chapters. In part, this is because the first (Alpert) has a single specific theme—climate change and its implications, i.e., the potential “death” of the Fertile Crescent—whereas the other aspires to a broader scope. Moreover, even more than most, understandings of this region and its future tend to come framed within particular worldview ideas and assumptions, not least concerning Israel, as is evident in the chapter by Kaya et al. As to questions of which ideas and assumptions are right and wrong, that is something for the fair-minded reader to wrestle with her/himself. Second, Asia gets extra attention for two obvious reasons: a very large share of humanity lives herein, and China, the emerging new hyperpower, will play an outsized role vis-à-vis the world circa 2100.

² The southern hemisphere subtropics are not included here only because expert individuals and teams who I approached over a period of several years in such locations (e.g., in Argentina) were unwilling to join the project. I encourage readers to contact me with suggestions so that this shortcoming can be rectified in future editions.

than the subpolar zone. As the planet warms, the tropical high pressure cells, the so-called Horse Latitudes, and the resulting hot/dry conditions currently associated with the likes of the Sahara and the American Southwest, will almost certainly shift pole-ward into the subtropics. See Chap. 3 for more about this process.

It is true that the impacts and implications of climate change and culture-shift will not be unmixed, and it is also the case that the “jury is still out” vis-a-vis human agency in response to them. Nevertheless, these chapters reveal that the world we now view through a glass darkly, the world in circa 2100, itself has a disturbingly gloomy hue.

Chapter 8

Europe 2050–2100: Imagining New Lifeways/Lifestyles

Niem Tu Huynh and Anke Uhlenwinkel

Abstract The effects of climate change in Europe vary over space, as biological and physical systems differ in western, central, southern, and northern Europe. Overall, Europe should expect to have more hot summers with Western Europe to expect even more hot weather than other parts. One of the key questions though is how Europeans will adapt to climate change. “Europe” even if it is equated with the European Union (EU) is extremely diverse. The European Union alone acknowledges 23 languages as “official languages” with Dutch, French, German, and Greek being spoken in more than one of its member states. The 500 million EU-Europeans are living in 27 states that have distinct histories, which do not only tell of cooperation, but often include wars that different Europeans were waging against each other. With collective change, cultural shifts may emerge. To envision scenarios that reflect possible European action, the authors focus on peoples’ values to environmental issues. Thus, cultural shift accompanying climate change may be non-existent as we simply choose to keep living the way we know best. However, given the dramatic changes in flora movement and water shortage or abundance, it is more likely that people will respond in one of two ways: work collectively or as fragmented nations. The next decades will prove to be interesting in observing the chain of reactions on how climate change will influence the way people live and respond. Examples of imminent changes may include people migrating from regions significantly affected to winner-regions that benefit from climate variability, changes in consumption habits, or shifts in value patterns.

8.1 Introduction

Shifts in the Earth’s climate pattern have always been in constant flux. The climate change considered in this book, the warming of the planet, is one of many dramatic changes that have occurred before *Homo sapiens* roamed the Earth. However, this

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issue is of concern to us now as we are being affected and have the capacity to adjust for our survival. Some options for human acclimatization may be through migration or local adaptation as the environment transitions from hot to cold and wet to dry (Behringer 2010), resulting in shifts in the biomes and the distribution of fauna and flora.

The extent of climate change, and thus the human impact and response, varies across place and space on the Earth. This chapter explicitly discusses and attempts to project how Europeans will respond. It begins by providing an overall context to set the physical boundaries of Europe followed by the changing cultures across this region. The peoples' perspectives play a role in their reaction to how they may or may not change their lifestyles at an individual and community level. The second section provides an overview of the projected changes to the physical environment, fauna, and flora in Europe. This is followed by a proposition of potential cultural shifts that may result when the attitude of Europeans and emerging environmental changes are considered.

8.2 Defining the Geography of Europe

The definition of what constitutes the geography of Europe differs across space and time. The chapter sets out taking a closer look at the politically constituted Europe, the European Union (EU), it then goes on to discuss some, mostly historical views of Europe as a continent to return to the intricacies of defining Europe. The geographic extent is important to frame the attitudes, politics, and projections following climate change and cultural shifts as all shifts might be place and culture specific.

Europe seen through the eyes of the US in the *Atlas Du Monde Global* (Boniface and Védrine 2010) (Fig. 8.1)¹ is shown as a tiny peninsula in the top right hand corner, colored in blue to denote its status as a member of NATO. Europe is also surrounded by conflict zones in the east and in the south.

The same continent seen through European eyes (Fig. 8.2)¹ is found in the center of the map and slightly larger. Europe is also colored in blue, but in this map, it reflects the EU and other shades of blue are used for other western countries such as the US or Australia, but also some countries in Europe. No conflict zones are shown.

The two "Europes" are almost, but not quite the same: while the NATO-blue leaves Austria, Switzerland, and the countries of the former Yugoslavia out, the EU-blue doesn't include Norway and Switzerland, although it still counts them as part of the western countries. Figure 8.2 doesn't include most of the former Yugoslavia, which seems not to be perceived as western, although most of the newly founded states have by now applied for membership; and Slovenia is already an EU-member.

¹ For Fig 8.1 and 8.2, there are instances where we have been unable to trace or contact the copyright holder. If notified, the publisher will be pleased to rectify any errors or omissions at the earliest opportunity.

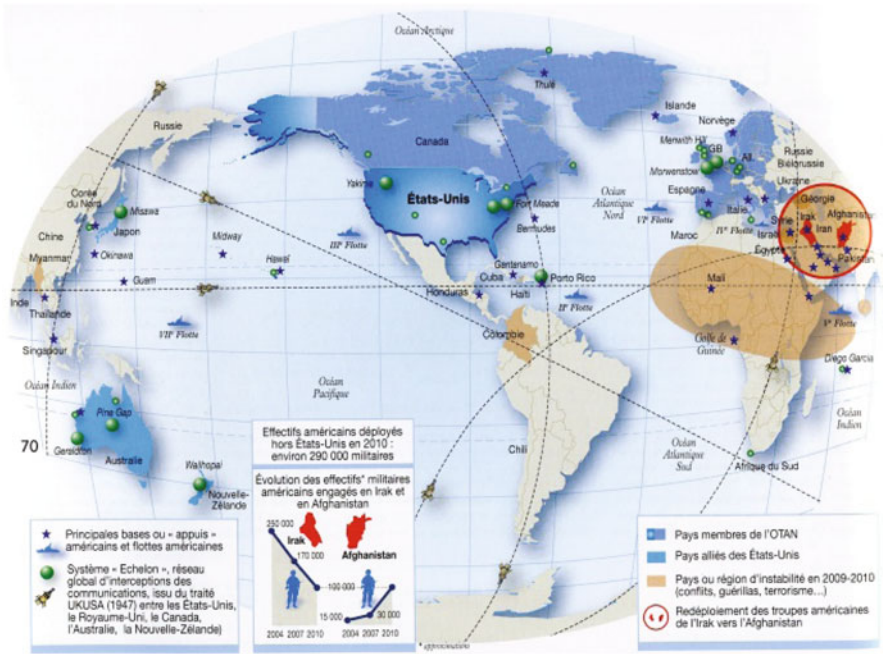


Fig. 8.1 The world seen through the eyes of the United States. (Boniface and Védrine 2010)

The way Europe is defined has always been less a geographical than a political question (Schultz 2003). Nevertheless geographical arguments were often used for political purposes. Today you may hear the complaint that Europe is equated with the EU, which excludes some countries to the east and north but also notably Switzerland, which is situated right in the middle of the continent. However, there are some good reasons for this from the perspective of EU citizens. The majority, with the great exception of UK citizens (Ross 2008), see themselves, at least partly as having a European identity, although not all see Europe in the same way (McNeill 2004). Yet an imagined shared identity may have developed as these Europeans are not only citizens of their respective nation-states, but also of the EU, which influences large parts of their daily lives. This citizenship is not so much a dual, but a multi-layered or nested citizenship (Ross 2008), which means that the country of which one is a citizen is part of the other political entity of which one is also a citizen. In this respect, the EU is unique: it is neither a federal state nor is it only a confederation of states like the North American Free Trade Agreement (NAFTA) or the Association of South East Asian Nations (ASEAN) (Beck and Grande 2007). It is a political body in its own right.

To better understand what this entails, take a closer look at a piece of EU and national regulation that affects the daily lives of European citizens. In December 2001, the EU published the Council Directive 2001/113/EC “relating to fruit jams, jellies and marmalades and sweetened chestnut purée intended for human consumption.”

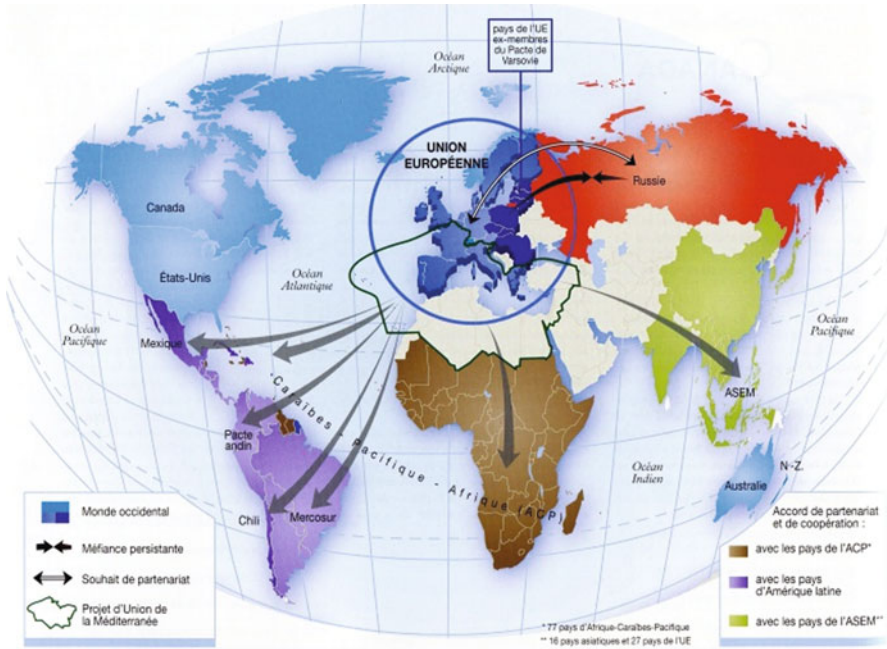


Fig. 8.2 The world seen through the eyes of Europe. (Boniface and Védrine 2010)

In it are the definitions of fruit jams, jellies, and marmalades that producers have to take account of in order to sell their product in the EU. One of the problems that the EU had to solve here was the different usage of the word marmalade in different European countries. The word originally derives from the Portuguese word for quince (*marmelo*), and quince jelly is the only product called *marmelada* in Portugal. In Britain, the word marmalade is only used for jams made of oranges, lemons, and other citrus fruits. But in Germany, the word *Marmelade* is used for all kinds of jam. The EU regulation defines marmalade in the British sense of the word, which is contradictory to the usages in Portugal and Germany. So what happens is that the Portuguese version of the regulation avoids the word marmalade. The British marmalade here is called *citrinada*. In the German version, the word *marmelade* is restricted to the British usage of marmalade and for the British jams, the original French word *confiture* (*Konfitüre*) is used. This dismisses the traditional German distinction between *Marmelade* and *Konfitüre*, where *Konfitüre* is defined as containing visible pieces of fruit. But the European legislation always has to be transferred into national legislation. So when Germany transferred this directive into its national law, a significant paragraph was added. It says that the word *Marmelade* may be used instead of *Konfitüre* (jam) if the product was sold only locally in farmers' shops or on weekly markets. On the level of daily life, however, next to all the categories that the EU defines, Germans have created a new, unregulated category called *Fruchtaufstrich* (literally fruit spread). It was first created when there was a rising demand

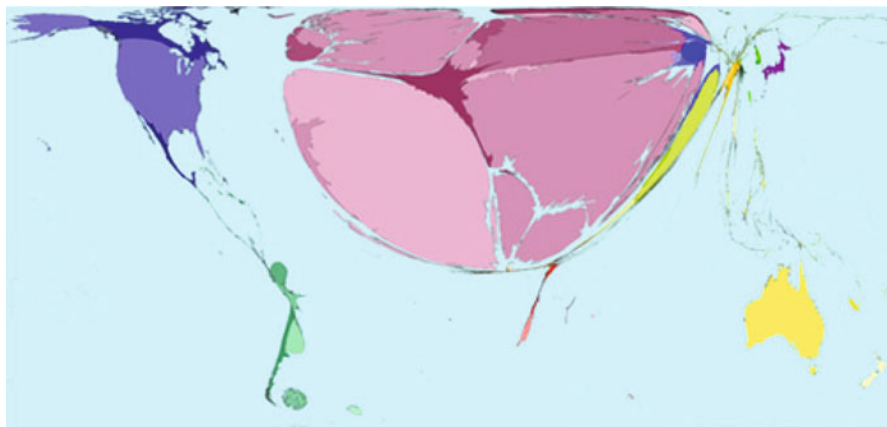


Fig. 8.3 Proportion of all people who demonstrated against the war in Iraq on the 14th, 15th, and 16th of February 2003 as shown by territory size. (www.worldmapper.org)

for more healthy and organic food in Germany, and it consists of all the jams that do not contain the large amount of added sugar that the EU prescribes. But whether the label says *Konfitüre* or *Fruchtaufstrich*, people more often than not will ask you to pass the *Marmelade* at the table. This example shows how the EU, when trying to formulate a general rule on the diverse backgrounds of its member states, usually produces a more complex diversity in the daily lives of its citizens.

For the EU citizen, it is not just the structure of the regulations that makes life more complex. The political character of the EU may also mean that he or she may be confronted with two controversial governmental viewpoints. For example, Germany recognized Kosovo after its declaration of independence but Europe didn't (Le Monde diplomatique 2009). But he or she may also use the different political layers to better voice his or her opinion, as can be seen in British voting behavior when substantially more voters are in favour of their Green Party in the European than in national elections (Ross 2008).

In this context, the formation of a truly European public debate must be discussed. In February 2003, large demonstrations against the war in Iraq were being held in a number of important European countries (Fig. 8.3) as a reaction to the move of Britain and Spain to support the US war. This was seen as the birth of a European public sphere by some, notably in the Habermas-Derrida manifesto published in spring of the same year (Heffernan 2007). The two philosophers underlined the necessity of the discursive construction of a European identity that was based on cooperation, egalitarianism, and the experience of losing colonies, empires, and wars, or for short: power. A European dialogue would enable the EU citizens to better understand each other and their continent as a whole.

The European continent is usually depicted as being bigger than the EU. The most common representation of the continent of Europe today is probably the one with its eastern limits shown as the Ural Mountains, the Caucasus Mountains, and the

Bosporus Strait. This representation is commonly used in textbooks in Germany. In France, it is usually one of many possible ways of limiting the geographic extent of Europe, but it has the slight problem that Europe's boundaries cut across two countries: Russia and Turkey. These countries would only be partly considered to belong to Europe, a fact that has led to on-going discussions about Turkey's possible membership in the EU (Schultz 2005).

Interestingly, this limited view of Europe is challenged by major European contests and tournaments (Schultz 2003). Take for example the European Football Championship. Its organizing institution, the Union of European Football Association (UEFA), has 53 members, some of which are not states in the common sense of the term (as England, Wales, Scotland, Northern Ireland, and the Faroe Islands), but Turkey, Israel, and Kazakhstan are members. The Eurovision Song Contest goes even further. Eligible for participation are all the member states of the European Broadcasting Union, which explicitly include Russia, Turkey, and Georgia, as well as "non-European" members (e.g., Israel, Morocco, and Jordan).

These understandings of the extent of the continent of Europe are not exceptional or even new concepts. Historic German geographical literature offers different definitions of the limits of Europe. In 1811, Rühle v. Lilienstern envisioned a "political Europe" reaching out far to the east and encompassing the southern Mediterranean coastal zones to expand Europe's dominance in the world. Contrary to that, before World War I, geographers like Banse excluded Russia from the European continent as the country seemed to be too different. This view was kept by some during the years of the cold war, but Krüger saw large parts of North Africa and the Middle East as belonging to Europe. Others, like Louis, saw Russia as culturally closer to Europe and included it as part of the continent, but left out the North African states (Schultz 2003; Fig. 8.4).

Some of these definitions fit the visions of individual EU members. France has for a long time promoted its "Mediterranean project" (Heese 2009) that would include all the states bordering the Mediterranean Sea (Boniface and Védrine 2010) (Fig. 8.2), and it has only temporarily suspended its efforts when the sudden expansion to the east seemed possible (Heese 2009).

The expansion of the EU eastward has also sparked a new discussion of the term Central Europe (Heffernan 2007). In Germany, efforts to divide Europe into larger regions can be traced back to the 18th century (Schultz 2003). German politicians and geographers used the term "Central Europe" as a means to voice their imperialistic claim of "organizing Europe from the center" (Schultz 2002). Central Europe for them was a term that defined those regions of Europe that were not, but in their understanding should be, parts of a larger Germany. The term justified their expansion efforts as it claimed that these regions more or less rightfully or even naturally belonged to Germany. Very soon school geography established even more European regions² (Fig. 8.5) to be able to better order the diversity of the continent. During the cold war years, both capitalist and socialist countries mainly used the division of West and East Europe. From the American perspective, this included the vision

² East, West, North, and South but also Southeast and so on.

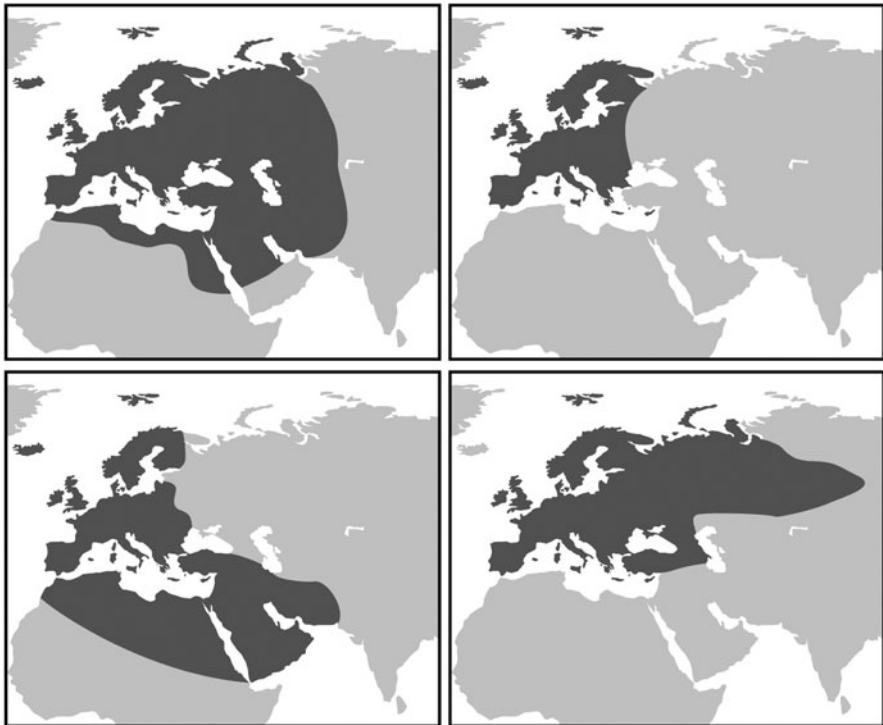


Fig. 8.4 Europe as defined by German geographers. (Schultz 2003)

of a political union across the Atlantic that would encompass the US and Western (= Atlantic) Europe (Heffernan 2007). In the mid-1980s, the term Central Europe was revived by dissident intellectuals in some of the Warsaw Pact states to express their desire for change. For them, Central Europe denotes a number of Slavic countries that have had a weaker tradition of statehood than other European nations, but nevertheless boasted a vivid cultural development in the fields of music, literature, the theatre and linguistics (Kundera 1984). This new understanding of the term moves Central Europe to the east (Fig. 8.5) and leaves room for speculation as to what is meant when we say Eastern Europe.

Definitions of what the continent of Europe includes, and for that case what it excludes, are becoming more important as the EU becomes bigger and tries to define the limits of its expansion. The EU has started as the European Economic Community (EEC), which was founded in 1957, six years after the establishment of the European Coal and Steel community. At first, it only consisted of six countries with seven other European countries being organized in the European Free Trade Association (EFTA), some of which joined the EEC in 1973. In the 1980s, it expanded to the south, first incorporating Greece (1981) and then Portugal and Spain (1986) (Uterwedde 1990). In the mid-1990s, Austria, Finland, and Sweden became members, and another 10

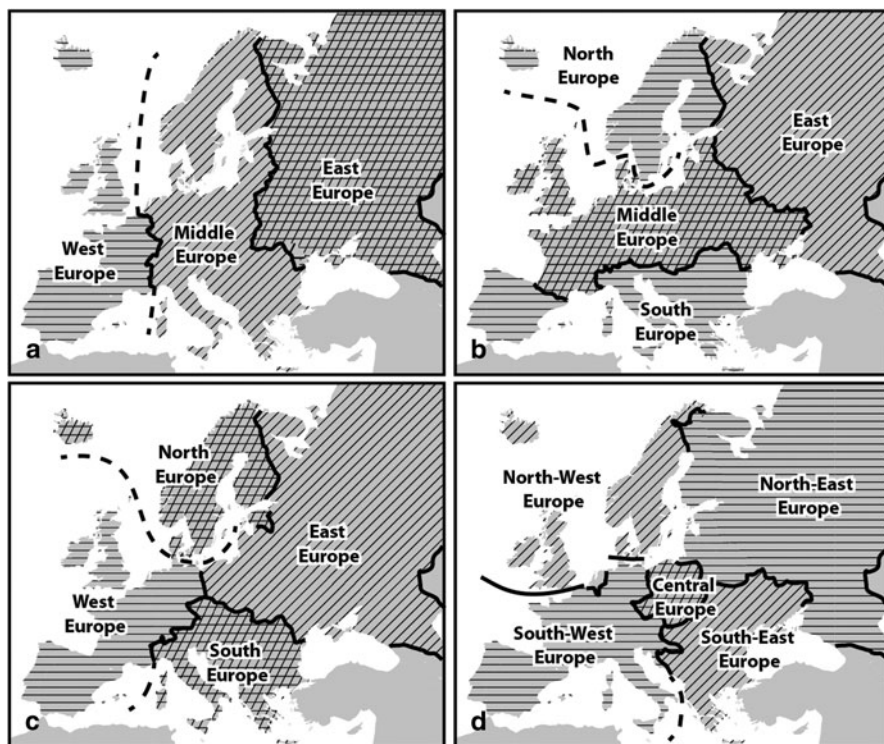


Fig. 8.5 Notional divisions of Europe. (Schultz 2003)

countries joined in 2004, most of them former socialist countries. By 2007, two more countries were added: Bulgaria and Rumania (Boniface and Védérine 2010). So during its first 50 years, the EU expanded to include 27 countries (Fig. 8.6).

But by now, the EU is all but one homogenous body. The European currency, the euro, is only used in 17 countries plus some smaller non-EU countries and potential candidates instead of all the 27 EU countries (Boniface and Védérine 2010). Countries like Britain or Sweden have kept their original currencies, and therefore are EU members but not members of the Euro-Zone. With the development of the common market there were efforts to facilitate travel inside the EU, which included abolishing border controls between EU countries and at the same time fortifying outside borders. This policy has led to the establishment of the so-called Schengen area, a region where people can cross borders freely. It includes non-EU countries, such as Norway and Switzerland, but it does not include the United Kingdom and Denmark (Clochard 2009). If you sum up these developments, you find a complex mosaic of inclusive and exclusive zones that were all initiated by the EU but are not identical with the EU. There is a bigger core zone of countries, like Austria, Belgium, Estonia, Finland, France, Germany, Greece, Italy, Luxemburg, the Netherlands, Poland, Portugal, Slovenia, and Spain, who are members of the EU and are part of



Fig. 8.6 The EU, the Euro-Zone, and the Schengen Area, 2010

the Euro-Zone and the Schengen area, but there are also countries, such as Britain and Denmark, that are members of the EU but are not part of the Euro-Zone and have only restricted participation in the Schengen area. For the EU citizen of the core countries, that means that they can travel without being controlled at borders and without changing money. For example, as one travels from France to Spain or Germany but not to Britain. To go to Britain, they have to buy British pounds and pass border controls.

When EU citizens talk about “Europe” today, they usually refer to the EU—at least as the core meaning. A lot of them are aware of the fact that they will have to

differentiate between the EU, the different perceptions of the continent of Europe, the Euro-Zone, and even the Schengen area as soon as they start discussing political problems. The complex interplay of all these different “Europes” have to be kept in mind when talking of climate change and cultural shifts in Europe.

8.3 Projected Climate Change in Europe

Scientists generally agree that the human influence on climate change is heating up the planet. The question that is less clear is how people will react to climate change. How will this reaction be influenced by different cultures and, in turn, how will it redefine culture? Will these changes in culture differ across sex, race, geographical space, or wealthy versus less affluent countries? These questions will be discussed later in the chapter.

In this section, we will introduce a summary of projections to take place in Europe as a result of climate change. First, we will take a look at the modeled global patterns, followed by a more detailed discussion of impacts on physical and biological systems. Finally, an introduction to nonclimate trends in Europe, such as population change, migration trends, and age groups, leads to the next discussion of how Europe might adapt to climate changes given its population composition.

The scenarios discussed herein are sourced from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, which was published in 2007. This organization published its first assessment on climate change in 1990. These reports point to a general increase in temperature at a global scale. Within the period between 2000 and 2100, the global trend is a temperature rise that follows the prediction of one of three scenarios: from 1 to 3 °C, 1.5 to 4.5 °C or 2.5 to 6.5 °C.³ However, only the most conservative scenarios show a warming below 2 °C (3.6 °F) (Mann and Kump 2008).

These predictions are based on climate models that are limited by uncertainties, which include unpredictable nature of the physical climate system, the human factors that affect climate change, simplification from models, and incomplete knowledge about important parameters to predict climate change (Mann and Kump 2008). For these reasons, the IPCC forecasts six projections for the 21st century, with certainty levels of virtually certain (99 %) to very unlikely (10 %) chance of happening. Models that take into account both human and natural factors produce predictions that best correspond to collected data (Mann and Kump 2008), with the most recent warming as a result of human influences whereas past temperature fluctuations are due to natural events, such as volcanic eruptions and solar output (Mann and Kump 2008).

Climate change has both global and regional impacts with the severity and types of changes dependent on the amount of temperature change. On a global level, an

³ 1.8–5.4 °F, 2.7–8.1 °F, 4.5–11.7 °F.

increase of 1.6 °C (2.88 °F) puts 9–31 % of species at risk of extinction, from flora (e.g., wood in tundra) to fauna (e.g., amphibians, krill, penguins). The foreseeable extreme of a 4 °C (7.2 °F) increase will result in 40–70 % of species becoming extinct with ecosystems losing 7–74 % of their current areas. If temperatures increase to 5 °C (9.0 °F), this will cause biodiversity changes (Mann and Kump 2008). Thus at a global level, each one degree change translates to significant impacts on human existence and wildlife.

On a smaller scale, Europe is also sensitive to changes as a direct result of climate change. The following section describes in more detail the impacts Europe will face. A rise in global temperature trends from 1950 to 2000 has been documented. A similar trajectory is seen for Europe (Mann and Kump 2008). Like the global scenarios, the climate change in Europe varies by region as changes in biological and physical systems differ in western, central, southern, and northern Europe. Based on the A1b scenario from the IPCC report, a middle-of-the-road view of change, southern Europe is expected to experience a temperature increase of 2.5–3.5 °C (4.5–6.3 °F), central Europe's changes range from 2.5 to 4 °C (4.5 to 7.2 °F), and in the north, a change from 2.5 to 4.5 °C (4.5 to 8.1 °F) is predicted between 2090 to 2099 (Mann and Kump 2008). Part of the reason for these differences, as described in the previous section on the geographic definition of Europe, is that the continent extends from the southern tip of Spain to the northern tip of Iceland. The large latitudinal difference between north and south is home to a range of climate systems from mild mid-latitude to polar climates, which translates to the diverse flora and fauna that inhabit these areas. The mountain ranges in Europe play an important role, for example the Alps or the Pyrenees by acting as a barrier to the movement of air masses. Their effect is evident such as in south Portugal where the Algarve shielded by the Serra de Monchique, and Serra do Caldeirão is the warmest region on the continent.

Despite this range in climate, Europe will experience more hot summers with Western Europe to have even more hot weather than other parts. As a region, Europe has seen a doubling of the length of heat waves and tripling of the number of hot days since the 1880s (Della-Marta et al. 2007).

The precipitation change for Europe in 2100 compared to the 1980–1999 period varies from no change to a decrease that exceeds 0.4 mm/day (Mann and Kump 2008). Countries to the south (e.g., Spain and Italy) will have less precipitation while central countries (Germany and Poland) will experience little change in average daily precipitation, contrasting to the north (Scandinavian countries, Estonia, Latvia), which will receive more precipitation by 0.2–0.5 mm/day (0.01–0.02 in/day) than current levels (Mann and Kump 2008). This suggests that parts of southern Europe are projected to experience increased drought, with extreme drought events (once-in-a-hundred-years-events) to occur more frequently. Likewise, only central parts of Europe (e.g., Hungary, Germany, Switzerland, and Austria) and the Scandinavian countries will experience less frequent drought. All other countries will experience more frequent drought by the latter part of the 21st century (2070–2079) (Mann and Kump 2008).

8.3.1 Regional Variations in Climate Change in Europe

Warming across Europe is well established, with increased temperatures documented from 1901 to 2005 (Jones and Moberg 2003; Alcamo et al. 2007), rising at 0.90 °C (1.62 °F) in this time period. However, the recent decades show a sharper increase between 1997 and 2005, more prominently in central and northeast Europe and the mountainous regions (Klein et al. 2003). In the 20th century, average surface temperature in Europe increased by 0.8 °C (1.44 °F), with warming over most regions more pronounced in winter than summer (Alcamo et al. 2007). Models suggest that Europe will increase in temperature by 0.1–0.4 °C (0.18–0.72 °F) every decade after the 21st (Alcamo et al. 2007). The PRUDENCE project (Christensen and Christensen 2007) predicts that warming will be more prominent in the winter than the summer in northern Europe. The opposite is true in southern and central Europe. With climate change, precipitation patterns and volume are shifting. In the 20th century, precipitation in northern Europe increased by 10–40 % while a decrease was seen in southern Europe of up to 20 % (Alcamo et al. 2007). The general trend is that precipitation will increase in the north and decrease further south (Alcamo et al. 2007). Table 8.1 summarizes and highlights changes across regions of Europe from the IPCC's Fourth Assessment (Alcamo et al. 2007).

8.3.2 Impacts of Climate Change

Climate has and will inevitably change our environment as well as experiences. The general regional changes will certainly bring about increased demands in basic needs, such as energy to cool the hot summers thus shifting peak energy demand from winter to summer use. In response to such looming changes, the European governments are opting for adaptive management strategies e.g., warning systems of heat waves, policies for agriculture, energy, and forestry.

Of the natural resources impacted, water is of the most important to human survival. It is also a shrinking commodity in the face of climate change. By the 2020s, there will be an increase of runoff in northern Europe by up to 15 %, but decreases in the south by 23 % (Alcamo et al. 2007). The risk involves higher chances of flood in the north as well as flash flooding across all of Europe from snowmelt or existing glaciers. By the middle of the 21st century, annual runoff will decrease by 20–30 % in southeastern Europe, and result in increasingly less runoff by 2070. At this time, although runoff increase continues in the north (by 30 %), a decrease by 36 % is likely to be seen in southern Europe. Drought risk in western and southern Europe is a very real threat. Furthermore, hundred-year droughts will occur more frequently in northern and northeastern Europe. The future seems to create imbalances of natural resources, such as water, within Europe. What agreements, arrangements, or proactive solutions will be sought to provide for a population projected at about 542 million in 2050, a drop of 8.3 % from 2007 (Berlin Institute for Population and Development 2008)? The impact that climate change is likely to have on Europe is briefly discussed and

Table 8.1 Summary of projected physical changes in Europe. (Alcamo et al. 2007)

Predicted events in European regions	Central Europe	Southern Europe	Northern Europe	Europe overall
<i>Changes in current climate</i> (Very high confidence)	Warming trend and spatial variability of rainfall will affect natural and managed ecosystems	Warming trend and spatial variability of rainfall will affect natural and managed ecosystems	Warming trend and spatial variability of rainfall will affect natural and managed ecosystems	Warming trend and spatial variability of rainfall will affect natural and managed ecosystems
<i>Climate related hazards</i> (Very high confidence)	Catastrophic fires expected during drought years on drained peatlands Increased frequency of heat waves and flooding leads to disease (food- and vector-borne)	Increased frequency of heat waves, and flooding leads to disease (food- and vector-borne)	Greater frequency of rock falls will occur due to destabilization of mountain walls from rising temperatures and melting of permafrost Increase wind speeds and storm intensity will occur in northeastern Europe and a shift of storm centers to the coasts	Increase of winter floods in maritime regions, increase in coastal flooding, and flash flooding overall will occur Longer and prolonged droughts lead to increased fire risk A reduced risk of extreme cold events is predicted
<i>Magnification of regional differences in natural resources and assets</i> (Very high confidence)	Warming is greater in the summer Crop productivity is decreased Forest retreats, and biomass decreases	Warming is greater in the summer Mean annual precipitation decreases Crop productivity decreases Tree mortality accelerates	Warming is greater in the winter Mean annual precipitation increases Crop productivity increases Forests expands and biomass increases	Effects vary over space with some areas benefiting (northern) and other areas negatively impacted (southern)
<i>Water resource</i> (high confidence)	Water stress increases	Water stress increases and this is the most affected region in Europe.	Effects include increased melting of glaciers and increased annual runoff during spring and summer Permafrost will eventually disappear in northern Europe	The percentage of areas to be under water stress will rise from 19 % to 35 % by 2070, affecting 16–44 million people Water availability differs by region. Runoff will be greater in northern Europe from annual runoff and decrease in central Europe

Table 8.1 (continued)

Predicted events in European regions	Central Europe	Southern Europe	Northern Europe	Europe overall
<i>Biodiversity</i> (high confidence)	<p>Fauna will benefit from increased runoff in the north but increased drought in the south will have the opposite effect</p> <p>Species will generally shift from the southwest to the northeast Europe</p>	<p>Due to drought and increasing temperature in the south, plant productivity will decrease, which leads to reduced nutrients available in soil</p> <p>Species diversity in freshwater ecosystems may emerge in northern Europe but decrease in parts of southwestern Europe</p>	<p>Forest areas will expand in the north, decrease in size in the tundra. The southern forests will shrink while western and central Europe will see its native conifer trees replaced by deciduous trees</p>	<p>Effects include loss of 20 % of coastal wetlands due to sea level rise that affects biodiversity in these areas</p> <p>Small glaciers will disappear while large glaciers will shrink</p> <p>Tundra communities will be replaced by forest expansion north, causing 60 % loss of mountain species</p> <p>Species that thrive or are adapted to cold temperatures are likely to migrate north or upstream, but some may disappear from Europe. Majority of amphibian (45–69 %) and reptile (61–89 %) species could expand their range if there were no limits to their existence</p>
<i>Agriculture and fisheries</i>	<p>Crops that currently grow in southern Europe (e.g., maize, sunflower, and soybeans) will be more productive at higher-altitudes</p>	<p>Fishing yields will see higher catchment in northern waters but a significant decrease in the south</p>	<p>Crop yield will increase in primarily in northern Europe</p>	

Table 8.2 The percent of aging population in some countries. (Public Reference Bureau 2011)

European Country	Over 65 (%)
Germany	20.7
Italy	20.2
Greece	18.9
Sweden	18.5
Portugal	17.9
Bulgaria	17.7
Austria	17.6
Finland	17.5
Latvia	17.4

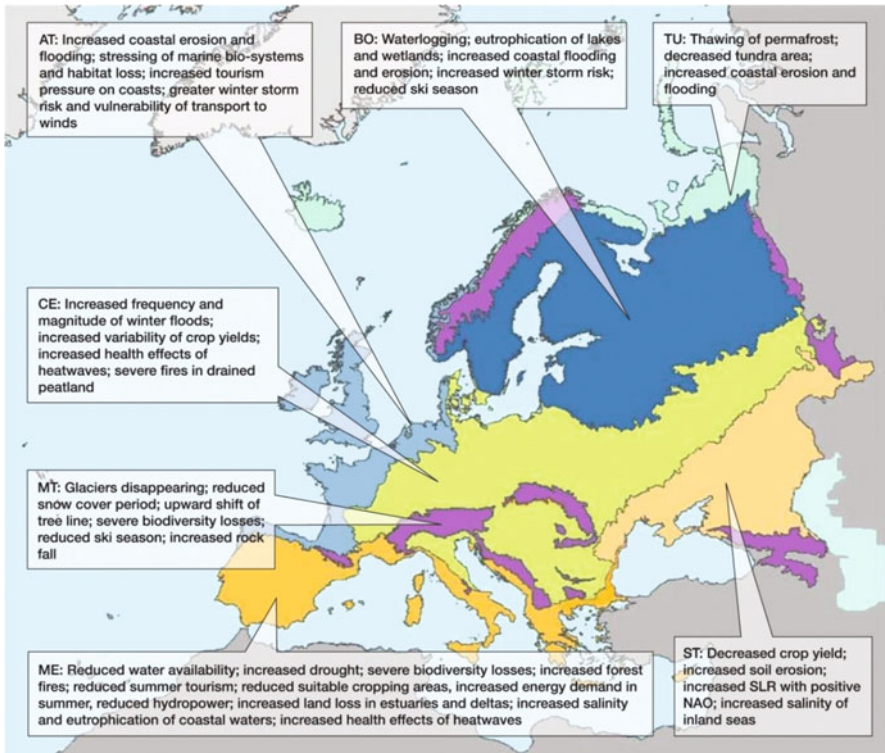


Fig. 8.7 Projected physical changes in Europe (Alcamo et al. 2007). The acronyms represent the following biogeographic regions: *TU* Tundra, *BO* Boreal, *AT* Atlantic, *CE* Central, *MT* Mountains, *ME* Mediterranean, *ST* Steppe, *NAO* North Atlantic Oscillation

summarized in Table 8.1. Some characteristics of Europe may exacerbate its experience of change, for example, a growing senior population or the recent migration patterns (Fig. 8.7).

The data from Table 8.2 on the aging population in Europe shows the percentage of population over the age of 65. Of the top counties with an aging population in the world, nine are from Europe. Thus, the demographics in Europe are changing

with a growing proportion of seniors. This is in contrast to the young populations (under age 15) on the continent of Africa. Europe is in Phase 4 of the Demographic Transition with a low to very low birth rate and low death rate (PRB 2011). Therefore, only a small proportion of young people are under 15 years of age (16%). These demographic factors will undoubtedly play a role in how Europe is able to and chooses to anticipate climate change.

Recent migration patterns in Europe show that people are moving from regions that might profit from climate change to regions that are predicted to be poorly affected. Spain, for example, experiences a substantial in-migration especially from Romania and Britain (Berlin Institute for Population and Development 2008). Also for the period between 2004 and 2030, substantial rises in population are forecasted for a lot of coastal regions, e.g., northern Germany, the Netherlands, Denmark, southern coasts of Norway and Sweden, practically all over Britain, the Atlantic and Mediterranean coasts of France, and the Mediterranean coast of Spain. At the same time, decreases in population are expected in East Europe, including eastern Germany, the central part of France and northern Spain. The only population changes that may seem in accordance with climate change forecasts are the predicted decreases of population in southern Italy and in the Spanish heartland of Castilla y León (Berlin Institute for Population and Development 2008).

In light of climate change, both physical⁴ and biological systems⁵ will be impacted, 94% and 89% respectively due to warming (Alcamo et al. 2007). Table 8.3 summarizes key impacts on human adaptation due to physical changes on Earth.

8.4 Cultural Shift in Europe

The previous section set the geographic stage of past and current as well as imagined and political boundaries of Europe for us to inquire about the diversity of cultures and cultural shifts in this region. Europe is a continent of much diversity due to porous and semi-porous borders, historical ties, and influx of immigrants, each contributing to the Europe of today. Despite these fluid exchanges of people, goods, and ideas, distinct often transnational or even transcultural perspectives are identified, each reacting to climate change in their unique way. In this section, we will first describe the general cultural scene in Europe, capturing the diversity within. Then, a discussion on the various groups and their opinions on climate change are described, followed by their different stances on such political and environmental decisions as transportation and energy production.

⁴ Snow, ice, and frozen ground; hydrology; coastal processes.

⁵ Terrestrial, marine, and freshwater.

Table 8.3 Key impacts of human adaptation to climate change in Europe. (Alcamo et al. 2007)

Subject	Potential future impacts and vulnerabilities
Energy	<p>The warming temperatures will result in less need for heating in the winter. For example, in the UK, a 2 °C (3.6 °F) warming by 2050 translates to a decrease of fossil fuel demand by 5–10 % and electricity demand by 1–3 %. This will be decreased by 10 % in Finland</p> <p>These numbers continue to fall as we near the end of the 21st century. Energy for cooling is high in central and southern Europe. For example, Italy and Spain will see an increase of energy use by 50 % by 2080 while the cooling energy for Madrid will reach 114 % during the period of 2071–2100</p> <p>Due to decreased precipitation and runoff, hydropower generation for Europe is expected to decline by 6 %. Impact may also be seen with thermal power production due to the need for available cooling water</p>
Transportation	<p>Higher temperatures may cause damage to rail and road surfaces although this will be offset by impact of reduced snow and frost on roads</p> <p>Flooding may impact underground rail systems and roads with inadequate drainage systems</p> <p>High winds will impact air, sea, and land transport</p> <p>Reduced sea ice in northern Europe provides marine access</p>
Tourism and recreation	<p>Tourism is expected to shift from current high seasons in the summer to the cooler autumn in southern Europe and will improve overall in northern and western Europe</p> <p>A 1 °C (1.8 °F) increase would lead tourist destinations to move further north and to higher elevations, moving from the current destination for sun and beach of western to northern Europe</p> <p>Mountainous areas in France, Italy, and Spain may be popular tourist sites due to the coolness at higher elevation. In contrast, hotter western Europe (e.g., Greece and Spain) will experience a flattening of tourism season by 2030</p> <p>The ski seasons will be affected from shortage of natural snow cover at the start and end of the ski season</p>
Human health	<p>Heat-related deaths are likely to increase, even if the population is acclimatized. Mortality and injury may result from intense natural hazards such as wind storms, flash floods, and coastal flooding</p> <p>Higher temperatures will impact food safety. The bacteria that causes food poisoning (salmonellosis) is temperature sensitive</p> <p>Extreme rainfall and droughts can increase the total microbial loads in freshwater, playing a role in disease outbreaks and water quality</p>

8.4.1 Europe—A Cultural Mosaic

When Europe’s culture is compared to that of (North) America you often find graphs or tables featuring about a dozen European countries, which is by far not all of Europe, not even the EU, and the US and Canada. Often these data are then aggregated into two groups, “America” and “Europe” (Nevitte and Cochrane 2007). “America” then consists of two countries, both of which use English as their main language. These two countries cover all of “America” and can be perceived as culturally relatively homogeneous, especially considering that the land area of the USA alone is more than twice as large as that of the European Union.

“Europe” even if it is equated with the EU is much more diverse. The EU alone acknowledges 23 languages as “official languages” with Dutch, French, German, and Greek being spoken in more than one of its member states. Europeans have food cultures ranging from tapas and pizza to English breakfast and sauerkraut. The EU, with around 500 million inhabitants has a significantly larger population than the USA, having some 310 million, and Canada, with some 34 million people, combined. The 500 million Europeans, living in 27 states, have distinct histories that do not only tell of cooperation, but often include wars that different Europeans were waging against each other. With that came stereotypes and prejudices that are more profound than stereotypes uttered of people in different regions of the same country: more profound as they are not based on the assumption of a general acceptance of the other as sharing one national identity (Beck and Grande 2007). Considering all these readily observable features of different European cultures, it may seem a little pretentious to try and write anything about culture or even cultural shifts in Europe. The sheer diversity of the continent seems to make it virtually impossible to cover all aspects on just a few pages.

Instead of simply looking at symbols and practices that prevail in different societies, some scientists focus on basic values to describe their cultures (Schwartz 2007). For Schwartz, basic values are beliefs that are linked to sentiments, motivate action by formulating aims, are ordered depending on their relative importance, are not linked to specific situations but serve as criteria to guide the evaluation of actions or people, and in this respect, can be traded-off against each other, for example, in dilemma situations. In respect to these values, Europe seems a lot more consistent. West Europeans are then seen to foster values such as intellectual autonomy, egalitarianism, and harmony much more than any other group of countries. At the same time, they do not consider hierarchical structures or a respect for traditions as important.

As a result of its eventful history, modern Europe’s basic values and observed cultural practices are closely interlinked, influencing each other in a rather complex way. These interactions have to be taken into account when imagining what cultural shifts may occur in Europe. Before trying to develop an idea of what European culture may look like in 2100, it seems therefore advisable to take a closer look at the historical development of culture in Europe. To do so, some fundamental questions have to be considered: with all its obvious differences, does Europe have an underlying unique culture as the EU likes to make us think (Beck and Grande 2007)? And if it does, has it always been there? How did different nations with different languages develop out of that? And in the future, will there be one European culture or several European cultures?

Two of these questions were, only slightly reformulated, at the center of interest of the first European Values Study (EVS) conducted in 1981. Is Europe “still culturally unified as it has once been under the influence of Christianity?” Or “have traditional norms and values been shaken fundamentally in modern times?” (Halman et al. 2005). The implication here clearly is that at least there has been one European culture in the past. But has there been?

In taking a very short glimpse at the historical development of Europe, this may be doubted. In the Middle Ages, most people in Europe lived in small, self-sustaining communities with little contact to the outside world (Sand 2011). They developed their own regional cultures especially in relation to everyday necessities like food (Fumey and Etcheverria 2004). The ruling classes acted quite differently though. In looking at the kings and queens of different regions in Europe, one will soon find a lot of interconnections: marriage was a powerful way of claiming new lands or securing alliances. The Spanish king Carlos I, who came to power in Spain in 1516, was the same person as the German king Karl V, who came to power in Germany in 1519 (Bernecker 2006). Starting at this time and going on for more than a hundred years, Europeans were quite divided in their religious views. Between 1517 and 1648, numerous religious wars were fought between Catholics and Protestants. At the time of nation-building, all these strands had to be either changed or re-interpreted. Nation-states wanted their own history (Feichtinger 2007; Schetter and Weissert 2007; Habermas 2008a), therefore “multi-cultural” kings were of little use. Also religious influences like that of Islam on the Iberian Peninsula, where both Spain and Portugal have prospered while being ruled by the Moors (Crespi 1992), were largely neglected and almost forgotten. But the new states did not only have to re-write their history, they also had to establish their own unique, and at the same time general, identity. To achieve this, they enforced, to name only one example, one common language for all the people on their territory (Feichtinger 2007). This of course made communication between the members of the respective states easier. At the same time, traditional links were lost, as for example, people in the northwest of Germany spoke a dialect that was very close to today’s Dutch. Nation-building also included the formation of observable traditions that were seen as typical for each country (Fumey 2007). Food became one of the “key markers for national identity in Europe” (McNeill 2004): croissants and baguettes for France, pizza and pasta for Italy. In Spain, the Valencian paella became a national dish as well as the flamenco, an art originally practiced by gypsies who incorporated among other influences Jewish and Arab traditions, became a kind of national dance (West 2007).

The successful introduction of these traditions lead to changing perceptions—by the respective populations themselves, who form a new identity, and by outsiders where this identity is used to form stereotypes. Yet, these identities and stereotypes hide the diversity that still exists in each European country and has been rediscovered in recent years. So what developed was a mosaic of traditions that often transcended the national boundaries while yet being resisted by regions inside the national territory. For example, a lot of Americans—and also other foreigners—would probably consider sauerkraut a typical German dish, but it can actually be found in numerous countries in Scandinavia and Eastern Europe corresponding to a preferred taste for sour and bitter (Fumey and Etcheverria 2004). And there is also a noteworthy tradition of “choucroute” in the French regions Alsace and Lorraine, which changed being part of Germany or France several times in their history. Conversely to this more transnational tradition of the dish, in some German regions you might find people would

prefer Labskaus⁶ and Knipp.⁷ Both are rather sour and bitter when it comes to taste but are almost unknown even in other parts of Germany (Gutmann et al. 1993). Food cultures, like other cultures, attain different meanings when observed at different scales (Fumey 2007).

The development of Europe's food cultures is not necessarily linear as one development in one direction. The distinct changes that can be observed are partly a result of globalization and regionalization (Willaime 2008). Compared to their great-grandfathers, more people nowadays travel larger distances (Thrift 1996) and therefore have the chance to meet people with different world views. In this context, larger migrations took place, not just in the wake of de-colonization but also between countries that have not been linked by colonial ties. For example, in the 1950s and 1960s, workers from Italy (year of contract: 1955), Spain (1960), Greece (1960), Turkey (1961), Morocco (1963), Portugal (1964), Tunisia (1965) and Yugoslavia (1968) came to Germany (Jamin 1998), and in the first half of the 2000s, large numbers of young and educated workers from Poland, Slovakia, Lithuania, Latvia, the Czech Republic, and other former socialist countries moved to Great Britain (Scott 2007). This kind of migration is, of course, also known to the USA, but it has different implications. The metaphor used to describe the impacts of immigration on the USA has for a long time been the melting pot as different cultures assimilated to form one nation (Beck and Grande 2007). In Europe, a mosaic is created where people move freely to and from countries, often living in two countries more or less simultaneously or having the perspective of moving across national boundaries if it seems appropriate and feasible. This concept becomes obvious when you compare American "snow birds" with German, Dutch, or British retirees moving to Spain (Breuer 2003; Hühn 2010). It is also found in young, ecologically minded people who moved to Portugal in order to live their ideas of a simple life in accordance with nature (Francisco 2007). This process offers both the immigrants and the societies that they move to new perspectives, and it is largely discussed under the concept of transnationality (Feichtinger 2007; Pries 2007).

To be able to capture the diversity of the continent, Europe is often divided into different cultural zones depending on the aspects of culture being considered. Fumey (2007, 2008), when discussing zones of influence in relation to food cultures, distinguishes an Atlantic Europe that is closely linked to the US and promotes different kinds of convenient and fast foods; the Mediterranean, which stands for healthy food, conveying at the same time a sense of place and freedom; and East Europe, including Russia, that does not have a great influence apart from certain dishes like bortsch (Fumey 2007, 2008). Similarly, the World Values Survey, the global counterpart of the European Values Study (Inglehart 2007), distinguishes four different parts of Europe: the two religiously defined parts of a Protestant Europe, consisting of the Scandinavian countries⁸ (Finland, Iceland, the Netherlands, Switzerland as well as Germany), and a Catholic Europe, which contains France, Belgium, Luxemburg,

⁶ Mashed potatoes with beef, usually served with pickled cucumbers, beetroot, and fried eggs.

⁷ Pork with oatmeal, served more or less the same way as Labskaus.

⁸ Denmark, Sweden, and Norway.

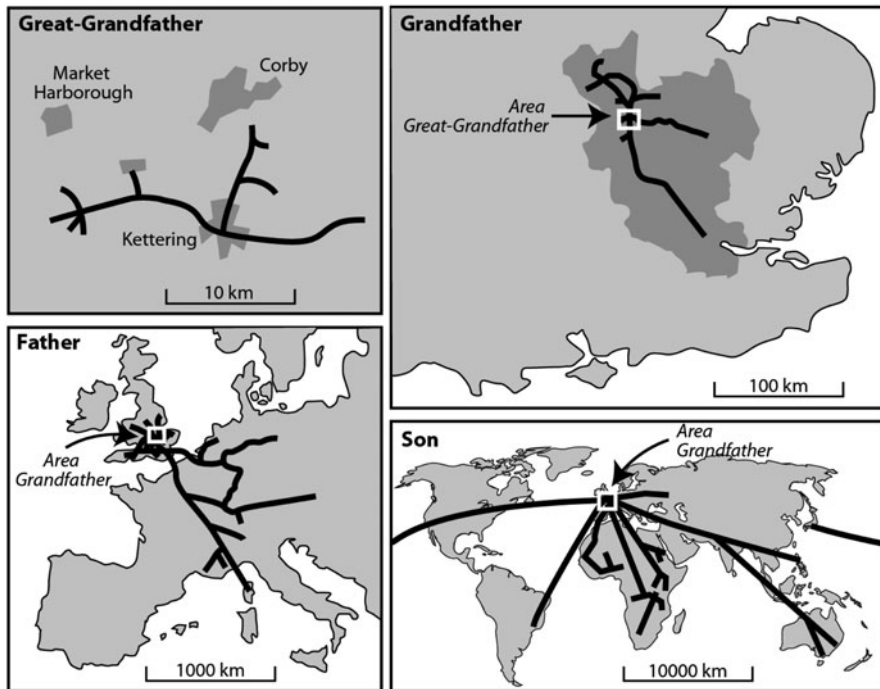


Fig. 8.8 Change in travel distances. (Thrift 1996)

Austria, Italy, Spain, and some former socialist countries.⁹ The latter list of countries also forms part of an ex-communist Europe that encompasses countries, such as Bulgaria, Ukraine, Albania, Estonia, and Georgia, to name but a few. The fourth group is the English-speaking part of Europe¹⁰ that fits in with other English-speaking countries from other continents¹¹ (Inglehart and Welzel 2005, Fig. 8.8).

8.4.2 European Values—Beyond Religion

The World Values Survey derived differentiated groups through classifying countries along two dimensions: one showing the change from traditional to secular-rational values and the other describing the shift from survival to self-expression values (Inglehart 2007). Both dimensions are described by a set of 10 items respectively. For traditional values, these include the importance of God, the importance of children learning obedience and religious faith rather than independence and determination,

⁹ Czech, Slovakia, Croatia, Slovenia, Poland, Hungary, and Lithuania.

¹⁰ Britain, Northern Ireland, and Ireland.

¹¹ USA, Canada, Australia, and New Zealand.

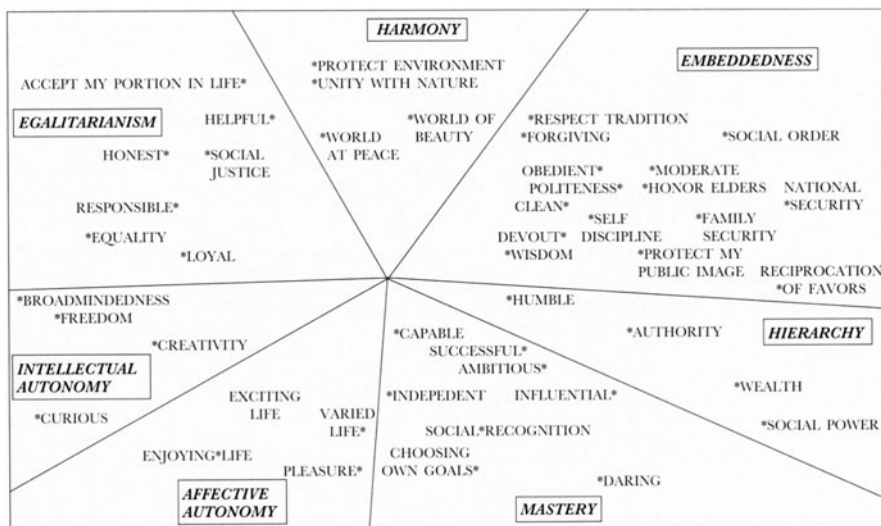


Fig. 8.9 Value dimensions according to Schwartz (2007)

the belief that abortion is unjustifiable, a strong sense of national pride, and the wish for more respect for authority. Secular-rational values would then agree to opposite viewpoints. For survival values, the items include a priority to economic and physical security over self-expression and quality of life, a sense of not being happy, the belief that homosexuality is unjustifiable, the unwillingness to sign petitions, and a lack of trust in people. Self-expression values would again be the opposite (Inglehart and Welzel 2005).

On these two dimensions, the Protestant countries feature high on both scales making them the most secular-rational and the most self-expressive countries worldwide. The Catholic countries feature slightly lower scores on both dimensions, which still place them above the worldwide average but rather second to the Protestant countries. English-speaking countries on average show similar values as the Catholic countries on the traditional values versus secular-rational values scale, but high scores on self-expression values. Contrary to that, former socialist countries have pretty low scores for self-expression, but score relatively high when it comes to secular-rational values (Inglehart 2007). All these countries are predicted to move more or less into the same direction that is to high scores for secular-rational and self-expression values. From this perspective, there would be something like one continual cultural shift but starting from different levels and moving at different speeds.

While the World Values Survey tries to measure the change from traditional to secular and from survival to self-expression values, Schwartz’s attempts are directed to measuring more stable basic values. To do so, he first theoretically distinguishes three ideal value dimensions, each of which has two contrasting poles respectively (Schwartz 2007): autonomy and embeddedness or conservatism (Schwartz et al. 2000), egalitarianism and hierarchy as well as harmony and mastery (Fig. 8.9). Autonomy is again split up into intellectual and affective autonomy

(Schwartz 2007). Intellectual autonomy signifies that people foster values like broad-mindedness and creativity, while affective autonomy is linked to values such as seeking pleasure through an exciting and varied life. Contrary to this, embeddedness stresses values like obedience, honour of elders, security, and respect for traditions. The poles of hierarchy versus egalitarianism are distinguished by values like authority, social power, and humbleness versus responsibility, social justice, and the acceptance of one's place in life. Values describing mastery are seen to be ambition, independence, and capability, while harmony seeks a world of beauty and peace as well as a unity with nature.

Using these dimensions to analyse the values of 76 countries, Schwartz derives seven distinct groups, three of which are at least partly European: West Europe, East Europe and the English-speaking world. According to Schwartz, the West European welfare states and their professed concern for the environment can be understood by their underlying values, emphasizing intellectual autonomy, egalitarianism, and harmony. Contrary to this, the English-speaking countries, which include the US, are characterized mainly by affective autonomy and mastery and score only average on intellectual autonomy, hierarchy and egalitarianism. The American culture differs from the rest of the English-speaking countries in that it stresses mastery and hierarchy more and finds intellectual autonomy, egalitarianism, and harmony of less importance. East Europe can be found somewhere in between. It is a rather heterogeneous group with a more pronounced tendency towards hierarchy and conservatism. Interestingly enough, the more western East European countries are more inclined towards mastery, intellectual autonomy, and egalitarianism, while the more eastern countries and the Balkans favor conservatism and hierarchy (Schwartz et al. 2000). In short, the more western part of East Europe in terms of basic values is more similar to West Europe, while the more eastern part is more similar to the USA (Fig. 8.10).

When we compare the two studies, there are some similarities. Both studies identify East Europe and the English-speaking countries as one group respectively. There is a difference when it comes to West Europe. While it is one group in Schwartz's study of basic values, it becomes two groups, Protestant Europe and Catholic Europe, in the World Values Survey. This division into Protestant and Catholic countries at least partly negates the thesis that Europe is, and for that case was, culturally unified even under the influence of Christianity.

Underlying these two different classifications is the question of the role of religion in Europe. When comparing the status of religion in Europe to the status of religion in the US, there are two points to be kept in mind. The United States has removed all religious practices from schools or even public spaces by building a legal "wall of separation" between the church and the state (Brocker 2008). This was not the case in Europe where some of the churches still have pretty close links to the state, as in Germany where the state collects a church tax for the Protestant and the Catholic Church respectively (Küenzlen 2008). Other countries though like France are seen to have a clear separation between the state and the church (Casanova 2009), which may be supported by the fact that since 2006, it is prohibited to wear any religious symbols at schools. But it is slightly contradicted by the fact that Catholic church buildings in France belong to the local communities, or even to the central state in

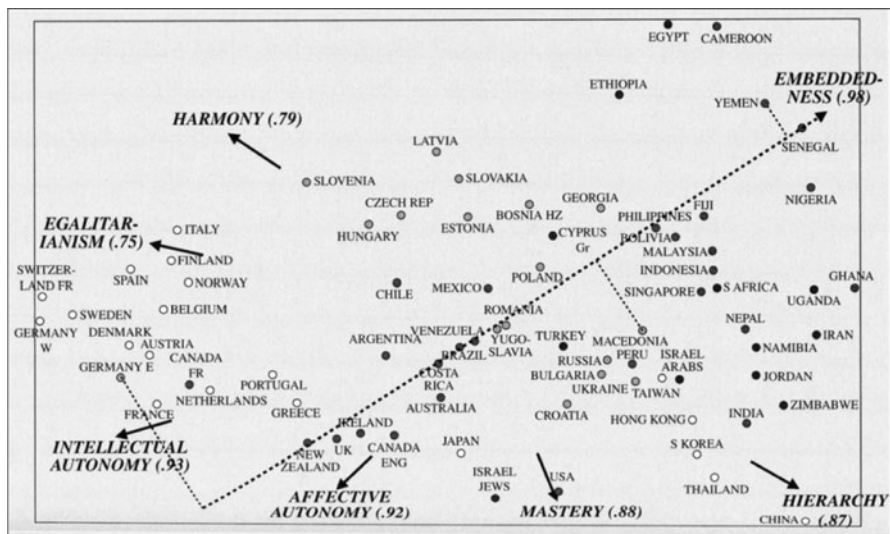


Fig. 8.10 Cultural orientation of 76 countries. (Schwartz 2007)

case of cathedrals, which implies that the states pays for their maintenance, but not for the maintenance of Protestant churches or Muslim mosques (Willaime 2008). Most European states have something in between these two models with their respective ways of organizing the relation between the state and the dominant religion, which is often due to either political debates in their countries (Delgado 2008) or to the way their dominant religion relates to other European religions, such as the Protestant culture in Scandinavia that people thought had to be shielded from influences of the Catholic Church (Werner 2008). On the other hand, the United States has an elaborate civil religion that is expressed in a number of symbols and rituals related to the state that may even contain allusions to God, but a God that is considered as a “ceremonial deity” only (Brocker 2008). Such a civil religion does not exist in a single European country or on the European scale (Willaime 2008). European countries consider themselves to be secular (Casanova 2009).

If Europe is as secularized as often stated, then it would have to be assumed that the religious orientations implied by the World Values Survey can neither be observed in people’s attitudes and values in general nor in relation to those attitudes and opinions that may concern climate change or its possible consequences, for example, migration to Europe. The European Values Study, which has been conducted approximately every 10 years,¹² has yielded some results that may be used to consider this question especially as the results of all four surveys were published in the form of maps that can also be downloaded from the Internet¹³ English, Dutch, German, French, Spanish, Turkish and Slovak. The 1999/2000 questionnaire included some but not

¹² 1981, 1990, 1999/2000, 2008/2009.

¹³ <http://www.atlasofeuropeanvalues.eu>.

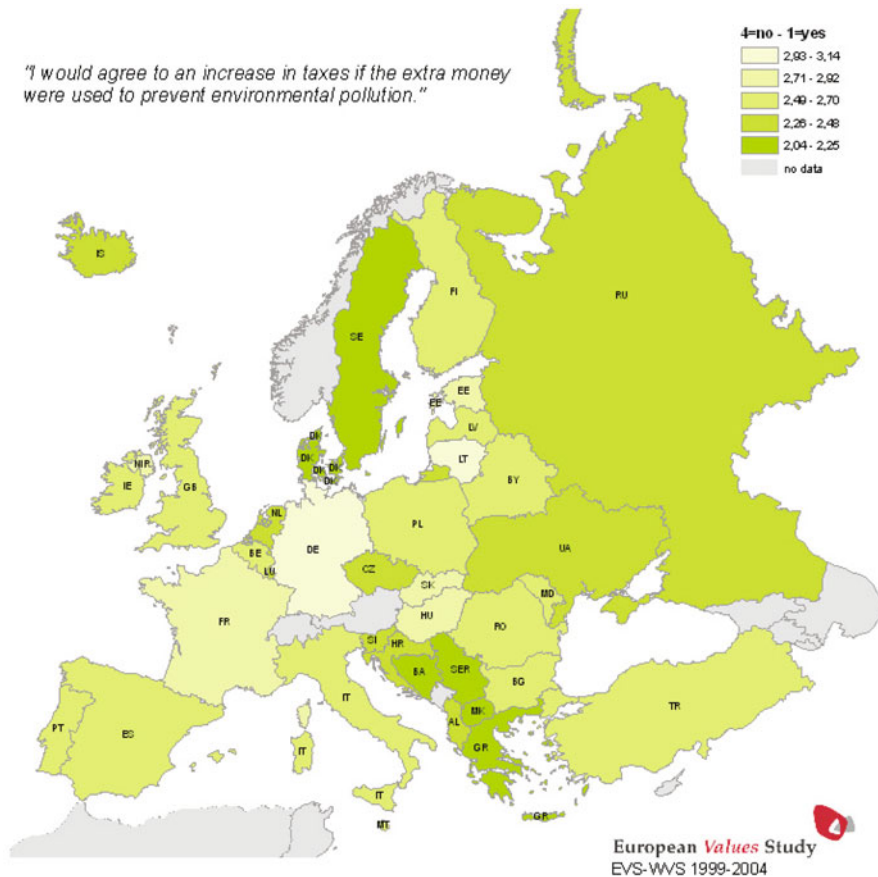


Fig. 8.11 The share of people who agree to an increase in taxes if the extra money were used to prevent environmental pollution. (<http://www.atlasofeuropeanvalues.eu>)

many issues that directly ask for opinions relating to the environment, but there is a whole range of questions on migration, or more specifically migrants, that may be important in view of possible consequences of climate change.

One question that was asked in relation to environmental issues was whether people would agree to an increase in taxes if the extra money was used to prevent environmental pollution (Fig. 8.11). Answers could be giving from 1 for “yes” to 4 for “no.” The map shows the answers classified into five groups. It has to be noted that there are no groups containing answers from 1 to 2.03 and from 3.15 to 4, which means that there is neither a pronounced “yes” nor a pronounced “no.” There is a slight overall tendency towards “no” though with Germany and Lithuania being the least in favour of taxes. Stronger supporters of taxes are found Sweden, Denmark, Greece, and some countries from former Yugoslavia, such as Bosnia and Herzegovina, Macedonia, and Serbia. The other questions posed by the European

Values Study led to similar results. The question of whether people would give part of their income if it was certain that the money would be used to reduce environmental pollution resulted in more or less the same map. Germany and Lithuania showed the lowest values and the highest values were found in Sweden, Denmark, Greece, most of the former Yugoslavian countries, the Czech Republic, Albania, and Turkey.

When asked to judge the statement: "The government should reduce environmental pollution, but it should not cost me any money" on the same scale as the other questions the "yes" votes became more pronounced, and most countries where people had tended to say that they are not willing to pay more were in favour of this statement. Interestingly, people in Sweden, Denmark, the Czech Republic, the Netherlands, and Iceland would not agree to the statement. When asked whether they were currently doing voluntary work for conservation, the environment, ecology, or animals rights in most European countries, there were about 1–3 % of people who said they did. High values of 7.5–9 % were only reached in Britain and Greece. Taking all these result into account, it is hard to discern a pattern as to whether Protestant or Catholic countries are more likely to agree to tax increases or any of the other measures, or if they are more willing to sacrifice time for the good of the environment. Also, there is no clear distinction between former socialist and western countries. English-speaking countries do not stand out either.

Focusing on the distinction between Protestant and Catholic countries, it could be argued that it is not so much a question of the type of religion people adhere to but of religiosity itself, that is of whether they attend church at all or maybe believe in religion without belonging or attending. However, here too the data of the European Values Study are not conclusive. When asked how important religion was in their lives, the countries in which it was considered of least importance were Sweden, Denmark, Germany, the United Kingdom, France, the Czech Republic, Slovenia, Estonia, and Latvia. There were only few countries in which it was considered as relatively important: Turkey followed by Poland, Romania, and Macedonia. As with a focus on religious denomination, there is no pattern to be observed here.

These findings are in accordance with results of a study investigating the connection between religious and moral values in Europe and America (Nevitte and Cochrane 2007). It showed that religiosity in the United States was and still is significantly higher than in Europe. In North America as well as Europe, the level of religiosity decreased slightly between 1981 and 2000, although in Europe, the aggregate hides significant differences between single countries with religiosity being on the increase in the Scandinavian countries, except in Norway as well as Finland and Italy while decreasing in the rest of the countries included in the survey. At the same time, the levels of permissiveness in values that are closely related to religious discourses, such as divorce, suicide, and homosexuality increased in all European countries, the United States, and Canada. The European findings are in accordance with theories on the development of post-modern societies that show a greater degree of individualization than industrial societies (Inglehart and Welzel 2005). When connecting the two results the authors also found that the correlation between religiosity and moral values has weakened for the European countries that were studied, but

has become slightly stronger for the United States (Nevitte and Cochrane 2007). The reasons for this may be manifold.

Casanova argues that there is a longstanding social construct in Europe that views the separation of religion and state as a precondition for the development of democracies. Religion is perceived as intolerant and provoking conflicts when involved in state policies (Casanova 2009). Therefore religion has largely been privatized. This argument is supported by the explanation offered by Nevitte and Cochrane (2007), who claim that the main difference between the United States and Europe is that in the United States, people are actively involved in religious groups, which also includes communicating with others of similar beliefs, while in Europe, people only participate in attending church, if they are religious at all.

This argument would be in accordance with constructivist learning theories that claim our brain has to develop its understanding of the world in a kind of self-referential learning process (von Foerster 1999) as it has no direct contact to the environment (von Aufschnaiter 1998). To do this, it uses the information that is coming in through the senses and translated into a neural code (Roth 1997). As these translations are never unequivocal, people need communication as a means to reassure themselves of their constructs. From this point of view, active participation in religious groups would be more supportive for establishing religious ideas, while the European debate on secular democracies would make religious ideas less significant.

Casanova extends his argument by claiming that Europeans are more prone to anti-Islamic sentiments because of their denial of their Christian roots. He also maintains that most of the new member states of the EU have a significantly less problematic relation to their Christian roots and beliefs, which means that they view religion as more tolerant and less prone to the creation of conflict than the western European countries (Casanova 2009). This would then imply that the east European countries are less anti-Muslim than their western neighbours. Here again, the results of the European Values Study are helpful to evaluate this claim (Fig. 8.12).

As with the example above, there is no clear pattern to indicate that Protestant countries feel markedly different than Catholic countries, or that English-speaking countries differ from the rest of Europe, but one might want to argue about the slightly higher share of people not wanting Muslims as their neighbors in former socialist countries. This would directly contradict Casanova's claim that European societies, which openly confess to being religious, are more open to Muslim neighbours than other societies. But there is another interesting pattern to be observed here that would make more sense. Countries with large shares of people who do not want Muslims as their neighbors often have a comparatively low percentage of Muslims in their populations, for as example Romania, Poland, and Finland. People in countries with a larger share of Muslims, such as Bulgaria, Germany, and Sweden—all neighbors of the above named countries, respectively—seem also to be more tolerant about having Muslims as neighbors. This argument is supported by findings from the 2009 Swiss referendum on whether Islamic communities should be allowed to build minarets or not. Figure 8.13 shows the results of the referendum depicting each community according to its population size rather than to its areal extent. It becomes quite clear

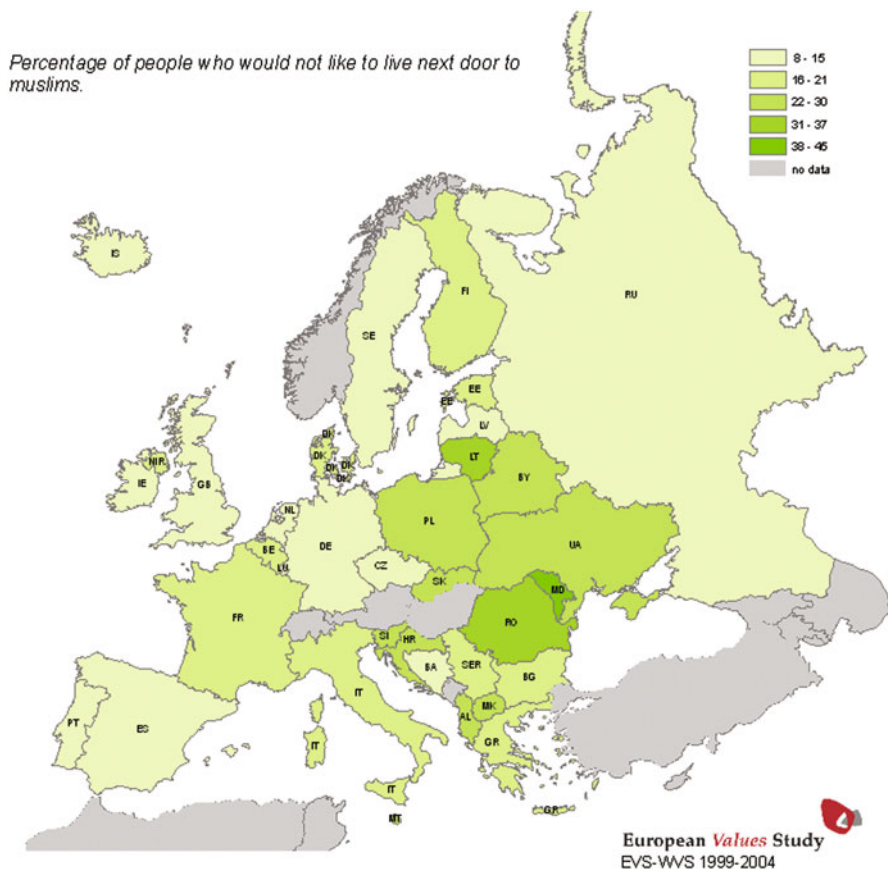


Fig. 8.12 Share of people who would not like to live next door to Muslims. (<http://www.atlasofeuropeanvalues.eu>)

that the strongest opponents against the building of minarets are found in rural areas, areas not affected by the building of minarets, while people in larger cities, as for example Zurich or Geneva that already have mosques with minarets, are less opposed to the idea. In Europe, people living in big cities generally seem to be more open to people of different cultural backgrounds and ideas (Chavinier 2010).

The Swiss example takes us back to two claims made earlier in this chapter: first, that modern Europe’s basic values and observed cultural practices are closely interlinked and second, that Europe is becoming more a transnational, if not a trans-cultural place (Hühn et al. 2010). To understand these linkages and shifts, we have to go back to the World Values Survey. Its basic assumption and outcome is that societies’ values are developing from more traditional views to modern and then to postmodern perspectives (Inglehart and Welzel 2005). Postmodernism is closely linked to individualism (Beck and Beck-Gernsheim 1994), which would mean that



Fig. 8.13 Results of the referendum “Against the building of minarets” in Switzerland in 2009. (Chavinier 2010)

people in developed societies are becoming less dependent on others and more involved with doing their own thing. This view also claims that religion is becoming less and less important, and although this is most certainly true in Europe, the US, in the context of this theoretical approach, has to be treated as an exception. Schwartz argues that, when you examine basic values, this problem could be solved if you look at the combination of values considered important on either side of the Atlantic. He claims that both the US and Europe foster individualism, only of a different kind (Schwartz 2007). According to him, individualism in the US is mainly linked to mastery and affective autonomy while in West Europe it is linked to affective and intellectual autonomy but not to mastery. These two foci alone would make a difference, but they are combined with different non-individualistic values respectively, which in the US are hierarchy and embeddedness, and in West Europe, they are egalitarianism and harmony. In the US, this leads to an emphasis on family values and religion, while in West Europe, the focus is more on a concern for the well-being of others and nature.

When this specific set of basic values meets with an influx of migrants and is maybe also confronted with the travel experience of a larger part of the population, transcultural places may develop. For Stock, Berlin is an outstanding example for such a transcultural place, and she illustrates what this means by taking a closer look at the foodscape of the city (Stock 2010). The first observation she makes is that it seems rather difficult to find restaurants that offer traditional German or even Berlin food. She then goes on to stipulate the great variety of restaurants offering all kinds of different cuisines. This she says would be characteristic for a multi-cultural city, but in Berlin, the restaurants from different parts of the world have also adapted to the local culture, which asks for cheap, yet distinguished and expressly anti-commercial as well as healthy and mainly vegetarian food. This has led to a mixture of cultures that make some people claim that döner-kebab has been invented in Berlin, although there are a number of different stories to this (Seidel-Pielen 1996). Nevertheless, what can be said is that in Germany, three times more döner-kebabs than hamburgers are sold per year, and döner-kebabs today can be found almost all over Europe (Fumey and Etcheverria 2004). Of course, it can be claimed that similar processes could be observed in the US when it incorporated the German hamburger or the Italian pizza into its foodscapes (Fumey 2007), but the difference again seems to be in the way it happened. In the Berlin example, a number of the basic values identified by Schwartz shine through. Intellectual and affective autonomy may lead to a wish for a large number of different offers so that people have something to choose from and are thereby able to distinguish themselves from others. That these offers are provided by people from different backgrounds and are not exclusively used by other people with the same background may be attributed to a combination of intellectual autonomy with egalitarianism. And the preferred choice for healthy and mainly vegetarian food can be traced to the peoples' wish for harmony with nature. In the US, on the other hand, there seems to have been a stronger tendency to try to embed the European foods into the newly developing culture, which leads to more homogeneous offers. Habermas (2008b) claims that integration as shown for the Berlin foodscape is important for the further development of a united Europe as it opens up peoples' perceptions for new experiences and thereby makes it easier for them to better understand people from other European countries (Habermas 2008b).

8.4.3 European Values and Environmental Issues

In terms of environmental policies, the analysis above implies that there are a number of different ways to reach the same goal, depending on the traditions and basic values of each European country. It also means that European countries can learn from each other, but that measures might have to be adjusted to the needs of the country adopting them. To explore this a little further, it makes sense to compare policies in one field in two different countries, for example the reduction of car use in polluted city centers in France, considered one of the more important West European countries, and Britain, which is an important English-speaking country. Before looking at the

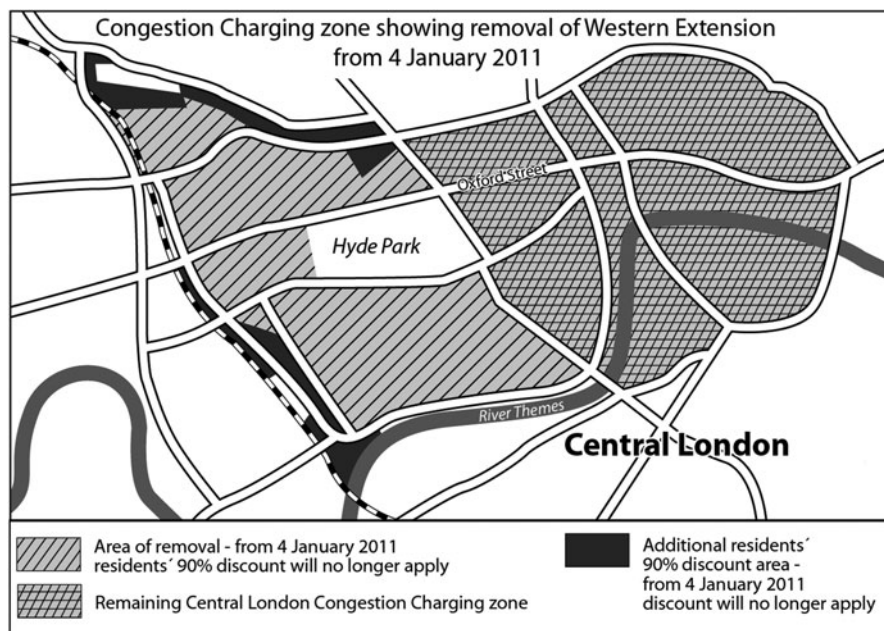


Fig. 8.14 Congestion Charge Zone in London 2011

different policies, it has to be noted that 59 % of French citizens believe that by 2030 a large number of people will have moved from larger cities to the countryside in order to avoid pollution exposure (Reinhardt 2009). Only 30 % of the British think that the same will happen in their country's future. However, in both countries, the main justification for regulating inner-city traffic is not the reduction of pollution, but the reduction of congestion produced by incoming traffic. There are two ways to deal with this, restrict traffic or facilitate it by creating new infrastructures. Congestion charges that are levied in several European cities, mainly in Scandinavia, Britain, and Italy, are an example of more restrictive measures, while the building of new tramways in a lot of French cities is an example for restricting car use while at the same time facilitating access.

Although not the first, the London congestion charge is probably the best-documented and also the most debated example in Europe. It was introduced in 2003 and covered an area of 20.7 km², comprising the financial and political center of London as well as most of the tourist attractions (Leape 2006). In 2007, the zone was expanded to cover Kensington and Chelsea (Tochtermann 2008), but this extension was taken back in 2011 (Fig. 8.14). In the beginning, the zone did relieve congestion (Leape 2006), but in the long run, there is contradicting evidence showing that the index value for congestions has reached pre-charging levels again in 2007 (Tochtermann 2008). One of the main problems with the introduction of a congestion charge is seen to be that it tries to influence behavior without offering many alternatives. Even before the introduction of the charge, 85 % of passenger

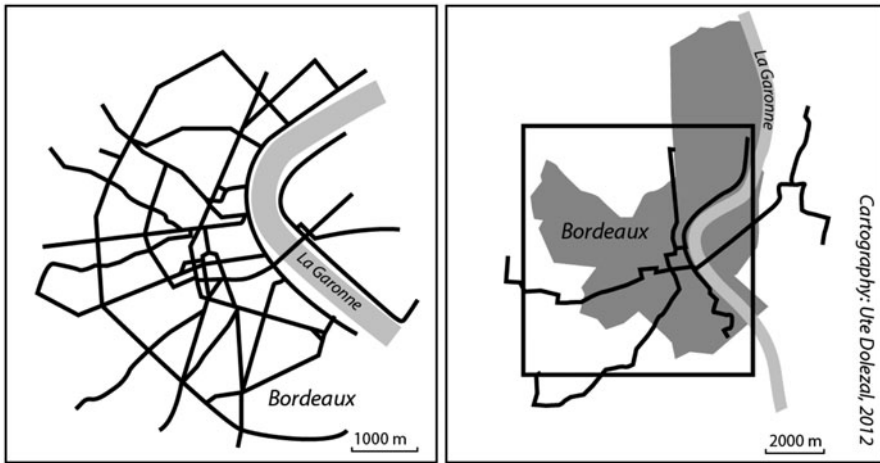


Fig. 8.15 The tramway network of Bordeaux in 1940 and 2004. (Dabitch 2004)

transport in Central London was dealt with by public transport. Although expected by the proponents of the congestion charge, rail usage didn't increase after the introduction of the charge (Leape 2006). Considering that old UK rail stations had been re-opened for public transport during the late 1980s and early 1990s (Railway Development Society 1992), this may not have come as a surprise as capacities had obviously been exploited already.

Contrary to the British approach, medium-sized French cities followed a slightly different policy. They started to re-introduce their tramways (Groneck 2003) to facilitate commuting and accessing commercial centers (Godard 2001). To reach these goals, the re-introduction of tramways was accompanied by a number of other measures, which included the reduction of cars and bus services in inner cities, the concentration of passenger traffic on a few arterial lines as well as the construction of parking lots at stations in the periphery of the towns and the introduction of bus services that take passengers from their departure points to the tramway and back again (Groneck 2003). Therefore, the new tramway networks look quite different from the first generation tramway networks (Dabitch 2004, Figs. 8.15 and 8.16). While the old tramways, being virtually the sole means of passenger transport, cover almost all streets of the city (center), the new tramways only consist of a very loose network that makes the center accessible from the outskirts and sometimes (as in Bordeaux) facilitates inner city movement by a kind of ring road. Unlike the efforts of some German towns where bus stops are relocated to share the roadway thus slowing car traffic and thereby convincing more car drivers to use public transport (MURL NRW 1993), the French system tries to combine the different means of transport, giving each their own tracks (Groneck 2003) and using the strengths of each to improve traffic flows instead of producing new congestions.

Of course, now the question would be, if one or the other of these two strategies is more promising and which model works best in which country? Based on the

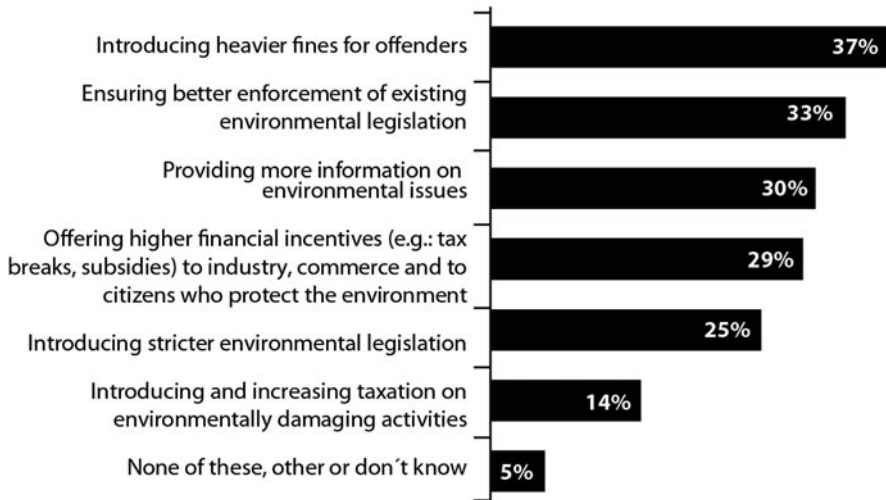


Fig. 8.16 Europeans' opinion on which would be the most effective way(s) of tackling environmental problems (max. two answers)—% EU-27. (European Commission 2008)

discussion above, one may come to the conclusion that the French model may be considered best for West European countries, while the British model is best for English-speaking countries, which means basically for itself and Ireland. But how about the Scandinavian countries and Italy who followed the British approach? Is this approach more satisfactory for the people or for the politicians? Or is it more appropriate for larger as compared to medium-sized cities? Or are the different approaches just a way of expressing Europe's diversity with both English and French policies contingent on location? If not, which of these two approaches may be more successful in the future? Or will future public transportation design be completely different? Are there general shifts in attitudes and values that would favour one over the other? If so, what do they entail in relation to how we deal with climate change?

A first hint as to the answers of these questions may be drawn from the results the Eurobarometer survey in 2007 (European Commission 2008). It is a Europe-wide survey that comprises a set of regularly asked questions that cover aspects of the EU and the unification process, the overall satisfaction with life and the economic situation, and questions concerning specific topics such as poverty, environmental problems, or the financial crisis. The survey is conducted every six months. In most countries, some 1,000 people are being interviewed, except for in Germany (1,500), Luxemburg (600), and the UK (1,300, of which 300 are from Northern Ireland). Results are published on the Internet¹⁴ mostly in English, but also in French and German. In the 2007 survey, the researchers asked about similar opinions as was in the European Values Study (Fig. 8.11, "Would agree to an increase in taxes if the extra money was used to prevent environmental pollution?"), but placed the statement in a

¹⁴ http://ec.europa.eu/public_opinion/index_en.htm.

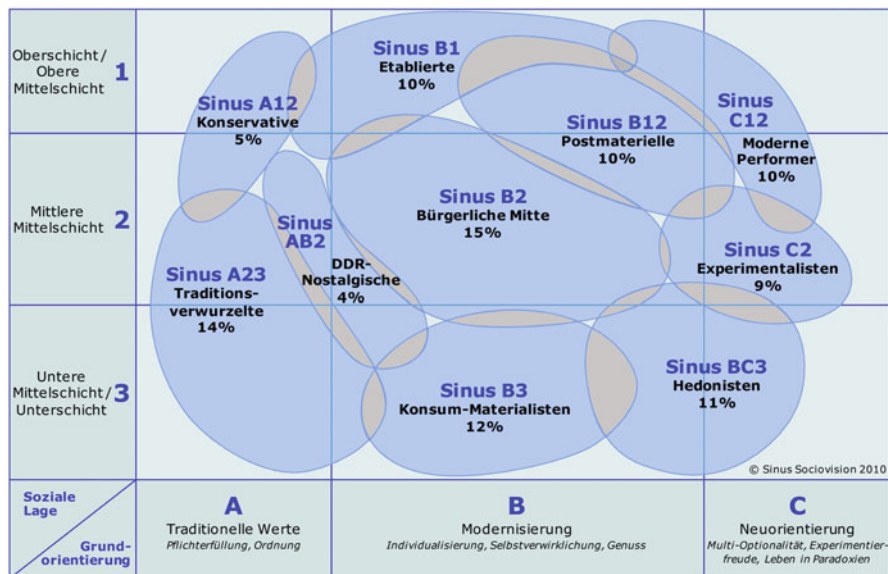


Fig. 8.17 Sinus-milieu groups in Germany 2001–2010. (Sinus Sociovision 2009)

slightly different context. It was just one out of six options put forward to answer the question, what are “the most effective ways of tackling environmental problems.” The other options were about introducing heavier fees for offenders, ensuring better enforcement of existing environmental legislation, providing more information on environmental issues, offering higher financial incentives to industry, commerce, and citizens who protect the environment, and introducing stricter environmental legislation. Two choices were possible. As shown in Fig. 8.17, introducing and increasing taxation on environmentally damaging activities, such as the London congestion charge is the least favoured one when looked at on a European level.

These national level data show some similarities to the results of the European Values Study as Denmark has the highest proportion of people favouring taxes (29%), and Sweden also has a share well above the average (23%). Greece has exactly the same percentage as the average (14%), while Finland with 27% has a share higher than that of Sweden. However, what is really interesting about these data is the relative importance accorded to the different measures. It seems that Europeans, when examined as one single group, do not support the introduction of any new restrictions, be it legislation or taxation. A higher number of Europeans also think that negative action, such as heavier fines (top in 13 countries) or the better enforcements of laws (top in two countries), are more effective than positive actions, such as incentives (top in six countries) or raising awareness (also top in six countries). But if you take into account socio-demographic data, you will find that younger people are more likely to prefer positive over negative action, while people with higher levels of education prefer financial incentives and enforcement of the existing laws.

Older people and people with less education are more likely to vote for fines and punishments for offenders. Socio-demographic data like these seem to indicate, at least in the long run, that the French model of battling congestion and pollution may be the more promising.

This conclusion is at least partly supported by the findings of a German company which specializes in market and social research. Out of the need to better address target groups for marketing and political communication, the Sinus-Institute in Heidelberg has developed a model of distinctive milieus. The idea behind it is that people do not only differ according to nationalities or socio-demographic characteristics as age or gender, but also in their values and outlooks on life. Sinus uses a combination of questionnaires and cluster analysis to determine the different value patterns. The questionnaires cover views on family, work and politics, recreational activities, lifestyles, dreams, visions, and values in general. After having identified different lifestyle groups through cluster analysis, they are then linked to social status groups. The results are shown in so-called “potato-diagrams” (Fig. 8.17).

For each of these groups, there are detailed descriptions that are summarized in Table 8.4 (Sinus Sociovision 2009). Groups with an A are the more traditional ones. B stands for modern outlooks, and C is for groups with rather new orientations. Although this does not mean that young people cannot be in A groups, or older people cannot be in C groups, the median age of the different groups varies considerably from 30 in the group of the modern performers (C12) to 70 in the group of the ingrained traditionalists (A23). Among the A groups, the lowest median age is 55 (AB2). Most of the B groups feature median ages around the mid-40s. These age differences in the milieu-groups may be interpreted in two different ways. Either values change when people get older, which implies that societies’ values as a whole may remain more or less stable; or societies’ values are changing and this change can best be observed in the younger generation.

In relation to the social status dimension, it can be noticed that the value differences between the lower and the middle classes seem more pronounced in the B and C groups, with the lower classes following a more explicit consumption orientation than the middle class or even the upper class. This, of course, may be due to a feeling that consumption cannot be taken for granted as it may be the case in the higher classes. Still, in the more traditional A groups, this difference does not show in the same way.

Sinus-milieu groups have been identified in other countries as well, such as Britain, France, Spain, Italy, Austria, and Switzerland but also in the US. As shown in Table 8.4, one group can be found in every country studied, B12. In Germany, Switzerland, and Austria, this group is called the post-materialists, while in Spain, Italy, and the US, they are perceived as different types of progressives and in France, merely as intellectuals. The bourgeois middle class (B2) can also be found in all countries but Italy. Interestingly enough, here too the names change so that in France, this group is described as the “quiet France,” which is quite similar to the British version of “quiet peaceful Britain.” In the US, the same group is called “modern middle America.” These different names imply that the groups are similar but by far not identical in the countries analysed. On the other hand, there are groups that

Table 8.4 Description of Sinus-milieu groups. (Sinus Sociovision 2009)

Sinus-Group	Name	Description
A12	Conservatives	Old German educational elite view cultural shifts critically, follow a humanistic idea of duty and emphasize good manners
A23	Ingrained traditionalists	The post war-generation that is looking for security and routine
AB2	GDR* sentimentalists	The resigned losers of German reunification that keep socialist ideas of fairness and solidarity
B1	Established	The self-conscious establishment that strives for success, believes in feasibility, and loves exclusiveness
B12	Post-materialists	Enlightened post-1968s have liberal attitudes, post-material values and love intellectual leisure activities
B2	Bourgeois middle class	The status-conscious modern mainstream tries to achieve higher statuses in work and social environments and looks for secure and harmonic surroundings
B3	Consumption-oriented materialist	The materialistic working class tries to keep up with the consumption patterns of the middle classes to compensate for social disadvantages
BC3	Pleasure seekers	The fun-oriented modern working and lower middle-class questions norms and don't want to conform to work ethics expected by society
C12	Modern performers	This group is young, unconventional, and "self-made." They are open for a variety of options, flexible, and love new multi-media gadgets. They like living life to the fullest
C2	Experimentalists	Individualistic bohemians love spontaneity and living with contradictions. They see themselves as the vanguard in questions of lifestyles

*German Democratic Republic

can only be found in one country, such as the GDR (German Democratic Republic)-sentimentalists in Germany, the rural in Austria, or the disenfranchised in the US. Some groups with slightly different abbreviations seem to share similar values, although on the analytical level, they cover different value groups as the A3 group in France and Spain fits in well with the B3 group of other countries. Also Italy's and the US's BC23 group (rebellious pleasure seekers or mavericks) seems to be comparable to BC3 (pleasure seekers) in other countries. What are these data good for? There is strong evidence that groups of people from different countries may share sets of values that are more similar to each other than to other groups of people from their own country but from different milieus. This in turn would mean that country data as shown in Fig. 8.11 and Fig. 8.12 may tell only part of the story. Differences between the countries may be the result of different historical developments and basic values, but both of these may again be superimposed by the values and attitudes of specific milieu groups. To examine possible cultural shifts in Europe, these milieu groups may be a good indicator and basis for prediction (Table 8.5).

Table 8.5 Shares of Sinus-milieu groups in different countries in 2002/2003

Milieu Austria	Switzerland	Germany	France	Italy	Spain	USA
A12 conservatives 6		Conservatives 5	Traditional conservatives 15			
A2	Traditional bourgeois 9					
A23 Rural and traditional* 21	Modest traditionals 10	Traditionals 15	Precarious working class 7	Traditional conservatives 21	Precarious working class 15	Old guard 15
A3					Established bourgeois 9	Sovereigns 10
AB1	Established 9					
AB12	Status oriented 10					
AB2		GDR-sentimentalists 6		Moderately ambitious 17		
AB23					Assimilated consumptionists 16	
AB3						Materialists 13
B1	Established 10	Established 10	Established bourgeois 10	Post-working-class 9		
B12	Post-materialists 9	Post-materialists 10	Intellectuals 11	Enlightened bourgeois 10	Affluent	Liberal
B2	Bourgeois middle class 19	Bourgeois middle class 16	Quiet France 12	Tolerant progressives 10	progressives 13	progressives 10
B23			Consumption-oriented workers 16		Economic climbers 10	Modern middle America 16
B3	Consumption-oriented workers 10	Consumption-oriented materialists 11		Precarious consumptionists 14	Responsive rebels 11	
B34					Precarious workers 11	
BC1						Disenfranchised 11
BC2						
BC3	Pleasure seekers 12	Pleasure seekers 11	Frustrated appeal 10			
BC23	Escapists 11			New achievers 11	Post-modernists 9	
C12	Modern performers 8	Modern performers 8	New luxury 9	Rebellious pleasure seeker 7		Mavericks 14
C2	Experimentalists 5	Experimentalists 6	Experimentalists 10		Avant-garde 6	Adaptive achievers 10

* divided into two groups: rural (7 %) and traditional (14 %)

In Germany, milieu groups have been used to learn more about environmental values. Studies have been undertaken on the people's attitudes towards forests and sustainable forest management (Wippermann and Wippermann 2010), consumption of organic food (Spiller 2006), and climate change (Umweltbundesamt 2009). The question "whether people would agree to an increase in taxes if the extra money was used to prevent environmental pollution" (Figs. 8.11 and 8.17) in this context provides another perspective to examine climate change. Interviewees were asked their opinion on willingness to (a) pay higher prices for environment friendly products, (b) pay higher prices for energy-saving gadgets, or (c) spend more money on fair trade products from less developed countries. The results show marked differences between the groups (Table 8.6). Three groups have above average percentages in each of these categories, namely the established, the modern performers, and the conservatives. All three groups are better off so they can afford to pay higher prices. But they can be distinguished from each other by the motives they have for their choice. Something similar can also be said about the three groups who show below average shares in each of these categories, including the bourgeois middle class, the consumption-oriented materialists, and the GDR-sentimentalists. They form the poorer center of society, together making one-third of the population. They may not be able or not willing to pay higher prices. And again, they have different value patterns that lead to the choices made. Interestingly, the most environmentally conscious group, the post-materialist, score only average in their desire to pay higher prices for environmentally friendly products. This may be due to the fact that a lot of them already do so.

All of the studies mentioned identify the post-materialists, a group that was found in all the countries included in Table 8.5 as a rather responsive group for their respective issue. For other groups only some issues seem to be of interest. Apart from the post-materialists, conservatives and modern performers spend proportionately more money on organic food than all the other groups (Wippermann and Hübsch 2007). The group with the highest percentage feeling that climate change threatens humanity is the GDR-sentimentalists, followed by the established, the bourgeois middle class, while the post-materialists score only slightly above average (Umweltbundesamt 2009). The value of forests is ranked highest among conservatives followed by the bourgeois middle class, GDR sentimentalists, and post-materialists. Among young people, the most perceptive groups for this issue are the better educated parts of the traditional youths, the bourgeois youths, and the post-material youths. These three groups make up around a quarter of the young population and are based largely in the A and B sectors with medium or higher educational levels (Wippermann and Wippermann 2010). These are also the main target groups for the German Catholic Church (Wippermann and Calmbach 2007). Overall and apart from the post-materialists, the established, the modern performers, and the bourgeois middle class are seen as the most important groups when it comes to communicating environmental issues. Other than the bourgeois middle class, which is not seen as an opinion leader, the established, the modern performers, and most of all, the post-materialists are perceived as trendsetters. The established and the post-materialists in Germany are the groups with the highest incomes. All three

Table 8.6 Willingness of Germans to pay for sustainable or environment friendly products. (Umweltbundesamt 2009)

How willing are you to . . .	Percent scoring in the category “very much”										
	Total population	Established	Post-materialists	Modern performers	Conservatives	Ingrained traditionalists	GDR sentimentalists	Bourgeois middle class	Consumption-oriented materialists	Experimentalists	Pleasure seekers
Pay higher prices for environment friendly products?	5	10	5	8	10	2	2	3	0	5	9
Pay higher prices for energy saving gadgets?	14	21	16	23	28	15	6	13	7	11	9
Spend more money on fair trade products from less developed countries?	10	12	18	12	15	5	3	10	2	12	11

bold higher than average

groups enjoy a good education. The established, according to Table 8.5, can be found in Austria, Germany, France, and Italy but not in Switzerland, Spain, and the USA. The modern performers group forms part of society in Austria, Switzerland, Germany, France, and the US but not in Italy and Spain. On the other hand, the two groups that do not seem to be responsive to any of the above mentioned issues, the experimentalists and the pleasure seekers, are absent from Italy and the US, with the pleasure seekers additionally missing in Switzerland and Spain.

According to this approach, cultural shifts take place when groups become more or less powerful. As we have seen, post-materialists were quite a widespread phenomenon in Europe. In the 1980s, their discursive counterpart was the established conservatives that had later split into the conservatives and the established—at least in Germany. Both these groups seemed to be missing in the US so maybe it is of interest to understand what the differences between these two were in relation to their perspectives on environmental questions and how this affects policies related to climate change.

In 2002, conservatives in Germany formed a rather small group. They made up only 4.9 % of the population. Their median age was 63, which meant that a lot of them were retirees. Relatively speaking there were more conservatives in West Germany than in East Germany. Conservatives confessed a strong attachment to what in Germany is called *Heimat*, a concept that involved a special attachment to your birthplace, which was seen as something like your eternal home turf. It was almost looked at as something sacred (Schetter and Weissert 2007). This implied that their idea of nature was closely linked to the idea of landscapes as was seen in their valuing forests more than other groups that were normally perceived as the most environmentally conscious. In their view, landscapes were an expression of the

home turf and thus had to be preserved for future generations. To achieve this, they stressed values such as responsibility and justice.

With a median age of 44, post-materialists were a lot younger than conservatives. Their share of the population (9.8 %) was twice that of the conservatives. They had grown up in the wake of the students' protests of 1968, demanding more democracy, and were often part of the German ecology movement. Most of them took part in demonstrations against nuclear power plants or at least sympathized with them. For all these reasons, like the conservatives, they were not as visible in East Germany as in West Germany. Post-materialists perceived the environment and nature as ecosystems. Thus for them, the protection of the environment was mainly a political question that included a global dimension. For a long time, post-materialists had been ready to give up part of their living standards to help save the environment for future generations. This readiness had waned slightly with feelings of losing utopian visions about the future (Umweltbundesamt 2009). These two groups were both willing to pay higher prices for energy saving gadgets and both wanted to protect the environment, but how did they argue on the issue of renewable resources such as for example wind power?

Renewable energy, and with it wind energy, is largely seen as one way to reduce the emission of CO₂ into the atmosphere (Pierret 2007). Thirty-seven percent of Europeans think that by 2030 wind and solar power will produce at least half of the energy needed, with the Swiss (60 %) and the French (59 %) being more optimistic than Italians (24 %) and the Russians (23 %) (Reinhardt 2009). The largest producers of wind energy worldwide at the moment are the US and China, which may not be too surprising considering the sizes of these two countries. But when it comes to wind energy produced per capita or per square kilometres, European countries feature at the top of the list: Denmark, Spain, Portugal, and Germany are the top producers of wind energy per capita, with the USA at ninth place and China absent in the list of top 20. Spain and Portugal, together with the Netherlands, are also at the top of the list when considering producers of wind energy per square kilometres, with China and the US reaching ranks 17 and 19 respectively (WWEA 2011).

Europe was an early promoter of wind energy, for example, the National Centre for Alternative Technology in Machynlleth in Wales (NCAT 1995). They consider wind energy to be part of the political solution to reduce the impacts of climate change. Conservatives take a slightly different stance (Cabrol 2010; Klaus 2007; Lawson 2008). They do not necessarily reject the use of wind energy, but they do put forward some constraining arguments.

Lawson starts his argument against wind energy by stating that "whether forests of wind turbines are a vision of beauty or an environmental outrage is a matter of personal opinion" (Lawson 2008). What follows is not a discussion of the environmental impacts but technological and economic considerations concerning distribution costs and the characteristic of wind as a nonpermanent source of energy.

Cabrol (2010) starts out with similar technological and economic arguments when he calculates that the biggest French wind park can at best serve 125,000 inhabitants, and that the costs are prohibitive. He then goes on to discuss the impacts that wind

parks have on people's health and on landscapes and calls those resisting the construction of wind parks *amoureux de l'environnement*—lovers of the environment or, if you like, landscape (Cabrol 2010), who are not willing to subside to political movements.

Klaus economizes the landscape argument by claiming that the sheer cost of land needed to build enough windmills would be exorbitant. He estimates that the production of energy at the Czech nuclear plant of Temelín would need some 5,000 windmills that, when put in a row, would stretch across 665 km (Klaus 2007). Klaus also offers another argument that is gaining momentum in the European discussion: that windmills allegedly kill between 12 and 15 million birds annually. This negative impact of wind parks on the environment has been studied especially in Spain (Lekuona and Ursúa 2009; De Lucas et al. 2009; Barrios and Rodríguez 2009), in Britain (Lawrence et al. 2009) as well as in relation to wind parks in the North Sea (Stienen et al. 2009). Contrary to the rather pessimistic judgment that the conservative authors express, these studies often provide solutions to arbitrate between the needs of wind parks and bird protection.

What unites the more conservative authors is their concern for the protection of landscapes, their strong objection to what is published by the Intergovernmental Panel on Climate Change (IPCC) as it is considered to be too ideological and the measures proposed as too little differentiated and often also their support for nuclear instead of renewable energy. Therefore, they may be in favor of the protection of the environment as are the post-materialists, but the implied values of both groups may lead to quite different ways of dealing with the consequences of climate change.

Statistics on the production of wind energy in Germany showed a similar pattern. Several federal states have already reached a rather large share of wind power in their overall power consumption, Sachsen-Anhalt (52%), Mecklenburg-Vorpommern (45%), Schleswig-Holstein (44%), and Brandenburg (43%). In contrast, Bavaria and Baden-Württemberg reached only 1% respectively. Hesse and Saarland reached a share of around 2.5%. All these shares were outpaced by the 4% share that the small city state of Bremen reached. These developments might partly be explained by the fact that some federal states are closer to the North Sea where wind speeds are higher, but the real reason is a political one (Scheer 2008). States like Baden-Württemberg, a traditionally conservative state that had the first "green" minister president elected in the wake of arguments over a new station building in the capital city of Stuttgart, devised planning regulations that made it practically impossible to build wind parks by declaring 90–99% of their land area exclusion zones for windmills. In Hesse, a similar regulation had been decreed, arguing that wind parks were not allowed to be built in zones with a high potential for experiencing nature and landscapes, a classical conservative value.

Interestingly, in the latest version of the milieu groups, the conservatives and parts of the established, merged again and became the "conservative-established milieu," which looks like a repercussion of the 1980s model, but the group is not rooted as firmly in the traditional sector anymore (Sinus Sociovision 2010). This may suggest that ideas to save nature in the sense of *Heimat* or to simply save landscapes for the sake of the beautiful view are becoming less and less convincing.

On the other hand, when the established (B1) formed their own group, they were seen as one of the trendsetting groups when it comes to environmental questions. What then distinguishes them from the post-materialists and modern performers? In contrast to the post-materialists for the established, the environment is not of great importance. They do not know a lot about it, but they know that it is politically correct to care about it. However, they are not willing to compromise their living standards just to protect the environment. This does not mean that they do not buy environment-friendly products. They do, when it means that they can buy trendy energy-saving gadgets or healthy organic food as there is a strong belief that environmental problems can be solved by technological and economic development. This would be in accordance with the assumption that the French tramways are successful because they nourish the people's love of futuristic technologies (Groneck 2003), but it is quite contradictory to expectations of Europeans in general since only 16 % believe that by 2030 the problem of climate change will be solved due to technical developments (Paludan 2009).

Modern performers, the last of the three trend-setting milieu groups, have more or less the same view as the established on technology and economic questions. The main difference between these two groups is that the modern performers are younger and therefore not established yet. They have not yet reached the well-paid jobs that the older group members have. This may also explain why they share some of the concerns of the post-materialists. But contrary to the eco-friendly behavior that post-materialists try to demonstrate, they are not ready to act accordingly. The main difference in worldviews between these groups is that post-materialists are rather pessimistic when envisaging the future, while neither modern performers nor the established believe in catastrophic worldviews. They want to live their life to the fullest and are rather optimistic about their future. This view is also expressed in a study on the ideas German students have about climate change and its consequences in different regions, especially in their own country and in a place as far away as Africa. Most students think that the vulnerability of people in Africa is by far higher than their own. They also believe that they themselves will not be affected by the consequences of climate change (Schuler 2009). In respect to the students' optimistic outlook and their wish to enjoy life, they fit perfectly into the value dimensions that Schwartz has identified as typical for English-speaking countries and especially the US: mastery in combination with affective autonomy (Schwartz 2007). But they may differ from typical US dimensions in respect to embeddedness and hierarchy, as they do not want to be bothered by moralistic reasoning. The most important thing for them is their individual freedom.

The latest version of the milieu groups has only part of the established merged with the conservatives. The other half is seen to form a new group with a part of the post-materialists. This group is now called the liberal intellectuals. The remaining part of the post-materialist became the socio-ecological milieu. But even in this group, there is a move away from a more moralizing and sometimes utopian view of the world to a rather more pragmatic one often implying individualistic decisions.

If these changes were stable, that might become of great importance to the way Europe can and will deal with climate change. In the book *The Cosmopolitan Europe*,

Beck and Grande (2007) claim that there are four ways in which European nation states organize their relationships. These ways are a combination of realistic versus idealistic and national versus cooperative (Beck and Grande 2007). The last two are relevant for considerations on climate change. Up to now climate change has been regarded as a global problem that needs global cooperation to be addressed sensibly. There are now authors who claim that this is changing. With climate changes becoming more predictable on a regional basis, it is also becoming more of a territorial problem with winners and losers (Brunel 2008; Priddat 2010). Especially in Europe, this may then lead to the political problems of scale as described by O’Lear (2010). O’Lear uses the example of the dead water zone and questions whose responsibility it is to improve this region in the Gulf of Mexico. Is this the task of the neighboring federal states of Alabama and Louisiana; the Midwestern states, such as Iowa, Illinois, and Indiana for releasing the phosphates and related substances; the United States as a whole; or even Canada, as the Mississippi watershed extends onto its territory (O’Lear 2010)? Similar processes may in the future arise inside Europe or the EU and this might lead to a regionalization of policies where the winners are no longer willing to support the losers. But such developments are of course also dependent on the voting population and whether they are willing to support such causes. Will they strive for affective autonomy and mastery or rather for intellectual autonomy and harmony? Will they be modern performers or post-materialists? How will this be affected by the regional demographic changes related to climate change? People from negatively affected regions may migrate to places that are less affected and can be perceived as the winning countries. These countries in turn may start to compete to get the best qualified workforce available to develop their respective economic potentials (Priddat 2010). Contrary to the previous regionalization of the problem, this eventually may even lead to shifting national boundaries, but it will certainly lead to a more pronounced mix of cultures. Thus Europe will have to negotiate and renegotiate transcultural settings. Therefore at least two questions arise: how will Europe’s culture(s) be affected by climate change, and how will they cope with climate change?

8.5 From Past to Future

Although some authors claim that the recent climate change is an unprecedented challenge (La Branche 2008), Europeans have seen changes in climate before. There have been two markedly warmer periods, the *Roman Climatic Optimum* and the *Medieval Climatic Optimum* (Behringer 2011). Both these times have seen prosperous and culturally productive societies (Brunel 2008). The first period even got its name from the Roman Empire, which was ruling large parts of Europe for centuries. The second period saw expanding medieval societies, including the German colonization of the east or the Reconquista of the Iberian Peninsula (Bernecker 2006). In between these periods, temperatures dropped markedly, which led to devastating results (Brunel 2008). During the Little Ice Age, which was an interval that began approximately A.D. 1400

until 1900 where the temperatures were colder in North America and Europe than today (Baede 2007; Behringer 2010), settlements recently constructed in northern parts of Scandinavia and Britain had to be abandoned. Large parts of Europe were struck with famine due to decreasing harvests affected by the drop in temperature and increasing humidity. Insufficient nutrition led to poor health and higher susceptibility for diseases such as the plague, which raged all over the continent between 1346 and 1352, killing large numbers of people. Coinciding with these catastrophes was a rise in religious fervor as observable evils were explained by sins committed by man. The prosecution of witches experienced its heyday (Behringer 2011).

Looking at these findings, one might wonder why Europeans should bother to prepare to mitigate the effects of climate change at all (Brunel 2008). For one thing, we are heading towards a warmer phase, which in the past has been rather positive. On the other hand, European societies are no longer agricultural (Behringer 2011). Even countries like Spain that export large quantities of tomatoes, cucumbers, peppers, and other vegetables to markets all across Europe, have experienced a steady decrease in the share of agriculture in their economies (Nohlen and Hildenbrand 2005). Nevertheless, Europe produces more food than it can consume, which, as a continent, makes it one of the biggest exporters of agricultural produce (Brunel 2009). At the same time, Spain's water reserves per capita of the population are higher than those in Germany (Freire Dias 2006) due to their substantially lower population density. So on the food production front, it appears that a warming climate pattern may even be beneficial to the continent's economy.

Something similar can be concluded for the tourist industry. With good reasons one may ask whether a cartoon published in Portugal that depicts tourists in 2050 sunbathing on a beach in Iceland and discussing the pros and cons for going to Scandinavia the following year (Afonso 2005) will materialize. The heart of the question is whether a temperature rise of 2 °C (3.6 °F) or even 4 °C (7.2 °F) degrees will cause such an imbalance considering that the average July temperature in Lisbon is 22.2 °C (71.6 °F) compared to 11.4 °C (52.52 °F) in Reykjavík.

If a rise in temperature appears not to be too dangerous, how about the rise in sea levels that may affect the coasts of Britain, the Netherlands, and Germany in particular? Perplexingly it is the Dutch and the British, who were found to consider themselves well-informed about climate who view it as a serious problem (Kuckartz 2010). In fact, population changes in these parts of Europe are still positive, and the happiest Germans are found in the harbor town of Hamburg and in the coastal areas of Lower Saxony (Köcher and Raffelhüschen 2011). What does it imply if people in risk areas seem to be unimpressed or unafraid of the inevitable rise in temperature and sea level? This nonchalant attitude may be related to the actual level of risks taken as a map depicting the climate change vulnerability index for 2012 shows Europe being one of the regions least vulnerable to the effects of climate change (Docena 2011). The Dutch government has just decided to meet rising sea levels by improving their dikes (Piguet et al. 2011). Maybe this is why the ordinary European doesn't see climate change as an urgent problem and thinks that separating garbage is a sufficient personal contribution to combat it (Kuckartz 2010).

On the other hand, climate change is on the public agenda (Acot 2010). So much so, that in Britain the government has even decided to distribute DVDs of Al Gore's film *An Inconvenient Truth* to all secondary schools in England. But this was seen by some as an attempt to use schools to circulate propaganda. A legal argument ensued and the government was made to provide a guide for teachers that would discuss nine points in the film that were found incorrect or exaggerated (Lambert 2008). In France, you can observe a growing number of voices that find the debates on climate change boring as they blame the human race as a whole for the changes and see a solution in things that can be done by everyone in small everyday gestures like turning the lights off when leaving a room instead of fostering a political debate naming winners and losers. At the same time, it seems to suffice when big companies subscribe to vague goals on how they want to promote climate friendly production without ever implementing appropriate but costly new technologies or envisaging changes in the work process (Acot 2010). This goes with a feeling that climate change is being used by a number of institutions as a great opportunity to make money: firms that produce climate-friendly technology or just want to green-wash their business, NGOs and science departments that are looking for funding, and the United Nations Organization (UNO), which is happy to change from the role of petitioner to advocate for developing countries (Brunel 2008). In some parts of Europe, people seem to be weary of the debate on climate change and voice a critical opinion that does not correspond to the disapproving views brought forward by the conservatives.

A value that is of utmost importance to a large number of (West) Europeans is egalitarianism. The term can be related to equality in single countries but also between countries. An egalitarian society would want to try to solve climate change related consequences together with those unaffected in order to help those in need. But people may not buy the idea of necessary actions at any price. As can be told from the previous assertions, there is a substantive number of Europeans who do not take too kindly to people whom they feel disrespect their intellectual autonomy. Any discussion on climate change that appears to be too moralizing may turn people away from the problem or lead to a meta-discussion on the way climate change is debated. Instead of just relying on scientific results and the conclusions scientists draw from them (Acot 2010), for many a genuine discussion on climate change includes a discussion of social, political, and value issues. This discussion will have to take into account the cultural diversity of the continent, and if it is to be successful, it will also need to draw on Europe's diversity as a valuable resource. Politics will have to find differentiated answers to problems occurring in different regions and sectors instead of one-size-fits-all-answers. If such a deepened understanding for their equality in diversity can be achieved, then Europe may even profit from the consequences of climate change.

For example, consider the threat that populations from large parts of the coastal areas will migrate inland. In some cases, this may lead to people crossing borders in large numbers. This is nothing new to modern Europe, but it may lead to a necessity of living bi- or even trilingual in some areas. That in turn would help the European effort to have its citizens learn second or third languages to advance the European project. And it may bring together creative people from different cultural backgrounds

to develop new problem-solving ideas. If things developed that way, maybe those Europeans who do not worry about climate change too much are not so wrong.

But of course things may turn out differently. What if the value of egalitarianism becomes less convincing, for example, because of a widening gap between the rich and the poor, as can be observed especially in Britain (Dorling 2011)? And what happens when scientific data becomes more precise and scientists are better able to determine to what degree each geographic region will suffer? One possible outcome could be that Europe will return to more national policies. Those people living in affected areas may not receive any help and may even be made to stay where they are, unless they are needed in the workforce of other countries. National policies like that are far from unlikely as could be witnessed in the recent so-called euro crisis when Britain's prime minister opted out of a new contractual agreement. Such a development may be in accordance with the values of mastery and affective autonomy that we find in the English-speaking countries, but it may also pose a heightened risk of (military) conflicts inside Europe if it is taken to its extreme. Thus, unrest and protest may be a reaction to governmental control of internal migration.

The probability of such a development may be supported by the results of the milieu group studies that show an increase in young people following values that could be classified as showing underlying affective autonomy or mastery values. But the questions remain whether this is a phenomenon closely related to a certain age and status group and will therefore change with peoples' social status and age—or not. Also, there is no clear indication that affective autonomy and mastery values must lead to a renewed nationalism. If Europe is seen as the framework in which best to live these values, then nationalistic tendencies will have little chance to develop. To achieve that, Europe will have to try and follow a policy that relies on positive instead of negative actions. Positive action again is more likely to set free new ideas and combined with the continent's diversity, a stronger emphasis on mastery and affective autonomy values may be of advantage, especially as it seems quite unlikely that the typical European values of cooperation and equality will totally vanish.

If values do not develop with increasing age or social status, then conservative values are clearly on the decline. In Europe this may not necessarily be bad with regard to climate change as conservatives are often quite critical of the results of the ICCP and oppose measures that imply significant changes in landscapes as the building of wind mills for power production. Also conservatives tend to be more nationalistic through their emphasis on the importance of the home turf. This may make them obstruct political measures that encompass all of Europe. Alternatively, if values change with age, then this group may become stronger with an increase of the share of older people in Europe's population. This may again lead to politics less inspired by a spirit of European solidarity than would be expected from Europeans. On the other hand, their humanistic sense of duty may also encompass other nations if Europe is seen as a home too.

As can be seen, the visions of what Europe may be like in 2100 depend a lot on the perspective you take. There are probably many more possible scenarios to the number of changes related to changing climate, such as shifts in faunas and floras, disease outbreaks, food production, and human migration to name a few. What

kind of Europe will finally materialize will depend on the decisions made and the policies chosen and on whether these decisions are widely debated and the policies are followed. Thus, the timing of decisions and visionary policies are important to align environmental changes with human mitigation efforts. If Europe keeps its faith, there is a good chance it will solve problems relating to climate change as well as to discussions on climate change in a way that will strengthen both values of intellectual autonomy and of egalitarianism.

8.6 Conclusion

Earlier humans left Africa due to climate change, migrating to optimal conditions for survival (Behringer 2010). With the flux of temperature and precipitation, these factors created the environmental conditions for new life to form and historical existence to reestablish itself. As one traces the earliest human existence with the parallel environmental changes, “we” as a species are resilient and adapt. The cultural shift in Europe as a result of climate change may be stagnant as we simply choose to live the way we know best now. However, given the dramatic changes in flora movement and water shortage or abundance, it is more likely that the European people will respond in one of two ways: to work collectively or as fragmented nations. The next decades will be an interesting time to observe as a chain of reactions set off by climate change will influence the way people live. Examples of imminent changes include new living spaces opening up due to shifting coastal boundaries or the migration of insects and animals that follow a northward movement of tree lines, leading to new ways to engage with people, with the environment, and with ourselves. The important question is how fortune and misfortune will be distributed, who are the winners and losers of this climatic shift, and whether the cultural shifts underway will be enough to embrace all in this change.

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Chapter 9

The Projected Death of the Fertile Crescent

Pinhas Alpert, Fengjun Jin, and Akio Kitoh

Abstract Projections of rainfall and stream flow in the Mediterranean and the Fertile Crescent of the Middle East are presented here for the end of the twenty-first century. Up until recently, this has not been possible due to the lack of observed data and atmospheric models with sufficient resolution. An innovative super-high-resolution (20-km) global climate model is employed, which properly reproduces the moisture fields of the present-day climate over the study area. The model projected that the Fertile Crescent will lose its current shape and may disappear altogether by the end of this century. The annual discharge of the Euphrates River will decrease by 29–73 %, as will the stream flow in the Jordan River. Thus countermeasures for water shortages will become much more difficult.

9.1 Introduction

The Fertile Crescent is a region where ancient civilizations have developed. Population increases and intermittent dry spells in the region have resulted in agricultural innovations (Bellwood 2004). This region runs northwards from the Jordan Valley, through inland Syria, into southeastern Turkey (Anatolia), eastwards through northern Iraq, and finally southeastward along the Zagros foothills of western Iran. Prevailing climatic conditions during ancient times allowed the first rain-fed agriculture in human history. Winter rainfall and snow in high mountains in the north were the main sources of water. At present, however, most of this region requires irrigation systems to sustain agricultural production. Recent satellite images show that some of the vegetation in the fertile Mesopotamian marshlands has disappeared

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(National Geographic News 2001). The Middle East contains a heavily utilized water basin and relies upon transboundary rivers to recharge artificial reservoirs. Several counteracting international projects are underway (UNEP 2001) and the projections of future water availability are indispensable (Alpert 2004; Alpert et al. 2006, 2008; Samuels et al. 2010, 2011).

It is widely accepted that the global and regional-scale water cycle has been changing since the last century due to the accumulation of anthropogenic greenhouse gases and land use/land cover changes (IPCC 2007). The rise in the world's population (UNFPA 2005) has brought increases in water usage for food production, flood damage due to urbanization, water pollution, drought, and an increase in water demand (Vorosmarty et al. 2000). Water in the environment is an international problem because it is strongly related with the import and export of agricultural and industrial products as well as the economic and social well being of the area.

Multi-model climate change simulations for the twenty-first century showed a decrease in runoff in the Middle East of up to 30% by 2050 (Milly et al. 2005; Mariotti et al. 2008). A 40% decrease in the annual stream flow of the Euphrates River has also been projected (Nohara et al. 2006). However, the horizontal resolution of the climate models used for these projections (between 400 and 125 km) is not sufficient to resolve the topography in the Fertile Crescent. Thus far, only regional models have resolved the necessary topography (Evans et al. 2004). As the mountains are the source of the water that maintains the life and culture in this region, a high-resolution model that can accurately resolve topography is necessary to project future changes in water resources.

Recently, a global climate model with a horizontal grid size of about 20 km has been developed (Mizuta et al. 2006). The increased horizontal resolution allows this model to realistically represent the topography of the area. This enables us to project the hydrological impact of climate change, particularly over those water source regions containing steep mountains, such as in Eastern Turkey. The horizontal resolution of this model is even higher than that of most regional climate models used worldwide, thus orographic rainfall is represented well in this model at the regional scale (Yatagai et al. 2005). We are now entering a new era in which regional-scale climate information down to a 20-km grid interval is available without the use of regional models.

9.2 Model and Experiment

9.2.1 *The General Circulation Model (GCM)*

The atmospheric general circulation model (GCM) used in this study is a climate-model version of the Japan Meteorological Agency's (JMA) operational numerical weather prediction model. The simulations were performed at a triangular truncation 959 with linear Gaussian grid (TL959) in the horizontal. The transform grid uses 1920 by 960 grid cells, corresponding to a grid size of about 20 km. The model

has 60 layers in the vertical with the model top at 0.1 hectopascal (hPa). A detailed description of the model is given in Mizuta et al. (2006). Mizuta et al. (2006) and Kitoh et al. (2008a) showed that modeled global distributions of the seasonal mean atmospheric circulation fields, surface air temperature, and precipitation agree well with the observations. Moreover, the model improves the representation of regional-scale phenomena. The results presented here are based on Jin et al. (2010) and Jin (2011).

It should be mentioned that there is little difference between the model used in Kitoh (2008a) and that in Jin et al. (2010) and Jin (2011). First, the time period for the present and future climate simulation is different. In Kitoh et al. (2008a), only a 10-year time span for the simulation was performed both for the present and the future climate study. In Jin et al. (2010) and Jin (2011), the time span is 29 years for the present (1979–2007) and 25 years for the future (2075–2099). Secondly, the future sea surface temperature (SST) used is different. In Kitoh et al. (2008a), the future SST from two climate models with different climate sensitivity, i.e. with moderate climate sensitivity (MRI-CGCM2.3.2, Yukimoto et al. 2006) and with high climate sensitivity (MIROC 3.2 (hires); K-1 Developers 2004). In Jin et al. (2010) and Jin (2011), the future SST changes are based on multi-models ensemble mean of Coupled Models Intercomparison Project Phase 3 (CMIP3) by the simulation of IPCC SRES A1B emission scenario.

9.2.2 *The River Model*

The river flow model used in this study is GRiveT (Global River flow model using TRIP), which was developed at MRI. The TRIP (Total Runoff Integrating Pathways) is a global river channel network in a 0.5-degree by 0.5-degree grid (Oki and Sud 1998). In the process of simulation, GRiveT distributes the runoff water on the model grids into TRIP grids with a weight that is estimated by the ratio of the overlaid area on both grids. GRiveT then transports the runoff water to the river outlet along the river channel through TRIP. GRiveT does not account for any human consumption or natural losses of the river water.

9.3 Results

9.3.1 *Future Changes of the Moisture Budget Components*

Figure 9.1 shows the spatial distribution of the evaporation (E), precipitation (P) and P-E changes between the future (2075 to 2099) and the current climate (1979 to 2007). The evaporation's significant increase is clearly noticed over the water body with maximum values of 150–200, 200–250, and over 250 mm/season over the eastern Mediterranean, the Red Sea, and the Persian Gulf, respectively (Fig. 9.1).

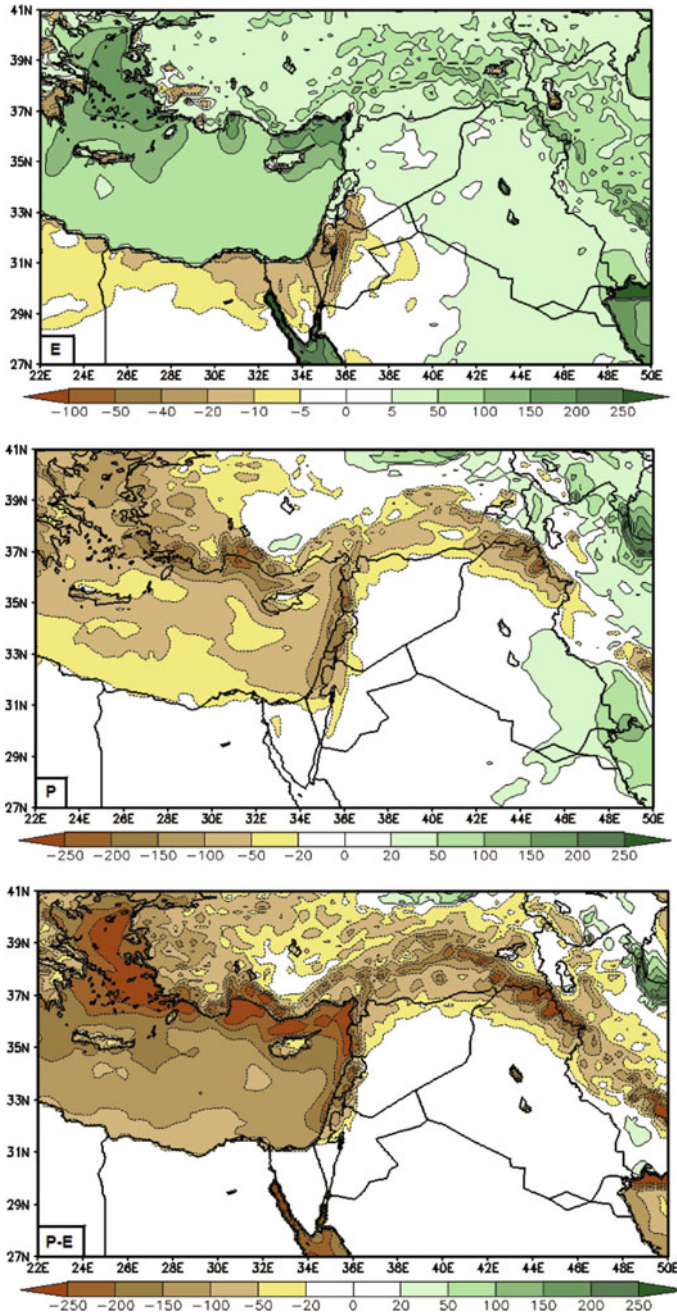


Fig. 9.1 Difference of seasonal (October-April) total evaporation (**E**), precipitation (**P**), and precipitation minus evaporation (**P-E**) between the future (2075 to 2099) and current (1979 to 2007) time periods in the 20-km global super high-resolution runs. Dashed contour lines indicate the negative changes, i.e. reduction in the future. The measurement is mm/season. (The figures follow Jin et al. 2010)

The center of the evaporation's increases in the eastern Mediterranean is located along the northern boundary with the magnitude of 150–200 mm. A slight increasing of evaporation over the Fertile Crescent can also be seen. A dramatic decreasing of evaporation is found over the Sinai Peninsula, Israel, and Jordan, with the maximum value exceeding 100 mm/season.

The precipitation differences show that the precipitation (P) of the entire eastern Mediterranean is decreasing with an average value of over 100 mm/season, with maximum precipitation decrease over the northern and eastern coastline areas of the eastern Mediterranean at a magnitude of above 250 mm/season (Fig. 9.1). The western part of Turkey and most part of the Fertile Crescent are also projected to be drier, as reported also by Kitoh et al. (2008a). Figure 9.1 suggests that the eastern coastline countries, i.e. Israel, Lebanon, and the western part of Syria will become much drier in the future by about 200 mm/season. On the other hand, a precipitation increase belt is found at the most easterly part of research region, including the eastern part of Iraq and western part of Iran. A potential explanation for the precipitation increases is perhaps due to the fact that the increasing evaporation over the surrounding region generates more local-source moisture that becomes available over this area.

The total moisture budget represented by the precipitation minus the evaporation, P-E shows that the Red Sea and the Persian Gulf region will have a moisture deficit due to the increased evaporation in the future in spite of no change of precipitation over these areas (Fig. 9.1). This is an important result that is ignored in some studies that focus only on the rainfall changes. A completed Fertile Crescent strip is even clearer than that of the precipitation difference chart in further emphasizing the drying tendency in the future of this region.

9.3.2 *Change of River Discharge Over the Mediterranean Region*

In order to obtain a more complete picture of the water cycle budget for the Mediterranean region, it is necessary to examine the projected changes of the river discharges, though it has a close relation with the precipitation regime especially for those main rivers flowing into the Mediterranean Sea.

Figure 9.2 shows the changes in the runoff of the land precipitation and the changes in the river flow rates between future (2075 to 2099) and current (1979 to 2007) periods based on the MRI river model (Jin et al. 2010). Figure 9.2 shows a clear decrease of the runoff over the continent of the north Mediterranean region with a mean value of about $-10 \text{ m}^3/\text{s}$, which is primarily as a result of the decreasing precipitation over the region that was simulated by the 20-km model. As a consequence, the flow rates of most of the rivers in this area are decreasing (Fig. 9.2). It is interesting to note that the river model shows that the Nile River is increasing its flow rate in the future. This is probably due to the tropical area projected to be wetter as suggested by some studies, which is discussed also by Kitoh et al. (2008a).

In the moderate climate change run of Kitoh et al. (2008a), (future moderate, i.e., FM run), the projected decrease in precipitation is concentrated in the Mediterranean

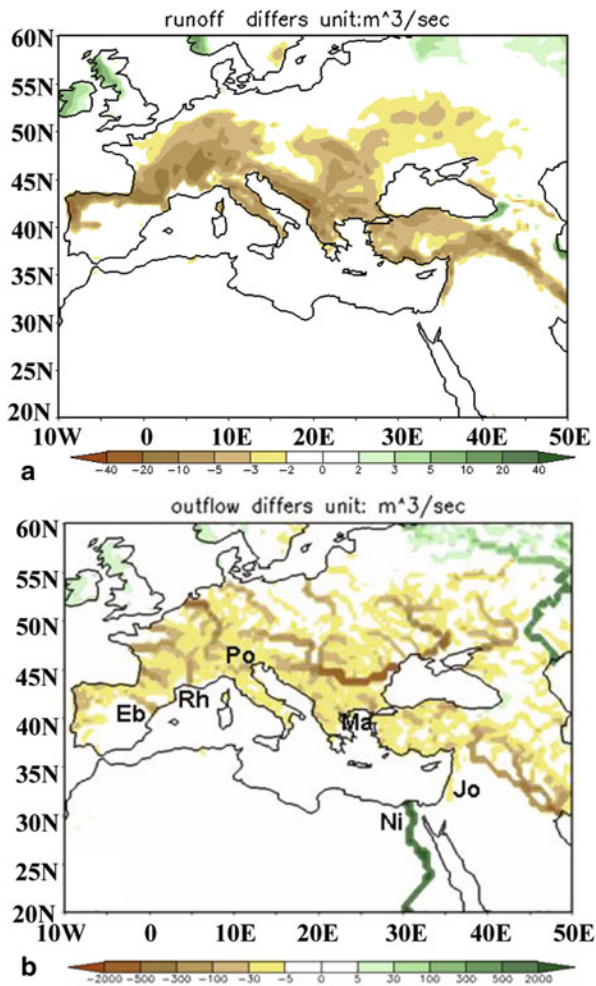


Fig. 9.2 Changes of runoff and river discharge by 2075–2099 as compared to 1979–2007 in terms of (a) runoff (b) river discharge. The six rivers are marked as Ebro (*Eb*), Rhone (*Rh*), Po (*Po*), Maritsa, Jordan (*Jo*), and Nile (*Ni*)

Sea and coastal areas of Southern Turkey, Syria, Lebanon, and Israel. This decrease in precipitation is mainly projected in the winter and spring. Annual precipitation is projected to increase in the future over the Caucasus Mountains and the gulf coastal region. This increase in precipitation is projected mainly in fall, thus detailed investigation is needed to clarify regional differences between the projected precipitation changes.

At the end of the twenty-first century, evaporation generally increases. Therefore, even in the areas where precipitation increases, an increase in evaporation may overcompensate for the increase in precipitation, leading to decreased surface runoff.

For this reason, trends in the stream flow are not always the same as that of the precipitation. Using the monthly runoff, simulated stream flow is calculated at 0.5-degree by 0.5-degree grids.

Figure 9.2 illustrates the simulated annual mean stream flow changes in the future. It shows that the stream flow decreases in most of rivers in the East Mediterranean region and increases in the Nile River and the Caucasus Mountain region. It also clearly illustrates that the annual stream flow is projected to decrease in the future in all rivers over the Middle East. Kitoh et al. (2008a) show that the annual discharge for the Euphrates River will decrease by 29 % in a moderate climate change and by 73 % in the higher climate change (FM & FH respectively there). In both runs, the decrease is largest during the high-water season. Percentage decrease in river discharge is larger at the Ceyhan River region in Turkey where the FM run projects 39 % decrease and the FH run projects 88 % decrease. Along this river, tremendous decreases in stream flow accompanied with greater warming demands a thorough countermeasure against agricultural and other uses of water in this southeast Turkey region. The situation is much worse in Jordan. Although uncertainty in projections is large in such a small drainage area, the modest warming case of the FM run projects an 82 % decrease. The high warming (and less precipitation) case (FH) projects that the stream flow will almost disappear throughout the year (98 % decrease). Since the water of the Jordan River is already a matter for high tension and conflict for the bordering countries (Alpert 2004), attention to this region is indispensable.

To further investigate the change of river discharge, several large rivers flowing into the Mediterranean Sea were selected (following Mariotti et al. 2008). The rivers' names and the countries where the estuaries are located are as follows: Ebro in Spain, Rhone in France, Po in Italy, Maritsa in Turkey, and the Nile River in Egypt, respectively. In addition, the Jordan River, as the only river that does not flow into the Mediterranean, was also selected in order to examine its change of flow rate and potential influence at the estuary of the Dead Sea. The reason for doing this is that the Jordan River is not only the main water resource for some countries in the East Mediterranean, but also it has significant influence to the water balance of Dead Sea and plays a special role on life in this sensitive region.

Figure 9.3, following Jin et al. (2010), shows that except for the Nile River, a decreasing trend of monthly mean river discharges is found in the future. As can be seen in Table 9.1, a most dramatic decrease of river discharge is found for the rivers Ebro, Maritsa, and the Jordan River, as projected by the model. The decrease of discharge for the East Mediterranean rivers Maritsa and the Jordan River is particularly large, i.e., even over a half as compared to the current rate.

It should be mentioned that, compared to the observed data, the current simulation of the river discharge from the river model shows similar fluctuation patterns from month to month. For instance, the Ebro River has a peak in March/April and minimum in July/August. However, the results from the river model underestimate the flow rate by a factor of two compared with the observed data, except for the Nile River where the deviation is much larger. Possible explanations for this deviation might be due to the simplified river model, which relies on the estimation of the runoff and the still relatively coarse spatial resolution of the river model. This flow deviation can be reduced to some degree when we focus on the difference of the river discharge

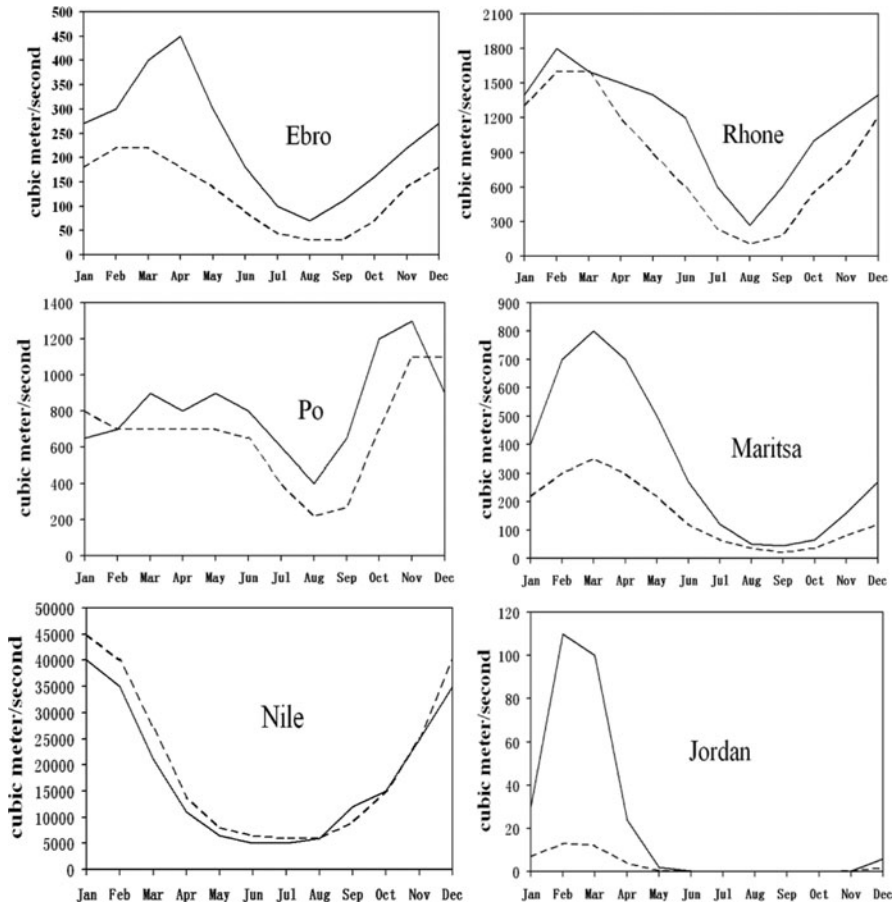


Fig. 9.3 Changes in monthly mean river discharge of six rivers by 1979–2009 compare to 2075–2099. Except to the Jordan River, all of the rivers flow into the Mediterranean. *Bold* lines are for current climate while *dashed* lines represent the future. (Jin 2011; Jin et al. 2010)

between the future and the current. An increasing trend of discharge with the value of about $2090 \text{ m}^3/\text{s}$ was calculated only for the Nile. It should be also noted that the river model does not take into account any anthropogenic influences into the model consideration. Therefore, there are additional discrepancies for the river discharge between the model and observed result. For example, the river discharge for the Nile from the model is much higher than the observed data due to the huge Aswan dam that was constructed across the river in Egypt (Kitoh et al. 2008b). In addition, the Nile is the largest river that flows into the Mediterranean, and it has a crucial role in the balance of the river discharges in the region. However, as the model showed, the absolute value of increasing discharge from the Nile River only is larger than the sum of all decreasing discharges from the other four rivers. Hence, it may seem that an overall surplus of river discharge was projected by this analysis. But we should keep in mind that, except the model errors mentioned above, there are still numerous

Table 9.1 Changes in annual average discharge rates for large rivers that flow into the Mediterranean sea

River feeding the Mediterranean sea	Decreasing magnitude of discharge rates (m ³ /s)	Percent of discharge reduction (%)
Ebro	108	46
Rhone	307	26
Po	146	18
Maritsa	184	54
Jordan	19	85

small rivers (over 20) over the European continent and isolated islands that flow into the Mediterranean, and all of those rivers were projected to have a decrease in their discharge (Fig. 9.2). The Mariotti et al. (2008) study also showed similar decreases of river discharges for some rivers based on the observed data. Therefore, a future water deficit is probably projected in the future over the Mediterranean. Moreover, researches have shown that the salinity of the Mediterranean is increasing steadily from the observed data even in the recent decades (Millot et al. 2006). These results might be due to the combined effect of decreasing of precipitation, increasing of evaporation, and the deficit water discharge in the Mediterranean region.

9.4 Discussion

This study clearly shows that the super-high resolution model simulates orographic rainfall very well. The 20-km mesh AGCM reproduces a regional maxima of rainfall along the coastal regions of the East Mediterranean and the Black Sea as well as along the south coast of the Caspian Sea. Lower resolution models used in climate projection studies, such as in Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment report, show much smoother maximum of precipitation over the Caucasus Mountains (IPCC 2007). Precipitation over the Fertile Crescent region is also well reproduced by the 20-km mesh AGCM, with the local maxima of orographic rainfall along the Zagros Mountains (also in comparison to a new high resolution observed database over the Mid-East, Yatagai et al. 2008). Projected changes in precipitation also differ qualitatively between the 20-km mesh model and the lower resolution models. The run shows increased precipitation over the Caucasus Mountains and some parts of Gulf Coast states. These differences in precipitation resulted in stream flow changes in these regions. The current climate model projects decreasing precipitation in the Fertile Crescent region. Changes in stream flow will become more severe, which may result in substantial damage to rain-fed agriculture in the Mesopotamia area. Ancient rain-fed agriculture enabled the civilizations to thrive in the Fertile Crescent region, but this blessing is soon to disappear due to human-induced climate change. The fate of people in this politically vulnerable region depends on global management of the limited available water. Countermeasures have been planned for a long time, and global climate models that sufficiently represent the Fertile Crescent and project its future change can now be utilized for such purposes.

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Chapter 10

The Future of the Middle East

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Abstract The Middle East is a region of diverse cultures, political systems, economies, historical experiences, and international alliances regardless of the monolithic view of the region from the outside. These differences become real sources of division and conflict within as well as among the nations in the region. The level of economic and social development in the region varies from country to country. The countries have a political geography that is a product of the colonial period, and authoritarian governments that have done little to improve the living standards in the region or develop a just political system. The regimes have tried to isolate their peoples, frame the outside world, and put great pressure on any organized group that has the potential challenge to undermine their position. A number of these countries have some of the most repressive regimes in the world. The uneven distribution of wealth and resources is a major social, political, and economic problem. People in the region want change and began to push for it. However, the Middle East has not been and is not totally isolated. It is part of a global system of markets, media, and migrations. Also, diverse religious, ethnic, and political groups ask for recognition, access to resources, and a fair representation. As a result, things are beginning to change and even more radical changes in social, political, and economic orders are underway in the region. The effects of climate change, such as falling precipitation rates and rising temperatures, may have dramatic impacts on the life in the Middle East. The region's water scarcity, along with worsening water quality, rising sea levels, and increasing population, could have important negative impacts on agricultural production, health, and the nature. Thus, adaptive measures need to be taken to deal with the overuse of groundwater, alarming water scarcity, and contamination in the region.

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10.1 Introduction

In his book *Imagined Communities*, Benedict Anderson mentions an important concept called “print capitalism.” He argues that, with the invention of modern printing system, access to knowledge and information was no longer a privilege for large masses (Anderson 1991). Before print capitalism, only small, elite groups in most societies had the privilege of literacy and access to books and intellectual works. However, with the rise of print capitalism, many people from different segments of society gained access to information through the written word. As a result, Anderson concludes that print capitalism made the ability to circulate and transfer knowledge possible not only within but also among different societies. This resulted in many changes in the societies, including the transition from empires to nation states and from traditional economies to market economies (Anderson 1991). This meant radical transformations in the society and the government.

Similarly, we are in a period in which digital capitalism is transforming societies in many aspects. Different media outlets are altering the way people become informed about world matters and the way they socialize and entertain (Esarey 2011; Himelboim et al. 2012). Traditional media sources, such as newspapers, magazines, radio, and television, in addition to new media sources, such as the Internet and social media, have had dramatic impacts on societies, political systems, and the way people communicate. Above all, television has had one of the most dramatic impacts on large masses. While commercially available since the late 1920s, the television set has become an ordinary item in homes, businesses, and institutions (Cullity 2003; Mai 1998). Particularly since the 1970s, broadcast television has become a vehicle for advertising, a source of entertainment, and news. Especially with the introduction of satellite dishes and Internet TV, the impact of television has gone beyond national boundaries and social classes (Ebrahimpour and Sepehri 2011).

The impact of traditional media, including television, on cultures has been phenomenal. However, traditional media is generally capital intensive and often subject to strict governmental control. As a result, traditional media is either strictly monitored or controlled by those in power under authoritarian governments. On the other hand, in democratic societies, traditional media is under the control of a handful of wealthy businessmen as media production and delivery are costly businesses (Fahmy 2010; Franck 2003; Livingstone 2011). Therefore, often what is presented is not what is important, real, or useful. Many TV and radio channels, newspapers, and journals, under the pressure of ratings, deliver what is sensational and what makes money. As a result, this type of media does not cover lives and experiences of large masses if these lives and experiences do not include sensational stories that draw the viewers’ attention (Franck 2003). This is where the Internet and social media take over. Every life and story finds a place in the cyberspace.

Today, the Internet is transforming societies and changing the way in which the societies are functioned and governed. It is not only altering the nature of access to information, it is also democratizing access to them (Lloyd 2011). Without a central governing body, the Internet is a globally distributed network that comprises many

voluntarily interconnected autonomous networks. Therefore, no single government has authority over what is published or posted online. People can access the Internet from almost anywhere via mobile Internet devices, such as mobile phones, datacards, handheld game consoles, and cellular routers, in order to search for information, communicate with other people, and transfer data.

The Internet has been a place for entirely new forms of social interaction, activities, and organization. Social networking has become a new face of the Internet with the introduction of websites such as Facebook, Twitter, LinkedIn, and MySpace. These websites have transformed the ways people socialize and interact as they give the opportunity to users to add different information to pages, gather over common interests, and find existing associates (Anderson-Wilk 2009; Carpenter 2011). With the rise of social media, “ordinary” people have gained the power in the production and circulation of information as well as a means to represent themselves in the ways they desire. Governments and corporations have little control over this new media. Moreover, the circulation of information across the globe has become available everywhere. Therefore, no pristine society exists today. Every place is part of a system of places, and all places are tied together with the global rise of capitalism, its institutions, and digital media (Castells 2002). In many places, physical borders have become meaningless. As a result, societies from different cultures began to influence one another at large.

Recent events in the Middle East demonstrate that the Internet has achieved new relevance as a political tool (Saleh 2012). It has become a political activism tool for many groups in order to carry out their missions. Particularly, the role of social media in organizing protests among the Arab youth during the Arab Spring is something recognized by experts. Social media websites, such as Facebook and Twitter, helped people organize the political revolution in Egypt where it assisted certain classes of protesters in organizing protests, communicating grievances, and disseminating information (Howard and Parks 2012; Tufekci and Wilson 2012). Governments that believe the Internet is a threat to their authority have restricted access to it. For example, Iran, North Korea, Myanmar, the People’s Republic of China, and Saudi Arabia have limited and strictly monitor Internet access through software that filters domains and content.

The Middle Eastern countries, particularly the Arab World, have tried to isolate themselves from the changing global cultural and political developments. While dictatorships in different parts of the world collapsed during the last half of the 20th century, the Arab regimes mainly stayed untouched (Cory 2006; Tlili 2001). For example, Franco’s Spain or Mussolini’s Italy went through important democratic changes and became integrated in the European Union and the global system. Similar changes took place in other parts of Europe after World War II. Many Latin American countries ended their dictatorships by dismantling their military regimes. Finally, changes in the former Soviet Bloc countries did not seem to have much impact on the democratically poor Arab states. Hosni Mubarak, Saddam Hussein, and Hafiz Assad and his son Bashar al-Assad ruled their countries for decades without any internal challenges. Similar things could be said about countries such as Saudi Arabia, Libya, Tunisia, Algeria, and other Arab states.

However, things seem to be changing. With the occurrence of the Arab Spring, all the nondemocratic Arab state leaders now feel threatened. The Arab Spring began in Tunisia with President Ben Ali leaving the county. It did not take long for the movement to spread to neighboring countries such as Libya and Egypt. In a very short time, the Arab Spring affected all of the Arab States (Ottaway and Hamzawy 2011). Leaders ruling these countries either resisted the public and international pressure or left their offices with or without a fight. Today, most Arab states are undergoing important transitions. This began with young people organizing in cyberspace through media such as Facebook and Twitter and then invading the streets. Of course, these movements cannot be reduced only being due to the use of social media (Saleh 2012). Years of oppression have already created a sense of alienation and hatred against these oppressive regimes (Warf 2011). However, social media and the Internet supplied new methods of communication for large masses. This created a new sense of power for the long excluded masses. While it differs from place to place, the Arab Spring movements have received an important degree of international support. While a change is underway in many of the Arab states, the direction and nature of this change are not clear (Mamadouh 2011). Some believe that the Western powers are behind these revolutions in order to support a true democracy. Others believe that this is just the beginning of a long democratic process, and it will definitely result in the overthrow of the oppressive regimes and the creation of democratic regimes in the region (Teti 2011).

10.2 Diversity and Change

Regardless of the suspicions that the new movements in the Middle East will not result in true democracies, it is a fact that social and political changes seem to be inevitable. Globalization and capitalism have linked the region to the rest of the world as they did in any other region. Global markets, migrations, and media not only link the region to the rest of the world, but also transform it socially, politically, and economically (Appadurai 1998; Giddens 2000). Many see this process of change as the end of all the dictatorships and the beginning of establishing new systems in the region (Bush 2012). However, how this change will take place and what its results are big questions. Different models are debated in academic and political circles. Some believe that this process will result in new Islamic governments, which may later result in religious radicalism in the region. Therefore, movements, such as the Muslim Brothers in Egypt, are viewed with great suspicion. Some even think that Al-Qaida types of radical movements will gain power. Others believe that the process is not going to be democratic as big powers behind the scenes will replace new puppets and continue their control over the region and its natural resources (Dupont and Passy 2012).

Social, cultural, political, and economic changes show that the Middle East is in an important historical process. First of all, the demand for more democracy is not something that can be stopped. People in the region are thirsty for democracy.

According to the democracy index prepared by the Economist Intelligence Unit in 2010, the Middle East is the most repressive region in the world. There are 20 countries in this region, and 16 of them are categorized as authoritarian (Economist 2010). The region, with its average 3.43 democracy average index, has the lowest average democracy in the world, which is even worse than Sub-Saharan Africa. No country, including Israel and Turkey, meet the criteria to be considered as a full democracy. Even Israel is categorized as a flawed democracy. Four countries (Turkey, Iraq, Lebanon, and the Palestinian Territories) are categorized as hybrid regimes. The other 16 countries are categorized as authoritarian regimes. According to the Index, the best-ranked countries are Israel (37), Lebanon (86), and Turkey (89). As a result, an overwhelming number of Middle Eastern countries are identified as repressive regimes (Economist 2010). The vast majority of the governments continue to restrict political freedoms. For example, all the Gulf States except Bahrain do not allow political organizations. Regardless of some political reforms, such as the establishment of representative assemblies in Oman, Qatar, and the UAE and the return of an elected parliament in Bahrain, the political systems still widely remain as authoritarian. The executive branch is unaccountable to anyone and dominates the political, economic, and social life in most of the countries.

Many governments in the region use enormous oil rents to sustain their autocratic rule. Rulers often finance far-reaching patronage networks and security apparatuses to sustain their privileged status. Since the regimes do not collect taxes from the public, they have almost no accountability. As a result, the civil society is very weak, and the social dynamics are not strong enough to overthrow the authoritarian regimes and strengthen democracy in the region (Bruckner et al. 2012; Economist 2010; Tsui 2011).

Moreover, the region has one of the lowest educational attainment levels in the world (Buckner 2011). These figures are more dramatic for women. Some of the countries, such as Yemen, have one of the lowest educational levels for women in the whole world (Yazdani and Williams 2010). However, it is widely accepted that education is a very important tool for the empowerment of individuals, particularly women in a society. Low educational levels result in the entrapment of large masses in poverty and under authoritarian political systems. However, as the Arab Spring has shown, in the age of information technologies and globalization, this is not a sustainable condition. People in the region are definitely demanding a new political order. This means a shift in the power both domestically and internationally. It is evident in the literature that the authoritarian regimes in the region could have not survived without the support of international powers such as the United States, Europe, Russia, and China (Haynes 2008; MacKenzie 2012; Perthes 2011). These powers place a great deal of importance on the flow of petroleum to their countries and do not want to risk the status quo in the region. For years, either the United States and Europe or countries such as Russia and China have supported these authoritarian regimes (Aslaksen 2010). Even today, the uprisings in Syria are contained with the political and military assistance of Russia, Iran, and China. The international community has not taken any serious action against the Assad regime in Syria regardless of thousands of killings, including children and women. The opposition groups in

Syria have fought against military forces equipped with heavy arms, airplanes, and tanks. People are trapped in vicious cycle of violence and oppression, and there is no easy way out.

However, is it possible to sustain such violence and oppression? All the regional and global dynamics show that the Assad regime will not continue to enjoy its unchallenged repressive ruling. With globalization and information technologies, it is quite difficult to maintain control over large alienated masses. New regional and global powers are emerging and old ways of doing business do not provide the same results (Ehteshami and Elik 2011; Sharbrough 2012). Societies and economies are part of a global system, and it is quite difficult to remain pristine. Therefore, democracy is knocking on the doors of the oil-rich Gulf States as well as regimes hiding behind religious rhetoric and legitimacy for maintaining their status and power. Men and women in the region demand a fair distribution of wealth and resources, access to basic human rights and services, and participation in the decision-making process (Warf 2011). Many dictators in the Middle East have already fallen. A similar process is underway in the rest of the region, and the future of authoritarian regimes is quite bleak.

However, the demands for democracy and equality may not be in the same form that was experienced in the West. First of all, cultural differences require different models of democracy and government structure. Many Muslims believe that democracy and political participation are inherently Islamic because the Surah tradition in Islam requires consultation and participation in the decision-making process (Opwis 2003; Shavit 2010). The life of the Prophet Mohammed is given as an example in terms of how he consulted with his people and how his successors were elected to rule. However, this does not mean the region will see a replication of the Western democratic and parliamentary systems. Particularly, the role of Islam in the government is a hotly debated issue. Therefore, secularism or the role of religion in the government is a concept that many people in Muslim states have not agreed on. While some believe that religion should be an important aspect in the government, others offer Western secularism as a solution for multicultural and multi-religious Muslim countries (Yavuz 2009).

The Middle East is place of contrasts in many aspects. The economies in the region range from poverty-filled countries to extremely wealthy oil-producing nations. Qatar, the United Arab Emirates, and Kuwait are countries with the highest per capita income while Yemen and the autonomous Palestinian Authority of Gaza and the West Bank have the lowest per capita income levels. Turkey has the largest economy with almost 800 billion dollars GDP followed by Saudi Arabia (around 500 billion dollars) and Iran (around 400 billion dollars). However, the distribution of the wealth in these countries is quite uneven and the status of women in the economic and social life is problematic in many of the countries. The lack of diversity in the economies is an important disadvantage. Particularly, oil-rich Gulf States are heavily dependent on the export of oil and oil-related products. Therefore, the future of their economies is blurred and quite uncertain. Turkey, Israel, Egypt, and Cyprus have more diverse economies as their exports vary from textiles, auto production,

and defense equipment to agriculture and tourism. UAE and Bahrain are also important places for banking along with the production and export of oil and oil-related products.

The region has one of the highest unemployment rates in the world. According to the International Labor Organization, the unemployment rate among young people ages 15–29 is 30% of total population in the region. The total unemployment in the region is 13.2%. The countries with highest unemployment rates among the youth are Syria (73%) and Morocco (37%). The Human Development Index (HDI) among the Arab States is one of the lowest (0.641) in the world after Sub-Saharan Africa (0.463) and South Asia (0.548). This is below the global average of 0.682. The Gender Inequality Index (GII) is 0.563, which is significantly below Latin America, the Caribbean (0.445), and Central Asia (0.311). Israel has the highest HDI, with a figure of 0.886, followed by United Arab Emirates (0.846) and Qatar (0.831) (UNDP 2011). Saudi Arabia's HDI is 0.770, Iran's is 0.707, and Turkey's is 0.699. In terms of GII, Turkey has a figure of 0.443, Iran 0.485, and Saudi Arabia 0.646. As it can be seen from the figures, although Saudi Arabia and Iran have higher HDIs than Turkey, they have higher GIIs as well. Therefore, the Arab States have one of the highest GIIs in the world regardless of high per capita GDPs in the Gulf States (UNDP 2011).

The future of the economy in the Middle East is not clear. Israel is the most developed economy in the region. However, the long-standing, unresolved political conflict with the Palestinians and the social and political shifts within the region creates a problematic context and often results in isolation for the economy of Israel (Dalacoura 2012; Spyer 2008). The Arab regimes are undergoing important changes, which has started to cause radical shifts in power relations and political structures within the region. Dictators such as Saddam Hussein, Muammar Kaddafi, and Hosni Mubarak are gone. New political power groups are rising in the region, and these events have important economic implications. The skewed distribution of wealth and low incomes has always been a major obstacle in the region (UNDP 2011). With the fall of the dictators, the future economies are very dependent on the structures of the new regimes and their economic policies. Many of these countries face civil war, and whether the political stability in the region will be achieved or not is a big question (Falah 2011). Without political stability, no one can expect economic prosperity and a fair share of wealth. The regimes with rich oil reserves are not safe anymore if the social and political movements spread in their territories. Civil liberties and the equality of men and women are still problematic issues in countries such as Saudi Arabia, Kuwait, and Bahrain (UNDP 2011). Although these countries have high average income levels, the unfair distribution of the wealth holds important risks for the future of these regimes. They cannot be sustainable unless they widen their democratic standards and create an inclusive system for all. Syria has one of the highest unemployment rates in the world, and the regime of Baser Asad can be overthrown any day. The status of minorities holds potential risks for countries such as Turkey, Iraq, Syria, Iran, and Lebanon (Fox et al. 2009; Nisan 2002).

Turkey has turned its face to the West since its foundation in 1923. It has a parliamentary system and holds free elections. It has limited the role of military in politics and increased its democratic standards in the process of accession to the

European Union (Gursoy 2011; Satana 2008). The economic development in the country has been followed by others in the region and globally. It has one of the fastest growing economies in the world and is expected to be one of the largest 10 economies in the world in 10 or 15 years. However, the status of minorities, particularly the Kurds, is challenging. Turkey has not turned its republic into a true democracy (Bruni 2003). If the rise of nationalism among the Kurds is not responded to with democratic initiatives, Turkey may face very dramatic political, social, and economic problems.

10.3 Struggle for Power

The Middle East is home to very different cultural traditions, ethnicities, religious affiliations, and economies. These differences can be real sources of division, conflict, and struggle within as well as among nations in the region. Such divisions and conflicts have important implications for the future of the Middle East. The results of these conflicts, divisions, and tensions will determine the cultural, political, and social geography of the region. First of all, the region is ethnically divided among large ethnic groups such as Arabs, Turks, and Persians. Ethnic minority groups, such as Kurds, Assyrians, Berbers, and many others, are also part of the historical heritage of the region (McCarthy 1983). Therefore, tension among these groups often forms along ethnic and religious lines. Arabs, Turks, and Persians have served as dominant ethnic groups and have a long history of statehood and dominance. As a result, the real competition has mainly been among these three ethnic groups.

Second, religious differences are another important source of tension and struggle. Such religious differences have caused issues not only between Muslims and non-Muslims in the region but also led to division among Muslim religious sects such as the Sunnis and the Shiites. The divisions among religious sects created historical hostilities. Particularly, the tensions between the Shiite and Sunnis often resulted in wars (Bleek and Stein 2012).

The third source of tension in the region is the rise of new nationalisms, such as Kurdish nationalism (Taspinar 2004). Nation states with sizable Kurdish populations have mainly ignored the cultural and political rights of the Kurds. The Kurds have gained a great deal of autonomy in Iraq with the support of the international community, particularly the United States. The Kurdish Workers Party (PKK) in Turkey has participated a war against Turkey for more than 30 years. Similar insurgents take place in Iran and partially in Syria as well. Other countries in the region with different ethnic and religious groups also face these same important internal conflicts.

The final source of tension in the region has been between Israel and the Muslim states. When Israel was founded in 1948, it caused a large reaction from the Muslim Arab and non-Arab states. Chiefly, there have been wars and serious political tensions between the Arab states and Israel. With the support of the United States and Europe, Israel, was able to expand its land from its original size in 1948 to gain control over much of Palestine. The Palestinian question not only consumed much of the Arab

psyche, but it also became an international problem with quite diverse participants (Spyer 2008).

For a long time, Turkey was used as a model for Muslim countries in terms of living with the Islamic religion and democracy at the same time. It argued that although the vast majority of the country is Muslim, it has created a successful experience of the parliamentary system and sustainable relations with the West. The idea of presenting Turkey as a model for Muslim democracy is not new. However, after the Arab spring, this has been more widely debated. Particularly since the Turkish Prime Minister Recep Tayyip Erdogan had his Justice and Development Party (or AK Party in its Turkish short name) begin to rule the country in 2002, Turkey's star in the Arab world began to shine (Aydın-Düzgüt 2012). While Recep Tayyip Erdogan was an important figure in the more Islamic oriented Welfare Party of Necmettin Erbakan, he has always put great emphasis on Turkey's relations with the West and particularly with the EU. His administration has strongly worked toward Turkey's EU membership although some of EU countries have never been interested in including Turkey in EU as a member. Turkey's reforms for EU membership have transformed the political system in the country and resulted in important power shifts. Erdogan has increased his public support in the last three elections regardless of the efforts of the establishment to stop him. The success in economic growth has let him to implement reforms in other areas such as the judiciary system. A new group of businessmen and new media outlets have come on the scene and supported Erdogan's administration. All these resulted in a reduction in the power of the establishment, particularly in the military and judiciary sectors (Heper and dot 2005). The changes gave Erdogan a greater power to implement new policies and widen his influence across Turkish borders.

The success in the economy and the increasing democracy showed its effects in Turkey's international relations. The government began to play a more proactive role in the international arena. It tried to end long-standing hostilities with its neighbors. The "zero problems with neighbors" policy created by Erdogan's foreign minister Ahmet Davutoglu has been partially successful. Turkey began to discover its soft power in the region as a result of its historical and cultural ties in the region (Ehteshami and Elik 2011). As the time passed, Erdogan's popularity became more evident. Especially, his special attention to the Palestinian question and his harsh criticism of Israel made him a hero in the Arab streets. Turkey established close relations with Syria and opened talks with Armenia. It tried to moderate the relation between Syria and Israel. Government leaders initiated talks with Saddam Hussein before the American invasion of Iraq. In the nuclear crises with Iran, Turkey was again a moderator along with Brazil to solve the problem peacefully. With its new strategy, the government began to lift visas with many states including Syria.

While this all occurred before the Arab spring, Erdogan gained an important degree of popularity in the Arab streets. However, Turkey's popularity in the region did not end after the Arab spring. Turkey did its best to push Arab leaders to reform their political systems. It initiated talks with Arab leaders, such as Kaddafi and Esad, for peaceful transitions in the governments. Particularly, Erdogan's visit to Egypt, Libya, and Tunisia in 2011 was a big event. He positioned himself on the side of the Arab public and supported the opposition groups. It is ironic to mention

that Erdogan, a leader who was accused of being a threat to secularism in Turkey, stressed the importance of secularism during his trip to the Arab states in North Africa. He did this in Egypt where Muslim Brothers are an important social and political power. In fact, it is important to note that this was not a position unique to Erdogan, as Turkish president Abdullah Gul also gave similar messages in his daily briefings and talks to Arab leaders. So it is fair that the new Turkish political leaders, with a political background in the conservative Welfare Party, have come to think that Turkey's relations with the West and its secular system are important strategic assets. Therefore, for last couple of the years, they have advised Arab leaders to democratize their systems to be become larger participants in the global arena.

Turkey's economic success, efforts to establish a strong democracy, and confidence in the international affairs attracted many in the Arab world to examine the reasons behind such advances (Tosun and Yilmaz 2010). Some opposition leaders in the Arab countries during the Arab Spring indicated that they saw the AK Party and its way of governing as an example for their own governments. Turkish government hosted several opposition leaders meetings and initiated talks between different groups. It has mainly established itself as an important moderator for such activities. What Turkey basically promotes is that it is a Muslim country with a democracy and a successful economy, and it has close ties with the West. This attracts many in the Arab World and gives Turkey an important opportunity to play leadership role in the future.

The influence of Turkey is not limited to the political arena. It also has an important cultural influence in the region. Turkish television series are broadcasted throughout the region, and many Arab tourists prefer to have their holidays in Turkey. Also, the country began to open the doors of its universities to neighboring countries. As the regimes in the region loosen, new opportunities are opened for cultural exchanges, economic cooperation, and political alliances. Therefore, Turkey has the potential to be an influential power in the region.

However, it is important to state that Turkey did not achieve its success overnight. First of all, Turkey has never experienced formal colonization. It has worked with a parliamentary system for almost a century and made important reforms in its political system since it was founded in 1923. After years of military influence in the political system, Turkey has widen its democratic standards and improved its legal system. Therefore, the Turkish model is not something that can be easily transferred and implemented. However, when one looks at this system, he or she must also consider the cultural and social change that shaped Turkey. The country is unique to its own experiences and context. Although it is Muslim oriented, it has gone through an important westernization process and is now a candidate for the EU. What we are trying to say here is that the Turkish model is not just a result of its internal dynamics, but also due to its external dynamics (Abramowitz 2003; Gursoy 2011). Turkey's membership process for the EU helped it to reform its legal and political system. Therefore, the model is a product of important domestic and international dynamics along with its unique historical and social legacy.

Another important power in the region is Iran (Bleek and Stein 2012). With its rich petroleum reserves, this country is an important economic and political power in the region. It also has a very rich cultural and historical heritage, and it has increased

its cultural influence since the Islamic revolution in 1979 (Arjomand 2009). The dominant religious sect in the country is Shiite, which is a more political sect of Islam and has often been considered outside of mainstream Islam. The historical struggles between the Shiites and Sunnis are critical to regional dynamics and sources of conflict. One of the crucial results of the American invasion of Iraq was the increasing Shiite influence in the region. About 60 % of Iraq is Shiite, and they were suppressed under Saddam Hussein's rule for a few decades. However, with the American invasion, the Shiites came to power in Iraq and developed close relations with Iran. Today, the current prime minister of Iraq, Nouri al-Maliki is Shiite and follows a policy of eliminating Sunni Arabs from the administration.

The wars between the Ottoman Empire and Iranian states created a sense of distrust between the Shiites and the Sunnis (Sohrabi 1995). When Shah Ismail established the Safavid state, he organized Shiite preachers to convert members of the Turkish tribes under the Ottoman rule regardless of the warnings from the Ottoman sultan. Also, when the Ottoman Empire was expanding into Europe, the Safavids attacked eastern Ottoman lands. Therefore, the Ottoman Sultan, Yavuz Sultan Selim, did not tolerate this. He prepared an army to stop Shiite religious activities and their expansions in eastern lands of the Ottoman Empire. The battle of Chaldiran, near Tabriz, resulted in the victory of the Ottomans. However, when the Ottomans left the area to expand westward, Shah Ismail once again took over the region, including the city of Tabriz with the support of his European allies who were not fond of the Ottoman Empire. It is important to note that the battle of Chaldiran is not just a war between the Ottoman Empire and Safavids, it was also a power struggle between Sunnis and Shiites (Sohrabi 1995).

The power struggle between Sunni Turks and Shiite Iranians left important marks on the collective memories of both groups. Therefore, even today, a great deal of distrust and a harsh political and cultural power struggle between Sunni Turks and Shiite Persians continues. This struggle has become more evident after the United States left Iraq in 2011 and the Arab Spring hit Syria, where there is a minority 10–12 % Shiite group (Nusayries) ruling the majority Sunni group. Iran has expanded its power into Iraq and supported Basar al-Asad in Syria regardless of the human rights violations and thousands of deaths. This also created new tension between Turkey and Iran, who have had rather close relations in last few years during the Tayyip Erdogan administration. However, recent events resulted in important collapses between these two countries. Turkey began to align with the Sunni Kurds and Arabs without cutting its ties with Iran. Iran and Maliki, the Shiite leader of Iraq, have harshly criticized Turkish foreign policy toward Syria and Turkey's support for the Arab Sunni leader, the former vice prime minister of Iraq and now a refugee in Turkey.

Sunni Arabs are also not fond of Shiites and the expansion of Iran in the region. Two things are important for the formation of Arab identities in the region: Sunni Islam and Arab ethnicity. Sunni Islam, the dominant sect of Islam among the Arabs, is an identity that distinguishes Sunni Arabs from non-Muslims and Shiites. Arab ethnicity is a source of cultural difference against other Sunni Muslim groups, such as Turks. It is also important to note that although the vast majority of Arabs are

Sunni, Arabs in Saudi Arabia have developed a new sect called Wahhabism. As a result, Saudi Arabia has tried to spread this sect of Islam in different parts of the world, including the Middle East. Therefore, when Iran increases its influence in the region, Sunni Arabs tend to align with other Sunni groups such as the Turks. However, this does not mean that they have developed close ties with Turkey. In fact, there is a great deal of uneasiness among Arab leaders about the rise of Turkey as a regional power. In such cases, Arab ethnicity becomes an important instrument for use in political power struggles, and Turkey is often left out in the coalitions among the Arab states. Traditionally, Saudi Arabia and Egypt have served as important political powers among the Arab states due to their economic power and the size of the populations. Sunni Arabs continue to be an important participant in the political struggles in the region.

10.4 Struggle for Energy

British Petroleum published a report about energy trends based on data collected in 2011. According to the report, proven global oil reserves are 1652.6 billion barrels, sufficient to meet about 55 years of global production. The Middle East region holds 48.1 % of the global reserves and produces 32.6 % of global production. It consumes only 9.1 % of world production as it exports much of its product (BP 2012). As a result, the region continues to be a major source of energy in the world. According to the report, similarly, proven natural gas reserves are sufficient to meet around 64 years of production. With 38.4 % of the world's total reserves, the Middle East still holds the largest reserves. The region's total production is 16 % of total global production while it consumes 12.5 % of global production (BP 2012). These figures show that the position of the Middle East as an oil and natural gas producer and exporter is not something that will change in a short period of time. The concentration of so much of the world's hydrocarbons in this geographic location means that as long as the modern economy depends on oil and natural gas, the Middle East will play a key role in global politics and the economy.

The data provided by British Petroleum Company indicates that global energy demand will continue to grow over the next 20 years as a result of the economic and population growth, particularly in less developed regions of the world. The increase in global energy is expected to be 39 % by 2030. Fossil fuels will continue to dominate the global energy supply with 81 % of total demand by 2030 (BP 2012). However, it is important to note that increased energy efficiency and strong growth for renewable energy sources are also forecasted. The expectation is that we will see a period with more gas and renewable resources use at the expense of oil.

According to the report, petroleum, as the leading fuel in the world today, will continue to lose market shares by 2030. However, the demand for hydrocarbon liquids will not drop. It will increase 18 % from 2010, which means the need for oil will continue. As a result, a heavy reliance on higher oil exports from the Middle East are not something that can be overcome easily (BP 2012).

Having important reserves is critical for a country, but it has disadvantages as well. For example, some experts, such as Ross (2001), claim that oil or other mineral resources, in cases where they account for the large part of the country's income, can be a major obstacle for democracy. Ross (2001) claims that the oil-impedes-democracy claim is both valid and statistically robust. In other words, oil hurts democracy. Moreover, oil does greater damage to democracy in poor states than in rich ones, and a given rise in oil exports will do more harm in oil-poor states than in oil-rich ones. Hence, oil inhibits democracy even when exports are relatively small, particularly in the poor states. Ross (2001) states that states with a large portion of their income coming from oil do not feel any accountability and do nothing for the development of democracy. Therefore, having important reserves of hydrocarbon fuels does not mean much if it does not accompany with other properties of human development. The income generated from oil export does not help the country to develop in a fully meaningful way (Ross 2001).

It seems that towards the end of this century and the next, oil and other fossil fuels will not play a significant role in the development efforts of countries because the reserves are not limitless. The oil-rich Middle Eastern regimes will not enjoy their privileged position over their natural resources. The internal dynamics for political change and the demand for a fair distribution of wealth will have dramatic impacts on the production of energy and distribution of the incomes generated from that production. Also, research on alternative energy sources and the limits to fossil fuels will have important impacts on the economies of the Middle East and the social and political order in the region. The struggle for change will have dramatic impacts on energy production and distribution of the income generated from those sources.

10.5 Climate Change and Scarcity of Water Resources in the Middle East

The Middle East is a predominantly arid region. The region receives one of the lowest rainfalls in the world and has very high evaporation rates (Gao and Giorgi 2008). This makes the region quite vulnerable to global climate changes and global warming. Most countries in North Africa and Arabian Peninsula face water shortage problems as a result of decreasing precipitation and rising temperature (Evans 2010).

According to the scholars (Allan 2001; Evans 2010; Sowers et al. 2011) studying global warming and its social impacts, the poorest countries and poorest populations around the globe will suffer the most from climate changes. The harmful effects are expected to be highest in vulnerable regions and less developed countries such as those in the Middle East. Based on the data on global climate change and the hydrological data on the quality of the water in the region, the Middle Eastern countries are very vulnerable to strong impacts on water resources (Sowers et al. 2011).

Climate changes coupled with rising water demands have a potential to intensify the water crisis in the Middle East. Different studies have also suggested that important reductions in precipitation in the region will occur. The predictions range from 10 to 30 % less rainfall. The figures from different studies show that there has been a significant reduction in the amount of precipitation in the Middle East already in the last five years. According to UNDP (2008), at least nine countries out of 14 in the region already have average per capita water availability below the water scarcity threshold. This means that the arid regime lands will substantially extend further and the scarcity of water resources throughout the Middle East will increase to critical levels. These reductions may have catastrophic effects on the water resources, agriculture, and the natural life in the region (UNDP 2008).

Syria, Lebanon, Palestine, and Israel are expected to be affected the most by declines in precipitation. When these decreases are coupled with an increase in the temperature, the effects will be amplified (Sowers et al. 2011). Studies about the climatic changes in the Middle East predict an increase in mean annual temperature up to 4.5 °C and a 25 % decline in mean annual precipitation by the end of the 21st century (Suppan et al. 2008).

Climate change often acts as a “threat multiplier” for vulnerable countries and populations according to Sowers et al. (2011). The water deficit in the region may have dramatic impacts agricultural production and fresh water use. The northern Levant is expected to have greater reductions in precipitation rates. Northern Israel, Lebanon, and Syria are expected to have worst effects. The position of Jordan is the most dramatic as the increases in temperature along with reduction in precipitation is expected to multiply the water scarcity in the country. Syria is also expected to have dramatic declines in its renewable water resources. Israel’s position is no better as the declining precipitation has had unprecedented effects in the country. The phenomenon of water scarcity is consistent with scientific observations of surface temperature increases in the Middle East (Suppan et al. 2008).

The vast majority of water is used in agricultural production, and 80 % of the water budget is used for agriculture in the Middle East. Therefore, the reallocation of water resources in the time of global warming and under conditions of water scarcity will be most probably at the expense of agriculture. Countries such as Yemen, Jordan, Israel, Syria, and Iran use more than 90 % of their water budget for agricultural production.

Thus, less available water will impact demographic growth. Many of the developing countries of the Middle East already face serious structural economic problems, corruption, bad governance, and environmental problems. The unequal distribution of resources and disparities in wealth are widespread (Allan 2001). Thus, these social and political problems in the region have the potent of becoming exacerbated when dwindling water resources are considered. Thus, the uneven distribution of wealth and resources in the Middle East make it difficult to generalize the water scarcity problem across the entire region. The oil-exporting countries, such as Saudi Arabia, Libya, the small states of the Persian Gulf, and Israel, are able to create new water resources by implementation of different methods such as desalination, reused

wastewater, and exploration of fossil groundwater to meet increasing demands (Sowers et al. 2011). Other countries in the region can be grouped in two categories: those with significant surface freshwater sources and those that rely on groundwater but do not have the means to capitalize those sources. Turkey, Egypt, Iran, Iraq, and Lebanon are the first group, while Jordan, Yemen, Tunisia, and Algeria are in the second group. Countries, such as Morocco and Syria, are based on both surface water and groundwater resources (Sowers et al. 2011).

Most governments concentrate their efforts and resources on large scale projects such as the construction of new dams, creating desalination facilities, working with inter-basin water transfers, and importing virtual water. However, there are still problems in the management of water demand, the efficiency of water use, the promotion of conservation and preservation (Allan 2003).

Governments in the region have withdrawn from quotas for various crop production and the setting crop prices. Some governments have also limited subsidies on some foodstuffs (Sowers et al. 2011). On the other hand, the increasing population and rising living standards put more pressure on agricultural production. Many farmers use mobile diesel pumps to directly access groundwater sources, which create another environmental problem. As a result, water resources are overexploited in countries such as Yemen, Jordan, Libya, and the Gaza Strip. Also, irrigation and drainage systems are inadequately maintained, which results in significant losses as the demand from a variety of users rapidly increases. Thus, it is quite likely that climate-related impacts on agriculture are going to be very significant (Sowers et al. 2011).

The rising temperatures often result in lower crop yields and are expected to shift cultivation patterns. According to studies conducted by Egyptian agronomists, most crops will need more water as a result of increasing temperatures and decreasing yields. Particularly, crops, such as maize, wheat, sorghum, barley, and rice, will be greatly affected by global warming and increasing temperatures. Experts expect important declines in crop yields if the temperatures rise. For example, if a two-degree average temperature increase takes place, the yields will decline 9–19 % (Eid et al. 2007).

Another expected problem is the degradation of the quality of irrigation water. Salinization is a widespread problem in the region. Certain places, such as Morocco, Israel, the Gaza Strip, the Jordan Valley, and the Mafraq and Azraq basins in Jordan, face serious salinization problems. As a result, experts expect severe reduction in the land suitability for vegetable and fruit tree cultivation in those regions (Conw 1996; GLOWA 2009).

The effects of a decline in precipitation and rising temperatures will not be limited to water scarcity for agriculture and daily use. The acceleration in the hydrological cycle has the potential to make droughts longer and rainfall events more variable and intense. This increases the possibilities of flooding and desertification (Sánchez et al. 2004).

To avoid these serious issues, countries in the region started considering serious and costly measures to circumvent some of the dramatic effects of climate change on

their economies, agriculture, and health. They need new reforms for water management and to determine new priorities during this time of increasing water scarcity and water quality crisis (Allan 2001). Any policy about water management must take into consideration the socio-political challenges facing the Middle Eastern countries. Water conservation is still a big issue in the region as most countries put most of their efforts on large scale projects. Both government and civil society must work together to increase public awareness about climatic changes, the scarcity of water resources and the importance of groundwater.

A study conducted by Evans (2009) predicts important temperature increases in the Middle East. While a small increase of precipitation is expected the southernmost portion of the domain of the region due to the northward movement of the Inter Tropical Convergence Zone (ITCZ), important reductions in precipitation are predicted in the area covering the eastern parts of the Mediterranean, Turkey, Syria, northern Iraq, northeastern Iran, and the Caucuses. The largest decreases expected to take place by the middle of the 21st century in western Syria and areas of Turkey near Syria. While significant decreases in precipitation are expected, the largest decreases are predicted to be seen in southwestern Turkey. These decreases are around 125 mm annually, which is 25 % of the current precipitation as a result of decreasing storm track activity in the Eastern Mediterranean (Evans 2009).

These changes may have important consequences for the living, agricultural and food production in the region. As Evans (2009) points out that “using the 200 mm isohyet to represent the limit of rainfed agriculture, this change represents a decrease of over 170,000 km² in viable rain-fed agriculture land by late-century.” When the length of the dry season increases, the length of time for rangelands to support grazing animals also decreases. Iran will be also significantly affected by climate changes. The effects of climate changes will not be limited to reductions in the amount of annual total precipitation. The timing of the precipitation will also be an important issue. Particularly, changes in the timing of the maximum precipitation will affect the growing season. This will impact cropping strategies and crop types. All these changes need preparations by the countries in the Middle East (Evans 2009).

10.6 Conclusions

The Middle East is a diverse region with different identities, economies, cultures, social dynamics and political organizations. These differences provide tension and battlegrounds for struggles for power in the region. The region has historically been home to diverse religions, sects, and traditions. Colonialism and western interventions resulted in small states with authoritarian regimes. These regimes have closed their ears and eyes to the demands of their people and resisted to changes. Poverty and uneven distribution of wealth are important economic issues. The region has one of the lowest educational levels and the most repressive regimes in the world. Tensions along ethnic and religious lines must be dealt with in order to achieve peace in the region. Globalization and regional dynamics are forcing the repressive regimes to

change. Some have already fallen while others are being forced to change. Democracy is knocking on the doors of the Middle East. The process is not going to be painless. Ethnic and religious groups, with the involvement of international powers, ask for a new social and political order in the region. Those with privileged positions are frightened and resist those changes. However, from the rights of minority groups to the rights of women, from a fair distribution of wealth to the political participation and fair representation, from integrated economies to cultural alterations, many changes are underway. The region will have to deal with high population growth and increasing urbanization, find ways to diversify their economies, establish a more inclusive political system for diverse identities, and seek a better regional cooperation system in the highly competitive global system. We believe that 50 years from now, repressive regimes in the region will be gone, oil-dependent economies will diversify, educational levels will dramatically rise, democracy will prevail, ethnic and religious groups will learn to coexist, and the status of women will greatly improve.

The effects of climate change may be more dramatic than expected as water scarcity, along with worsening water quality, rising sea levels, and increasing population, will have dramatic impacts on agricultural production, health, and the nature of the area (Sowers et al. 2011). Overuse and pollution of the groundwater, salinization of agricultural land, and urban water shortages require policy makers take adaptive measures now in order to deal with the future alarming water scarcity and contamination in the region.

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Chapter 11

Imagined Lifeways in North America ca. 2100

Mark Bjelland, Michael S. Bruner, and John Davenport

Abstract North America is one of the key regions from which both anthropogenic climate change and culture shift emanate. Together, these change agents are speeding the reformulation of beliefs and social structures, making public discourse a critical arena of contestation. This chapter charts a course through the competing public discourses on climate change and sustainability, arguing for a greater focus on the flourishing of both humans and non-humans. Attention is given to two key components of everyday lifeways: settlement systems and food systems. The chapter explores three alternative futures for North American lifeways in 2100: a “stay the course” alternative beset by continual socio-environmental crises, a Promethean scenario that would face headwinds of both culture shift and ecological realities, and a soft path of bioregionalist sustainability.

11.1 Introduction

Just as the dual change agents of global climate change and cultural shift were not produced in a vacuum or in specific places, nor will their effects be equally distributed across the face of the earth. Like other cultural and environmental processes, they are geographically uneven. This chapter imagines the range of possible outcomes in North America, one of the key regions from which these change agents emanate. We begin by sketching a theoretical framework on paradigms and epistememes, critically interrogating the concept of sustainability, before shifting to more detailed examinations of particular components of everyday lifeworlds. We take as a given that culture integrates artifacts and social relationships as well as ideas

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and beliefs. Culture shift then is not limited to the rise of post-modern worldviews and increased self-referentiality. Rather, the changing worldviews of culture shift described elsewhere in this volume overlap, like fish scales, with changing technologies of communication, transportation, production, and consumption. We conclude with case studies of two areas, where we envision central changes in the lifeways of North America in 2100: settlement systems and food systems.

11.2 Paradigms and Epistemes

In his book, *The Structure of Scientific Revolutions*, Thomas Kuhn (1962) argued that most science proceeds incrementally within a rather well-defined paradigm. The scientists in a given era largely ignore anomalies that cannot be explained within the paradigm. From time to time, the dominant paradigm is replaced in a kind of scientific “revolution.” But actual change occurs more through the replacement of the previous generation of scientists with a new generation. A classic example of paradigm-shift in the sciences is the movement from a geocentric view to a heliocentric view. Another example is the change in physics from Newton to Einstein. For the purposes of the current chapter, a third example is instructive, an example in which the struggle between two competing paradigms (and variations of each paradigm) is played out, not just in the lab, but in public discourse. The debate is not about competing scientific perspectives, but it revolves around how we shall understand our world and what shall be counted as “scientific.” Clarifying what counts as scientific evidence is important because such information informs public policy related to not only climate change but a broad array of challenging issues that promise to affect citizens of the world over the course of the twenty-first century.

As challenges to scientific authority have mounted during the ongoing transition from modern to postmodern perspectives, the discourse on prognosticating climate change scenarios has been further variegated to include the claims of global warming critics. These critics staunchly oppose the notion that a steady rise in global temperatures remains a distinct and highly probable outcome. Oftentimes personal experience, something as routine as the yearly arrival of the fall and winter seasons, provides skeptical onlookers a modicum of self-evidential proof of climatic regularity. Anecdotal evidence aside, this example is illustrative of a more general trend throughout society, even among more educated circles, in which personal experience, as one type of evaluative criteria based not on factual evidence, counts for equal status despite the apparent absence of an underlying rigorous methodology. Value judgments qualify instead as reason enough for one to assemble a generalized notion of how the natural world consistently operates. Appearances are appropriated as a means of stabilizing meanings that assist with bringing order to one’s experiential world. The symbolic power of extending such claims toward the derivation of potentially hegemonic narratives that populate public discourse may be exercised across different environmental and social projects. In fact, noticeable similarities exist between how the symbolic and the material enter into the discourses on such varied topics as environmentalism and racism.

For instance, in her essay, “Race and Genetics from a Modal Materialist Perspective,” Celeste Condit (2008) argued that science and *The New York Times* helped to revitalize “race” as “scientific discourse” by reporting on possible connections between genetics and brain size. Space does not permit us to summarize the whole account, but we point to one of Condit’s most important insights. She concluded that neither a physical perspective on race nor a discursive perspective on race is adequate. Likewise, it is our best intuition that the material aspects of climate change are more thoroughly understood when we broaden our conception of the discursive practices that more generally inform the project of environmentalism. According to Condit, we must take into account the interaction among three forms of matter: (a) the physical, (b) the biological, and (c) the symbolic. Modal materialism enables us to transcend the “fact” (materialism) versus “value” (idealism) divide. If genes are “real,” if discourse is “real,” and if discourse is circulated through biological beings (human bodies) living in actual settlement systems (with their respective food systems), then our explanations and predictions must be based upon the interactions of all three forms of matter as they are situated in dynamic, open systems. In the geographic literature, this is similar to Robert Sack’s notion that existence lies at the nexus of the spheres of meaning, social relations, and nature.

The above perspective offers one account of how we may navigate the oftentimes turbulent confluence of competing discourse on climate change. Condit’s integrated view of discursive practices, including the matter it comments upon and consequently helps constitute, provides an intellectual turning-point for us to retrospectively observe how past paradigms, indeed all paradigms, have been developed and then contested. Philosopher Michel Foucault (2002) previously examined in great depth the exact nature of how paradigms, be they scientific or otherwise, are stabilized and disrupted. In his book, *The Archaeology of Knowledge*, Foucault argued that, in any given era, we operate within a public vocabulary and a set of concepts that we accept as knowledge or even truth. This discursive formation, or “episteme,” is like a paradigm. We largely dwell within this set of terms and concepts as one might do when explaining, rather than describing, a given topic from a singular instead of modal perspective on materialism without much conscious awareness. We simply accept the paradigm, its vocabulary, and its concepts as fact or as “true,” hence the fact/value divide potentially widens.

For example, in the nineteenth and twentieth centuries, it typically was assumed that Columbus “discovered” the “New World.” Columbus was a “hero.” This narrative was enshrined in history books. Around 1992 (the 500th anniversary of the first voyage of Columbus), however, public discourse began to change. An alternative paradigm began to take root, a paradigm in which Columbus “encountered” already existing civilizations. Moreover, the new paradigm postulated that the contact was not positive. Consequently, in the new paradigm, Columbus lost his hero status. The heroic status of the historical figure was, in part, premised upon some longstanding notion of cultural stasis. This idea posited indigenous peoples as passive recipients of externally regulated forces with limited or no history of cultural development and complexity of their own. Such discursive practices served to dispossess the now a historical figure of the symbolic capital required for a more prominent role in the

narrative of colonial expansion. The idea of cultural stasis provided self-referential meaning by stabilizing through the production of symbolic power an objectified view of indigenous peoples as those who were “discovered.” The eventual exchange of the “discovered” misnomer for a more accurate account of being “encountered” has served to partially remedy the historical momentum of Eurocentric viewpoints across the academy. The exegesis of widely circulated texts, such as textbooks are, has resulted in the writing of revisionist histories. Hence, the specialized skills needed to fashion such works rank high among the ordination of abilities sought for executing contemporary scholarship. The texts produced by these efforts enter the classroom curriculum of universities and ultimately help sway the public discourse that shapes collective worldviews, including those which prize the historical figure of the anti-hero. Today, amidst a postmodern cultural shift, internal regulation of knowledge reproduction with an implicit goal toward social and environmental reform has dictated that emerging intellectual discoveries, including the construction of counter-narratives, be directed at making the world once again new—even if it never quite was so in the beginning or possibly can be in the future.

From a literary perspective,¹ the disruptive practices associated with purposefully ushering in a new intellectual paradigm, like those prizing the anti-hero, have in common with other anarcho-political movements (e.g., Dadaism, a historical predecessor and key informant to Postmodernism), a preoccupation with undermining prevailing standards toward advancing a trenchant critique of the believed meaninglessness of the modern world. In terms of its symbolic capital among the philosophically initiated such practices are subversively anti-art. By intentionally fiddling with correspondence theories for variously related and sometimes deeply personal reasons, a type of counterrevolutionary act of ridicule-as-method is performed and a foundation for further protest is laid. To stabilize discursive meanings amidst a “meaningless” era would, according to Dadaist calculation, only advance the projects advocated by bourgeoisie culture. It is a sort of speaking death to culture that is presented under the guise of speaking truth to power, in which the performance of symbolic vandalism announces (in fact, preemptively facilitates) the demise of the existing vanguard. This observation would be of little to no interest to observers outside the inner-circles of intelligentsia were it not for the influence that theoretical permutations of the movement—active across numerous divisions of social life and through multiple types of media—have on shaping public discourse. For some this is simply an act of replacing one mythology with yet another.²

¹ One could argue that at its root all writing whether humanistic or scientific is, according to its discursive function, literary in nature.

² This observation would have minimal relevance to our present discussion concerning climate change were it not increasingly apparent that society’s creative capacity to forge new lifeways will require a sustainability concept that takes seriously the idea that, even with modernity now partially behind us, we are all still nurturers *and* conquerors despite the pernicious and unfulfilled need to feel otherwise. These sentiments of unfulfilledness oftentimes find expression in both the aforementioned symbolic practices and in more tangible yet unrecognizable ways such as those described in the later chapter by Gare—using bourgeoisie culture’s own bankroll to finance black comedy films about “sadistic idiots” toward “saving the world.” For the Dadaists (a term that translates as

The idea of cultural stasis underlying our collective mythology about Columbus serves a similar function to that of present-day views of a static nature over which the triumph of human occupation resides. The racist undertones required of the conquest of the American Indian roughly parallel the exploitative rhetoric necessary for advancing the solitary interests of humans beyond what is considered advisable for the health and long-term sustainability of natural systems. This recognition is further complicated by the fact that environmental systems also have always been products and drivers of continual change. Our narratives about change reflect the very discursive practices that narrow or widen the divide between environmental facts and values. This realization allows us, as scholars and educated citizens, to more critically assess which assemblies of theoretical frameworks might most appropriately serve to bridge rather than expediently divide the modern from the postmodern era.

The central argument of the current book is that climate change and value change are coming together in such a way as to speed the reformulation of our most basic beliefs and patterns of social organization. Therefore, in this section of “Imagined Lifeways in North America,” we wish to pay special attention to public discourse. We seek to explore how the concepts of climate change and worldview are constructed, challenged, and transformed in public discourse. For example, it is interesting to note how public discourse has moved from emphasizing “global warming” to emphasizing “climate change.” Whereas climate change refers to a somewhat broad and ill-defined (not to mention rather benign) notion of the variability common among long-term climatic trends, global warming relates the amplitude of these changes to their encroachment of an upper threshold. This threshold marks the limit beyond which a manageable return to some dynamic equilibrium state, especially in natural systems, is exceedingly improbable. While emphasis on the “climate change” term over the “global warming” concept may appear to be merely an issue of semantics, from the standpoint of mitigating against environmental hazards, the former term does little to reinforce the idea that high amplitude events present a significant obstacle to effectively adapting to atypical deviations in system behavior. Because of the symbolic nature of the “climate change” and “global warming” concepts as they

“rocking-” or “hobby-horse” in French, and oddly or intentionally ironic enough resembles the phonetic pronunciation “da” and “da,” a first word often spoken by infants), and thus the Postmoderns, no sustainability term that rises out of this supposed defunct culture could ever be satisfactory or conceivably serve as an acceptable basis for political action. The entire modern project is thought to require a complete symbolic and material overhaul. Hence, both perpetually deconstructing the “gold standard” and aggressively spending other’s “gold,” a metaphoric auctioning-off of expensive fine art from private collections to add value and meaning to the long-awaited era of a post-capitalist world, are central to the Postmodern project. Alas, it remains unclear to the dispassionate observer how robbing humanity of its artistic impulses, purging the public house of all but state-sponsored forms, can itself serve as a stable foundation for sustainable lifeways that don’t leave humans more unfulfilled than society may currently find its self. Nevertheless, like Nero playing nocturnes by violin while Rome burns, or vandals idly hanging the work of Marcel Duchamp while the collective Mansion ignites, the irony of tragic circumstances and the poet’s last breath are quietly celebrated. For *anti-art* critics “the importance of being Dada” not only means everything—it gives life meaning.

circulate through public discourse, each term carries with it a different set of assumptions and level of importance in the public mind. In order to connect this section to the larger project, we will keep in mind Condit's concept of modal materialism while approaching the broader issues through an analysis of changing public discourse on "sustainability."

11.3 The Rhetoric of "Sustainability"

The term "sustainability" has become the mantra of the environmental movement. It has become a kind of "gold standard" by which to judge the policies and practices of our lifeways. However, the sustainability term has, at times, been appropriated by different groups and taken to mean various things that are inconsistent with the overall goal of maintaining the integrity of terrestrial and aquatic ecosystems. According to Bruner and Meek (2011) one potential problem with the current notion of sustainability is that it seems to necessitate a vast and complex calculus. When dealing with one species in one locale, such as in a timber harvest plan for redwood trees in northern California, sustainability could function effectively as a guide for logging. A timber company would cut only so many trees of a certain age, plant additional trees, and rotate cutting in a cycle of one hundred years or more. It is clear in this particular case and elsewhere throughout the Pacific Northwest where decadent, mature, old growth forests persist that such a timber harvest plan is inappropriate for achieving objectives associated with the protection of endangered species. Consider now a similar set of calculations—but this time for all marine species in all of the world's oceans. The prospect is daunting to say the least. Although sustainability-oriented approaches to natural resource management offer useful alternatives to more destructive practices (e.g., clear-cutting or a hands-off approach) their transferability from one specific site to the next should be carefully scrutinized prior to implementation. This observation holds particular importance for the possible role of bioregionalism in helping to organize specific sustainability techniques and associated lifeways around appropriate resource bases rather than the other way around.

Another issue with the sustainability term, as it has been conceived by some, is that it is based on the paradigm of a gentle and wise human as well as a benign and stable nature. Here, humans are considered the stewards, and nature, apart from human influence, is harmoniously balanced. This model implies that humans have the right to harvest other species, the wisdom to do so intelligently, and the foresight to plan for centuries into the future. While sustainability is certainly preferable to plunder, many of its assumptions are open to debate. Recent work on many fronts has challenged the sustainability model's assumptions. For example, the new ecology and a better understanding of past climate change paint a picture of natural systems marked more by chaos, disturbance, and change, than stability (Botkin 1990; Hulme 2009). Likewise, the assumption of a clean division of culture and nature has suffered trenchant empirical and philosophical critiques (Cronon 1996; Haila 2000). Swyngedouw (2007) argues that "... imagining a benign and 'sustainable'

Nature avoids asking the politically sensitive but vital question as to what kind of socioenvironmental arrangements we wish to produce. . . .” Thus, the critic must ask if there is another, even better, paradigm for the relationship between humans and the environment.

Despite its many shortcomings, Buckingham (2007) argues that the concept of sustainability reminds us “that the economic, environmental, and social are inextricably bound.” Peterson’s (1997) approach to sustainability, which she phrased in terms of “sustainable development,” called attention to the tensions between the two concepts. Drawing upon Kenneth Burke (1966), Peterson argued that “Sustainable development offers a representation of environmental policy decisions as comic, rather than tragic, drama.” Comic criticism, in the Burkean sense, focuses on symbolic representations and may not eliminate material conditions, such as depleted stocks of North Atlantic cod. Nevertheless, Burke and Peterson offered the critic a way to “call into question the cultural values that the current technological worldview emphasizes and create fresh possibilities for environmental policy.” We wish to call further attention to this hopeful note about imagined possibilities. In truth, we realize that the pressures produced by existing sustainability practices and global population growth will require creative thinking as a requisite part of any solutions moving forward.

Although sustainability exposes the unsustainability of much of everyday life in the prosperous economies of North America, the current sustainability concept may not be the best idea for motivating change. Swyngedouw (2007) critiques sustainability discourses as focused on sustaining current neoliberal capitalist arrangements and foreclosing the possibility of radically different socioenvironmental futures. While sustainability is arguably a promising term, given the possibility of new interpretations, it largely remains insufficient when compared to the idea of “flourishing.” How might circulating the idea of flourishing—focused on promoting and maintaining the health of, even happiness within, socio-environmental systems and a robust capacity for resilience and self-repair—through the existing discourse on sustainability help us conceive of these new futures.

11.3.1 Sustainability Flourishing

On the one hand, discourse reflects change, such as when new words appear in the dictionary to address technological creations (“iPod”). On the other hand, discourse promotes change in attitude and action, for example, when a cancer patient consciously moves from “victim” to “survivor.” Our point is that public discourse about future lifeways will be critical in both documenting change and promoting change. It will be critical for describing human and natural systems behavior to illustrate their functional components and explaining operational breakdowns to offer prescriptive measures for the restoration of mutually beneficial processes. Let us recall, however, that discourse (a symbolic form of matter) is inextricably tied to physical matter, such as climate, water, and earth, and to biological organisms arranged within social and ecological systems. Keeping this in mind, we turn to the topic of settlement systems.

11.4 Settlement Systems in North America: Looking Back to Look Ahead

The North American settlement system ca. 2010 is emblematic of knowledge as power, technology as mastery, and human-environment relationships characterized by conquest. Environmental writer Wendell Berry suggests that in our rush to settle the vast expanse of the North American continent, there existed a tension between the conqueror and the nurturer³—a battle usually won by the conqueror’s exploitative energies.

Generation after generation, those who intended to remain and prosper where they were have been dispossessed and driven out, or subverted and exploited where they were by those who were carrying out some version of the search for El Dorado (Berry 1977).

As the “conquerors,” whether in the form of developers, strip miners, or large-scale agriculturalists, displaced those seeking a more nurturing, rooted way of life, “the particulars of . . . landscapes have slipped away from us” and we’ve lost the intimate-place knowledge and landscape-language of our forebears (Lopez 2006). Ours is a predominantly technological civilization with an overarching faith in progress, but containing within it, ambivalent strains expressed in various romantic reactions (Wallach 2005).

The systems of land use and transportation in North America, both in rural and metropolitan regions, were not laid down in a continuous pattern but in successive surges that were characterized by a dominant energy source and circulation mode. In the transitions from Eastern seaports to canals, railroads, interstate highways, and

³ By relating indigenous peoples to that of being “nurturers” one may, in turn, be projecting onto these populations an idea of the “gentle and wise human and a benign and stable nature” which in our previous section was considered a primary characteristic and intellectual shortfall of the current sustainability paradigm. Understanding how these categories—themselves a type of “gold standard” against which the value of knowledge is measured—circulate, as Foucault observed, through academic discourse before entering the public realm as received wisdom is a critical aspect of comprehending the power of ideas. The material and symbolic aspects of knowledge production, including the pronouncement of dualistic designations, help shape how conquest is practiced both on the ground and in the mind. Consequently, unpacking the sustainability concept is exceedingly difficult given its own set of underlying assumptions, many of which are tied to preexisting ideas which are themselves represented by contested terms (e.g., nurturer, conqueror) whose meanings have yet to be stabilized. These difficulties are indicative of the transition from a modern period to one characterized by postmodern tendencies, where the hegemony of a playful hermeneutics promotes the purposeful destabilization of meanings thereby avenging any attempt to work out a modal materialist position (itself viewed as merely an intellectual compromise that nevertheless supports the underlying tenets of material progress). No doubt, indigenous people have their own thoughts about being leveraged as symbolic figures in the ongoing development of this largely Westernized politico-historical narrative. The influence of more radical postmodern worldviews on the debate over the meaning of the ongoing American experiment is a project, a type of niche or specialization, whose flourishing is itself squarely dependent on the philosophical tension present in counter narratives of national conquest. Perhaps even the participants of counter conquest have as their primary object of interest, if not the more precious art and freedom to produce it, then the same gold that was coveted by numerous other eras before them.

jet travel, each new wave opened new landscapes for geographical development and economic exploitation and rendered previous locations obsolete. While these boom periods are generally celebrated, the agrarian critic Wendell Berry refers to this mode of constantly shifting patterns of production and settlement as the “unsettling of North America.” Each wave of geographic expansion and economic development was fueled by the expanded use of new non-renewable fossil energy sources and as such was inevitably unsustainable. In many respects, the current settlement system of North America, with its automobile dependence and spatially extended commodity chains and lifestyles, seems designed to maximize the consumption of fossil fuels.

The successive waves of economic and geographical development are often understood in terms of Kondratieff waves (or K-waves). K-waves are named after the Russian economist Nikolai Kondratieff (1984) who studied the global capitalist economy and identified repeated self-correcting cycles of expansion and growth, followed by crisis, in turn followed by a successive wave of growth and expansion. K-waves are driven by technological revolutions that solve existing problems with new products, services, and modes of production and business organization. Each K-wave goes through phases of (1) slow start-up, (2) rapid growth, (3) plateau, (4) declining profits and increased competition, and (5) economic slowdown. The K-wave cycles occur over a period of 50–60 years and transition when the economic slowdown (recession or depression) associated with one wave coincides with the slow start-up phase of the next wave (Berry 1991). Economic geographers have identified past K-waves associated with coal and iron, canal building, steel, rail, petroleum, organic chemical, and telecommunication revolutions (Borchert 1991). Each K-wave drives structural changes in the economy and also favors particular geographic locations, shifting capital investment, job creation, and ultimately population centers. Each K-wave also leaves behind its share of abandoned, derelict landscapes since communities and the built environment are relatively fixed in space compared to the mobility of capital (Bjelland 2004).

Urban geographers understand urban growth and decline as well the internal distribution of land uses in terms of K-waves and successive eras of city building. In the twentieth century, we witnessed the depopulation of many rural, agricultural regions and the metropolitanization of the US and Canada with population shifts to the suburbs and the Sunbelt. In the second half of the twentieth century, our cities shifted from monocentric, transit-oriented land-use patterns to the amorphous, sprawling, polycentric metropolitan regions created in an era of cheap fossil fuels and unprecedented prosperity and mobility (Teaford 1996). The post-modern urban region is described as fragmented collages of enclaves, consumption, and spectacle spaces that are held together by a network of highways and fiber-optic information pathways.

In the process of metropolitanization, depopulated and deindustrialized urban cores emerged as collections of derelict landscapes and toxic, contaminated brown-field sites. Some cities, such as Pittsburgh, were able to reinvent themselves as post-industrial service centers with their obsolete multi-story manufacturing and warehousing buildings re-imagined as hip residential and office spaces for the creative, knowledgeable worker class. Others seem mired in decline with the geographical inertia of past infrastructure investments working against them. Buffalo,

New York, at the terminus of the Erie Canal, and Detroit, Michigan, the center of the automobile industry, are poignant examples of how places whose prosperity was most strongly associated with a particular K-wave and its mode of production, circulation, and energy source, often become the most dysfunctional. Their partially-abandoned neighborhoods, industrial ruins, cycles of rising taxes, and declining services, provide glimpses into a future when the infrastructure is in the wrong place for the new economic-geographic realities.

Since 1945, suburbanization of residential, industrial, commercial, and office work has been driven by rising use of the automobile and the production of landscapes that require the use of automobiles for everyday functions. The New Urbanism movement, which has had modest success in reimagining the development of North American cities, envisions a physical form in which a child can travel to purchase a popsicle on their own. The fact that most US neighborhoods built since World War II fail the popsicle test and that the New Urbanism movement is seen as revolutionary, suggests something of the magnitude of change that will be needed. Imagining a world of sustainable urban development is increasingly difficult when entire lifeways have been built upon sources of energy and modes of circulation that will not be available in 2100.

11.5 The Human Geography of North America in 2100

According to the U.S. Census Bureau, as of this afternoon there were 308,745,538 residents of the United States, together comprising about 5 % of the estimated world population of 6,925,465,613 (U.S. Census Bureau 2011). Rounding out the continent, Canada and Mexico add estimated populations of 34 million and 114 million, respectively (U.S. Central Intelligence Agency 2011). While demographic forecasting is fairly simple—people are born, move around, and die—the U.S. Census Bureau’s projections for 2050 range from 314 to 515 with a midrange estimate of 404 million (U.S. Census Bureau 2008). Meanwhile, the Census Bureau projections for 2100 range from under 300 million to nearly 1.2 billion. Obviously, migration rates and fertility rates are the key. On the other hand, we can be pretty confident that there will be significant aging of the population through the first half of the twenty-first century, which will stress social support systems and government finances. Bigger questions include, will the second demographic transition of sustained sub-replacement fertility, first noted in Europe and among more educated urban populations in North America, diffuse more broadly into North America? Will the new lifeways of self-referentiality, self-realization, and rejection of external authorities drive fertility rates below replacement values? Will marriage and childbirth come to be seen as lifestyle options rather than an expected part of the lifecourse? Will the US continue as an outlier among developed countries with its near replacement fertility rates? Will traditional religious groups (Orthodox Jews, Mormons, Muslims, and conservative Christians), with their significantly higher fertility rates (Kaufmann 2011), become numerically more important, changing the balance of power between traditionalists and postmoderns?

Equally interesting to geographers, will the continued southwestern movement of the US population continue through the twenty-first century? We should expect the rise and fall of multiple production locations as two K-waves run their course of growth, stagnation, and decline. Will today's boom regions, such as Silicon Valley, be the Rust Belt circa 2100—history suggests that unless those regions regularly reinvent themselves, they will be left behind. Straight-line extrapolation of recent trends would put the mean center of US population in 2100 somewhere near the intersection of northwestern Arkansas, southwestern Missouri, and eastern Oklahoma. Such a shift would certainly be accompanied by shifts in culture, political power, and vulnerability to climate shift, the subject to which we now return.

11.6 Alternative Futures for North American Settlement Systems

The most direct effects of climate change are likely to be felt in resource-dependent regions where changes to physical or biological systems directly affect livelihoods. Changes in water availability, annual runoff, drought frequency, wildfire frequency, length of snow and ice cover, temperature regimes, and geographic ranges on animals, plants, pests, and diseases, for example, will affect agriculture, fisheries, forestry, and outdoor recreation-dependent economies. On the other hand, 81 % of the US population and 80 % of the Canadian population live in urban areas where the direct effects of climate change will be mediated by technological systems such as urban water systems, air conditioning, and long-distance commodity supply chains (U.S. Census Bureau 2010; Statistics Canada 2009). Urban dwellers, while partially shielded, will not be immune to the effects of climate change. As we sketch out possible futures for North America after culture shift and climate change, we envision three broad categories of scenarios for the continent's urban systems:

1. the “stay the course” alternative,
2. a promethean scenario attempting mastery of a changing continent, and
3. a soft path in which bioregional sustainability becomes the default way of life.

11.6.1 *Stay the Course Scenario: Infrastructure in the Wrong Place*

In environmental impact studies, the various alternatives must be compared against the “do nothing” alternative. As we imagine future lifeways, the status quo scenario is the equivalent of the “do nothing” alternative. We assume that growth, development continue along the same pathways as in the second half of the twentieth century and there is a lack of resources or political consensus to enact major changes of direction or major new rounds of infrastructure development. Given the current political

paralysis, tight government budgets, looming medicare and social security costs for aging Baby Boomers, and an inability to make hard choices now in order to prepare for the future, this “do nothing” alternative is quite likely to be the default scenario.

The two great population shifts of the second half of the twentieth century, suburbanization and migration to the amenity-rich parts of the Sunbelt, have put the continent’s infrastructure into locations particularly vulnerable to climate change and limited in their ability to shift towards more sustainable lifeways. Continuation of suburbanization of the US and Canadian population and continued southward and westward migration of the US population is very likely to increase vulnerability to climate shift. The emerging situation is analogous to that of the flood-prone cities of the US interior. These cities were mostly founded in the first half of the 1800s when rivers were the interior highways of the continent and FEMA flood maps were far off in the future. Now, up and down the Ohio, Mississippi, Missouri, Red and other rivers, floods are a regular source of major disaster losses, simply because we built the infrastructure in the wrong place and the economic, political, and social costs of relocation are too high. The irony is that for many of these interior cities, the rivers upon which they were founded have little or no economic use today. But given the long lifespan of infrastructure, the flood risk of locations unwisely chosen 150–200 years ago continues to impose significant costs of flood mitigation and regular disasters.

By the year 2100, certain versions of the American Dream—a McMansion with a three-car garage in an automobile-dependent residential suburb somewhere in the Sunbelt—are likely to join the list of prominent examples of infrastructure built in the wrong place. The prosperous low-density suburbs that symbolize our quest for the good life ca. 2010 could become the blighted, derelict landscapes of 2100, just as Detroit, the symbol of mid-twentieth century prosperity, serves as today’s landscape of despair and decline. We envision three major crisis points:

1. chronic water shortages in the arid and semi-arid regions of the American West,
2. increased losses from natural disasters, principally floods, drought, and hurricanes, and
3. declining demand for large houses in automobile-dependent suburbs.

The American West is a region, defined in large part, by the scarcity of water and the landscapes, politics, economies, and massive engineering projects that have responded to that scarcity. Water scarcity has not slowed growth in the American West. The five fastest growing states between 2000 and 2010 were all in the West and the fastest growing state, Nevada, was the only state to grow more than 25 % in each decade from 1980–2010. Climate models predict declining water availability by 2050 across most of the American West. Warming in western mountain regions is projected to result in decreased winter snowpack (IPCC 2007). This will result in increased winter flooding in western rivers and decreased streamflows in the summer months when the water is needed for irrigation, municipal supplies, recreation, and maintaining minimum flows for aquatic species. Chronic water shortages in arid and semi-arid regions of the American West will challenge the provision of municipal water supplies for growing cities such as Los Angeles, San Diego, Phoenix, Las Vegas, and Denver.

Under the “stay the course” scenario, rising costs of natural disaster losses from floods and hurricanes will challenge federal, state, and local budgets as well as taxing the finances of insurance companies and homeowners. Much of the increase will be driven by continued real estate development in vulnerable Gulf Coast or Atlantic Coast regions or floodplain locations. More than 10 trillion dollars of insured commercial and residential property in the US is in locations vulnerable to North Atlantic hurricanes (AIR Worldwide 2013). Rising sea levels and increased intensity of hurricanes in the twenty-first century forecast by climate models will increase storm losses.

Heat wave intensity is forecasted to increase under climate change scenarios (IPCC 2007).

In the chapter, “The Good, the Bad, and the Ugly,” John Davenport explores the ability of North Americans to expend energy more efficiently when cooling and heating their homes to comfortable temperatures under climate change scenarios. Some of the geographic shifts of the late twentieth century moved the US population to areas in the southeast and desert southwest with significantly high air conditioning use. Energy costs for cooling (and heating) are compounded by the growth of house sizes over the past half century, effectively tripling the amount of square footage per person in new housing (Bjelland 1999). Rising energy costs that are very likely to accompany the transition to post-fossil fuel energy sources are likely to reduce demand for large houses, particularly those in automobile-dependent, single-use residential suburbs. In this scenario, the high costs of scarce fossil fuels, housing market collapses in overbuilt locations, wasted infrastructure investments, and natural disaster losses, will leave the economy reeling. Under this scenario, derelict landscapes and declining standards of living are everywhere in evidence. Cynicism is likely to take root as the United States loses its global dominance and its grip on the environment it once thought it had conquered.

11.6.2 Promethean Scenario: Promethean Mastery of a Changing Continent

The promethean scenario requires a renewed application of the model of technology as mastery and an orientation of promethean domination of a continent undergoing climate change. In essence, the twentieth century feats of engineering and infrastructure (e.g. Hoover Dam, the Interstate Highway System) will need to be repeated, this time to provide water and energy where current supplies have run out. In this scenario, the population continues to migrate to amenity-rich Sunbelt locations, regardless of water availability or vulnerabilities to rising sea levels or more intense hurricanes. In this scenario, the response to a warmer climate is more air conditioning, not natural ventilation or reduced carbon emissions. The response to rising sea levels is seawalls and related flood control infrastructure. The solution to water shortages is new water reclamation technologies, not conservation. Water needs in regions such as the desert Southwest are met through energy-intensive advanced

wastewater reclamation techniques or desalination. The solution to energy shortages is, again, new technologies. Energy use remains high and remains reliant on the hard energy paths of fossil fuels and nuclear energy. Meeting future energy needs in a world of rising energy use and status quo scenario requires the full-scale exploitation of remaining fossil fuel sources of coal, natural gas extracted by fracking, Canadian tar sands, oil shale, Venezuelan bitumen, and increasing use of nuclear power.

One contradiction in the promethean scenario is that these solutions depend on strong science and engineering skills and Science as an authoritative force within society. Yet we see declining science and math skills as youth are devoted to social networking and self-referentiality, alongside increasing rejection of external sources of authority such as Science. Further, this scenario also requires great sacrifice and investments in the future, something that fits less in a post-modern outlook than it did in a traditional or modern worldview. Finally, as the environmental and appropriate technology movements have long told us, environmental limits are real and sophisticated technology leads to increased vulnerability to failure. Under this scenario, the earth's systems are evermore subsumed within humankind's works with vast zones of environmental wastelands—coal tips, hazardous waste dumps, radioactive zones from nuclear energy accidents, etc. Needless to say, such a grim outlook has prompted some to conceive of softer paths toward forging sustainable lifeways.

11.6.3 Soft Paths: Bioregionalist Sustainability as Way of Life

As the Local Agenda 21 initiatives that emerged following the 1992 United Nations Summit on the Environment in Rio and the Transition Towns movement suggest, sustainability solutions are most likely to emerge at the local level. This trend would mark a potential re-enchantment with local knowledge and the reacquisition or development of landscape languages which correspond to newly emerging bioregions. In essence, this scenario represents the triumph of the nascent sustainable communities, eco-communities, and Transition Towns Movements. At present, the sustainable community movement is focused on transitioning to post-petroleum and carbon-neutral lifestyles but consists of a grab-bag of measures rather than a total way of community life. On the one hand, there are architecture and urban design emphases and on the other there are a host of household-level initiatives including recycling, community supported agriculture, local currencies, urban chickens, bicycling as transportation, and so forth. But these movements have not addressed critical questions about how such small-scale efforts can be scaled up to that of the metropolitan or national economy.

This scenario's turn to sustainability will require a renewal of intimate place knowledge, remembrance of folk skills, and recovery of local ways of living like that described by Wendell Berry. While postmodern culture appears to embrace "difference" and the "local," agrarian writer Norman Wirzba (2003) sees in the postmodern quest for liberation the continued attempt to "free ourselves us from the concerns of place." This scenario requires a deeper culture shift that lets go of

the post-modern emphasis on infinite choice and embraces limits and lost traditions. In many ways, the settlement systems and food systems of the soft paths scenario resemble those left behind in the twentieth century. It will also require increased willingness to sacrifice on behalf of a cause greater than one's self. Whether this soft path scenario is compatible with the post-modern culture shift remains to be seen.

Alongside the more tangible aspects of bioregional change will be parallel changes in the nonmaterial culture which informs and reflects future settlement patterns. Nonmaterial culture is defined here as any cultural form or trait which is not present in physical form (i.e., without material artifact) but rather is alive, passed down, and therefore reproduced through the lived practices and minds of people. Examples of nonmaterial culture include folk song, dance, and storytelling. Similarly, varying ideas on the existence of vernacular regions (e.g., New England, American South) qualify as aspects of nonmaterial culture. True, vernacular regions may be mapped by tracing the diffusion and existence of cultural forms like architectural styles. Yet, their perceived presence in peoples' minds is arguably of more importance to their transmission from one generation to the next than the information any material artifact might convey. The fluid boundaries of vernacular regions vary according to each person's unique interpretation. For example, one New Englander may consider the "New England" vernacular region to extend as far west as Schenectady and Poughkeepsie, while another individual might place its western boundary along the New Hampshire, Massachusetts, Connecticut state lines. Likewise, one person might imagine the proverbial American South to protrude as far north as the Ohio River, while more strict interpretations may consider the historic Mason Dixon Line to remain its present-day northern terminus. As they relate to our discussion of culture shift and climate change, various vernacular regions may emerge in tandem with the development of newly defined bioregions. These vernacular regions, like the ones that preceded them, would reinforce alternative place-based identities much in the same way that the creation of informal yet functional networks can potentially bind together previously isolated groups.

Such place-based identities might correspond with particular suites of bioregional attributes which don't necessarily coincide with preexisting state boundaries. For example, as people in arid regions migrate to resource abundant districts (e.g., southern California beginning to further populate the Bay Area) already proposed vernacular regions like "Cascadia" could gain greater support. In fact, such a development might potentially result in a series of "leapfrog migrations" in which San Franciscans relocate to Portland, while Portlanders trek north to the Emerald City. Of course, what is of primary interest when conjuring up images of a consolidated Cascadian region is the area's abundance of water. The importance of water to a newly emerging vernacular region like Cascadia is more immediately recognizable compared to the fall foliage of a quintessential New England landscape. The opposite could be said, however, about how climate change might alter the environmental attributes which support long-standing vernacular regions like New England. Changes in temperature and moisture will most certainly shift plant species distributions to such an extent that New England may not necessarily remain the place where one routinely goes to view fall colors, or procure maple syrup, or experience many of the other fine things

that endear travelers to the region. How might these changes impact the local or regional tourism economy? Which new industries might people embrace in an effort to maintain their existing lifeways? How would these changes ultimately shape future settlement patterns—indeed, alter our geographic imagination—of a long perceived American vernacular landscape?

Farther south, along the mid-latitudes which occupy the humid subtropical climate of America's southeastern states, additional changes that might shape place-based identities seem a distinct possibility. Hurricane season along the Gulf Coast has served as a continual reminder to the region's Indigenous inhabitants and contemporary residents alike of our imperfect and oftentimes uneasy relationship with nature. These sentiments are evident in the landscape language and responsive behavior of area residents from Pensacola, Florida to Mobile, Alabama to New Orleans, Louisiana to Galveston, Texas. An expected increase in the number and magnitude of storm events along the Gulf Coast (prior to Hurricane Katrina a significant number of the nation's fastest growing counties were along this coastline) could exert a push-effect on local populations. Relocating further inland to avoid the physical and financial risk associated with catastrophic conditions would be a reasonable response to these climatic changes. One result might be that second-tier cities across the Sunbelt would experience the growth and subsequent pressures of inward migration from neighboring communities to the south. San Antonio and Austin, Texas; Alexandria, Louisiana; Jackson, Mississippi; Augusta, Georgia; and Raleigh, North Carolina represent a few of the places where future relocation might occur. However, it is unclear whether these places would be either willing to or capable of accommodating such projected growth, including the decision to extend urban service boundaries and fiscally retain the right to use certain natural resources (e.g., surface or ground water) that are required of most new development. Both San Antonio and Austin already show difficulties in adequately delivering enough water resources to satisfy public demand. Thus, the potent combination of dryer conditions and a growing population will certainly present long-term challenges to these urban centers and others like them. Fortunately, the receptivity of Austin's population toward adopting bioregionalist sustainability initiatives provides an encouraging test-ground for the experimentation needed to find local place-based solutions.

11.7 Alternative Futures for North American Food Systems, or the Rhetoric of “Organic” Food and the Local Food Movement

In recent years, “food” has become a contested site in public discourse in the USA. The writings of Michael Pollan are an important part of this debate.⁴ Space does not permit a full examination of all the issues,⁵ so we will focus upon the growth of the “organic” food movement.

⁴ See, for example, Pollan (2006).

⁵ See, for example, Cramer et al. (2011).

According to Hahn and Bruner (2012 in press), among the most important stages of the organic movement was the decade-long struggle for the US Department of Agriculture to create an “organic” label. The Organic Food Production Act of 1990 ordered the U.S. Department of Agriculture to develop national standards for organic food production. The USDA received an astounding number of responses to its draft guidelines, resulting in years of contentious negotiations over the precise meaning of the organic label. The National Organic Program became law in 2002. Under the terms of these national standards for “certified organic” products, for example, soil must be free of industrial chemicals for five years.

While the beginnings of organic produce were due to a mutually beneficial relationship between farmers interested in healthier food and sustainable farming practices, government regulation, and the desire of the youth-oriented counter-culture hippies to rebel (Pollan 2006; Thompson and Coskuner-Balli 2007); the ultimate rise in popularity and sales of organic food depended on retail outlets willing to introduce, market, advertise and deliver the products to the consumer. As the market for organic products continued to grow at 17–20 % a year, it was the fastest growing segment of the American food marketplace (Hansen 2004). By comparison, the conventional food market was growing at 2–3 % a year (Warner 2005). Compared to 1980 when there were only six natural food stores in the US in 2003 organic foods were sold in 20,000 natural food stores and 73 % of conventional grocery stores (Greene and Dimitri 2002). An indicator of the growth in the natural foods market can be seen in the 2012 Annual Report from Whole Foods Market: “This was the best year in our company’s 32-year history. We delivered our strongest financial performance, breaking records on many levels. Our sales approached \$12 billion . . .” (Whole Foods Market 2012). The growth was attributed to a heightened awareness of the role that food and nutrition play in long term health, which has led to healthier eating patterns; a better educated and wealthier population whose median age is increasing each year; increasing consumer concern over the purity and safety of food due to the presence of pesticide residues, growth hormones, artificial ingredients and other chemicals, and genetically engineered ingredients; and environmental concerns due to the degradation of water and soil quality (Whole Foods Market 2012).

The most recent development in the Organic Movement is the debate between so-called Big Organic and Little Organic. Michael Pollan (2001), writing in The New York Times, expressed his fear that “the new corporate and government construction of ‘organic’ leaves out values that were once part and parcel of the word.” In other words, Wal-Mart and other giant businesses, seeking to limit costs, may alter the meaning of the word “organic” so much that it may be time “to move beyond organic,” according to Pollan. For example, milk cows in large lots could be fed factory-farmed “organic” feed, but never taste a blade of grass. Hahn and Bruner 2012 argue that we can summarize what has happened in the following flow chart:

little organic >>> BIG ORGANIC >>> locavore

In short, public discourse about “organic” food is currently being transformed into the vocabulary and the concepts of the “eat local” movement, including the related

concepts of “community supported agriculture.” A modal materialist reading of community agriculture shows that the movement may be indirectly contributing to the contested discourse on the nature of the sustainability term. The movement may also serve as a grass-roots reaction against the tendency of some corporate entities to manipulate the categories that were initially intended to symbolize the scientific basis of organic certification. In the context of factory-farmed livestock it is important to note that the trophic levels, which contain the energy needed to produce organic food stuffs, present in truly organic, locally grown food are quite different than those associated with industrialized processes of production. Consequently, one symbol cannot represent two exceedingly different processes. The discursive discrepancies that exist between our understanding and portrayal of the interactions between all three forms of matter—the physical, the biological, and the symbolic—must be reconciled in an ethical manner.

The compatibility between what something is or claims to be and what can be expected of it is not only a question authenticity but also a matter of practicality or pragmatism. What authenticity is there to the claim that North American settlement systems are capable of withstanding the stressors associated with changing climate conditions over the course of the twenty-first century? In the preceding chapter, we have attempted to make some important observations concerning several scenarios, including the prospect of a successful North American continent slugging mindlessly forward, reacting to crisis after crisis owed to a do nothing strategy, with little regard for the vulnerabilities that lay before it. Alternatively, a promethean industrial food model under climate change scenarios would not appear to offer a viable solution to the problem of reducing petrochemical inputs into the agricultural system. A bioregionalist model, rather, suggests that local small scale food production complemented by a partial recovery of lost skills and the reacquisition of a corresponding landscape language would offer people a suite of lifeways more appropriate for weathering the difficult periods associated with climate change. Whether these lifeways would be wholly adopted or partially incorporated into existing structures remains a valid point of debate. Over the course of this century, the discourse on sustainability and human flourishing, and the quality of our changing lifeways and those of our children will benefit greatly from an open and honest dialogue like the one we have begun to describe in this chapter.

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Chapter 12

Climate Change and Its Impact on Cultural Shifts in East and Southeast Asia

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Abstract Predictions warn that the annual mean warming across land in Asia will be approximately 3 °C (5.4 °F) in the 2050s and about 5 °C (9 °F) by the 2080s. Water surface temperatures are projected to increase 2 to 4 °C (3.6 to 7.2 °F). This region will experience more heat waves, heavy precipitation events, and cyclones than the present. Characteristics that make this region particularly vulnerable to the impacts of climate change are a high rate of poverty that spans across many Asian countries, the susceptibility towards endemic illnesses, and increasingly dense populations that reside along coastlines and low-lying areas. This chapter focuses on four countries in South and Southeast Asia: Cambodia, China, Philippines, and Vietnam, each with characteristics that make them susceptible to climate change. Cambodia has a high rate of poverty and an agricultural sector that is climate dependent. China is seeing a rapid and massive migration from inland to coastal areas as well as urbanization. The Philippines is an archipelago. The country is not well equipped to respond to effects of climate change partly due to its geography as well as such factors as poverty and poor infrastructure. Like China, 74 % of the population in Vietnam is concentrated along the coastal plains and river deltas with an equally large urban population distributed in low lying areas. How will the Asian population react to the impact(s) of climate change on the physical environment (e.g., food production and water resources, ecosystem degradation, and coastal regions) that have a direct influence on their livelihood and culture? Projection of cultural shift rests on key and significant

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changes that include migration patterns from coastal to inland, diversification of livelihood (e.g., change agricultural practices), and solutions to protect valuable water resources. Together, these shifts will impact the economy, social structure, and culture across multiple and interlocking scales as we know it today.

12.1 East and Southeast Asia Introduction

Asian societies are uniquely tied to the traditional, socio-cultural values of self-reliance and the importance of family and community over the self-centered desires of the individual (Kim 1994). It is the ideal of individual responsibility that is most valued, where respect for authority (family, elders, etc.) and fulfilling one's duty in society maintains harmony and repels chaos. But is it possible, in a postmodern, over-consuming world, for the mythic narrative to guide us towards a necessary shift in global responsibility where the individual, regardless of geographical location, gains a sense of moral obligation toward the betterment of mankind and the environment? Is it possible for postmodern societies to reclaim a sense of union and harmony between man, nature, and the spiritual realm in order to secure Earth's salvation and continued renewal?

Asia is a region defined by its connection with myth, tradition, and nature. Myth not only creates culture and value systems, but it also provides a means to understand the past, creates strategies for living in the present, and inspires visions for the future. To understand the significance of myth in modern times is to reflect on its meaning and importance to humankind throughout the centuries, which may offer clues on how people in this region may react to climate variability. Specifically in Asia, mythic iconography remains a part of everyday life, and it is represented in its architecture, art, and literature. For example, the Naga, a kind of serpent-being originating from Hindu and Buddhist mythologies, remains embodied in much of South, East, and Southeast Asian societies. Known as the keeper of the force of life stored in the world's rivers, lakes, and seas, in a sense, the Naga is a protector and teaches us that mankind's carelessness and disrespectful actions toward nature and the environment will bring suffering and negative outcomes to society.

The Flood myth is one of the most prevalent mythological themes throughout Asian culture. According to an ancient Flood myth from Thailand and Laos, at the beginning of time, the "Thens" or sky gods ruled the heavens while keeping a deep connection with the Earth (Oxford University Press 2004). For many agricultural societies of the past, the Flood myth was a climactic narrative that described how the moral sins of mankind could ultimately cause destruction on Earth. However, the myths provided for potential renewal as long as man respected the gods and followed their teachings, and therefore, man could regain a sense of harmony with nature and existence. David Clines, in his essay, "Noah's Flood I: The Theology of the Flood Narrative," analyses the biblical Flood story and contrasts it with other Flood stories. Clines suggests that, "in the Hebrew setting the Flood is fundamentally a narrative of God's dealings with man, and the Flood is an expression of His will and activity" (Clines 1972 p. 132). Explaining the causes of the Flood have many interpretations

depending on cultural origins, however, it is plausible that it was not only man's sin, but his arrogance that brought on this turning point between renewal and destruction and was the natural result of the chaos created by the masses of humanity (Clines 1972).

It is here where the postmodern culture finds itself today: a world that is experiencing a period of transition where certain actions are needed in order to cope with the chaos man has created. What actions must we take today in order to prepare for future consequences of global climate change? Can myth help steer our decisions as the postmodern culture shifts from one of "limitlessness" towards "harmony and balance?" Life on Earth can no longer be sustained through our selfish ways and over-consumptive behavior because, as the Flood myth reminds us, the world cannot sustain a limitless life.

Asia is the world's largest and most populated continent. Nearly 4 billion people, or two-thirds of the Earth's total population, currently reside on a land area that covers 75 % of the Earth's surface (IFAD 2011). Asia can be broken down into five sub-regions: Central/North Asia, West Asia, South Asia, East Asia, and Southeast Asia, and it extends over four climatic zones (boreal, arid and semi-arid, tropical and temperate) (UNFCCC 2007). Countries within Asia may encompass more than one climate zone (tropical, arid, humid subtropical, and highland), depending on factors such as latitude, elevation, prevailing winds, and proximity to moderating effects of water (Weightman 2002). For example, due to its complex topography and variation in elevation, China is largely identified by its continental monsoon climate, but it is also divided into seven climatic zones that range from tropical/sub tropical in the south to sub-arctic in the north (Met Office 2011).

Monsoons are the seasonal wind systems that originate over the Indian Ocean and southern Asia and blow northeast during the summer and southwest during the winter. They are a benefit to most of the region. The summer monsoon brings heavy and sustained rainfall, whereas the winter monsoon typically introduces drier conditions. The negative effects of monsoons are flooding and destructive runoff that damages crops and infrastructure. Positive impacts are precipitation to areas of drier conditions and higher temperatures as well as for agriculture. Monsoons also play an important role in determining population densities especially in the fertile alluvial plains where rice production is abundant (Pearson Education 2007).

This introduction serves to provide context to the forthcoming discussion of climate change in Asia. In particular, this chapter focuses on East and Southeast Asia and will specifically discuss the present and future impacts of global climate change with focus on the countries of Cambodia, China, Philippines, and Vietnam (Fig. 12.1). The authors attempt to detail the daily life of people and what impact climate change will have on their culture and way of life, leading to speculations of potential large-scale cultural shifts. The challenges, perhaps confronted long ago as retold in myths past, are very real and worthy of consideration as we face the inevitable impacts of climate change.



Fig. 12.1 East and Southeast Asia regions

12.2 Cambodia: A Country in a World of Environmental Struggle

12.2.1 Introduction

Cambodia is a war-torn country that is currently in the midst of its own reconstruction, striving to emerge from a violent legacy of civil war and genocide into a future of peace and stability. The atrocities committed by the Khmer Rouge during its bloody tirade in the 1970s was essentially a Marxist assault on Western ideology that left nearly 2 million people dead and destroyed the country’s education system, religion, government, and industry sectors. The creative and intellectual elites were expeditiously singled out as enemies of the regime and murdered. It is difficult to determine the true costs associated with the total decimation of a culture, and it will take years to provide young Cambodians the education and skills necessary to solve contemporary problems in a rapidly changing and complex world. Today, Cambodia’s future is uncertain as the global economy redefines regional identities and countries in Southeast Asia struggle to cope with shifting markets and fragile economies. In the

twenty-first century and beyond, Cambodia will face new challenges in the wake of global climate change where increasing poverty, threats to food security, and disease will put new strains on the country, its people, and the region as a whole.

Cambodia (13°00' N, 105°00' E) (CIA 2011) is located on the mainland of Southeast Asia and borders the countries of Laos to the north, Vietnam to the east, and Thailand to the west (CIA 2011). The Gulf of Thailand is situated along the southern border, providing a coastline of 443 km (CIA 2011). Cambodia's total land area of 176,515 km² is characterized by several major physiographic divisions, such as the Cardamon and Elephant Mountains in the southwest, the Dangrek Mountains in the north, and the Eastern Highlands in the northeast. Fertile wetlands and paddy fields are found in the central plains and surround the Tonlé Sap, or otherwise called, the Great Lake. Throughout the year, temperatures remain relatively consistent with an average-mean temperature of 27.7 °C (81.86 °F) and a relative humidity of 80 % (Asian Development Bank 2011).

With a total population of 14,701,717 (July 2011 est.), 80 % of Cambodians live in rural areas and 20 % in urban cities (CIA 2011). Descended from the ancient Khmer people and the Angkor Empire that dominated much of Southeast Asia between the tenth and thirteenth centuries, Cambodians are largely identified as Khmer (90 %) but other ethnic groups include Vietnamese (5 %), Chinese (1 %), and other (4 %) (CIA 2011). Ninety-five percent of the population speaks the native Khmer language and practices Theravada Buddhism (CIA 2011).

Cambodia's primary natural resources are oil and gas, timber, gemstones, iron ore, manganese, phosphates, and hydropower potential (CIA 2011). There is a diverse array of industries, including tourism, garments, construction, rice milling, fishing, wood and wood products, rubber, cement, gem mining, and textiles. Primary exports are clothing, timber, rubber, rice, fish, tobacco, and footwear (CIA 2011).

The country's economy is considered a "mono-culture economy" where agriculture is the prominent employment and rice is the single most dominating crop (National Intelligence Council 2010). Eighty percent of all farmers in Cambodia grow rice and a majority of them (60 %) rely on rice production for their daily caloric needs (United Nations 2009). Despite the country's wealth of natural resources and a variety of industries, the agricultural sector remains an essential part of Cambodian life where it contributes 33.4 % to the GDP and employs more than 57.6 % of the labor force. In 2010, Cambodia's economy reported a growth rate (GDP) of 6 % (2010 est.), with garment and tourism sectors contributing the most. However, both the garment and tourism sectors experienced losses during the global economic downturn in 2008 to 2009 (United Nations 2009).

12.2.2 The Mekong River and the Tonlé Sap: Cambodia's Lifeline

Cambodia has a unique and profound relationship with its water resources. The Mekong River Basin and the Tonlé Sap, or Great Lake, nourishes Cambodian culture and the country's socioeconomic well-being. Called the "Mother of All the Waters"

and the 12th longest river in the world, the Mekong originates from melting snows in the Tibetan Himalayas and travels through the countries of China, Myanmar, Thailand, Laos, Cambodia, and Vietnam. It is one of the most diverse fisheries in the world and plays an important role in industry, agricultural development, and transportation. Centrally located in the northwest section of the country, the Tonlé Sap is the largest freshwater lake in Southeast Asia and crucial towards fishing and wet-season rice cultivation as well as restocking the Mekong River Basin fisheries by providing nursery habitat for migratory river fish species.

Both the Tonlé Sap and the Mekong River have a unique relationship with the monsoon, a wind system driven by cyclic air changes over Central Asia that brings two distinct seasons to Cambodia each year. The dry Southeast monsoon brings cooler temperatures and drier air during the months of November through May, and the wetter Southwest monsoon brings sustained and heavy rainfall during the months of June through October. At the end of the rainy season, high water levels in the Mekong empties into the Mekong Delta with such volume and force that the river of the Tonlé Sap reverses direction and flows upstream, emptying into the Great Lake (Sommer Heidhues 2000). This phenomenon causes the lake to increase over three times its original size from an area of 2,500–3,000 km² during the dry season to 10,000–16,000 km² during the rainy season (Asian Development Bank 2007). Flooding of the surrounding plains produces rich deposits of silt and fertilized fields as well as an abundant harvest of fish. With fish being the primary source of animal protein in the Cambodian diet, the lake is vital in providing over half the fish consumed in Cambodia, or about 41,740 t per year (Saburo et al. 2006). However, these natural wetlands are currently under threat by climate change as variations in flood hydrology and water chemistry affect biodiversity, food security, and peoples' livelihoods.

12.2.3 Projected Climate Change in Cambodia: Key Vulnerabilities

Cambodia is vulnerable to the effects of climate change due to its high rate of poverty, fragile food and water supplies, and an agricultural sector that is climate-dependent. Nearly 80 % of Cambodians live in rural areas, most of whom depend on subsistence agriculture in order to survive (United Nations 2009). Increasing temperatures, flooding, and drought will likely impact the poor by making it more difficult to grow crops, driving them into deeper poverty (Ministry of Environment of Cambodia 2011). Increasing poverty will exacerbate the immediate issues of inadequate nutrition, insufficient access to sanitation and clean drinking water, and sub-standard healthcare. Therefore, the human toll as a result of climate change will be significant as the severity of poverty increases, rural to urban migration ignites, and water-related diseases, such as malaria and dengue, are unleashed. In addition, it is likely that civil unrest could erupt as more people become desperate for shrinking resources.

It is estimated that Cambodia's average temperature is expected to increase by 1.35–2.5 °C (2.43–8.87 °F) and annual rainfall is expected to increase between 3 and

35 % from current levels by 2,100 (United Nations Development Programme 2010). These changes could result in damages to infrastructure, reduced crop yields, forest degradation, loss of wet and dry forest eco-systems, coastal flooding, pest infestations, and more volatile ground and surface water supplies.

Forest fires are also expected to increase due to hotter and drier climate conditions (National Intelligence Council 2010). Sea-level rise is expected to cause saltwater intrusion and coastal flooding that will threaten Cambodia's port facilities and transport infrastructure involving the areas of trade, oil and gas, tourism, and fisheries (Ministry of Environment of Cambodia 2011). Also, it is predicted that the timing and onset of the monsoon will also be affected where the rainy season will be shorter and wetter, and the dry season, drier and longer. Heavier rainfall during the wet season will cause more frequent flooding of greater intensity, especially after 2030 (Penny 2008). Additionally, a delay in the timing of the monsoon is expected to occur by 10 to 15 days between 2030 and 2070, which will adversely impact agricultural communities and the volume of harvest (National Intelligence Council 2010).

Recent climate trends could reveal possible future implications for Cambodia and its people. For example, between 1998 and 2002, a high prevalence of flooding and drought caused severe disruptions in rice production, where floods accounted for 70 % of the losses and drought accounted for 20 %. The total damages caused by flooding during this period amounted to \$ 205 million and resulted in 438 casualties, population displacement, and damages to crops and infrastructure (Cambodia National Mekong Committee 2010). The drought of 2002 was quite widespread, affecting eight provinces, damaging more than 1,000 km² of paddy fields, and causing food shortages for over 150,000 people (Cambodia National Mekong Committee 2010). Future climate trends, especially those that threaten Cambodia's rice harvest over multiple seasons, could likely result in humanitarian and economic suffering throughout Cambodia and the region (National Intelligence Council 2010).

In order to cope with the consequences of climate change, Cambodia will need to invest in a robust food distribution network and develop its infrastructure. Currently, only 18 % of Cambodia's arable land is irrigated, which accounts for the fact that rice production in Cambodia lags behind its neighbors. Although, wet season farming accounts for approximately 80 % of Cambodia's total rice crop, and irrigation is only necessary during the dry-season months of November through May (CDRI 2011), future rainfall variation and possible delays and timing of the wet season monsoon will make irrigation systems more critical in producing higher food yields. In addition, improved roads, rail systems, and airports are also important to Cambodia's future food security, especially as rural-to-urban migration shifts the country from one of self-sufficiency to dependency. To assure the efficient transport of food and products to both urban and remote areas in need, an improved infrastructure will be necessary.

The poor are especially vulnerable to the consequences of climate change because they don't have adequate resources to recover from climate-related shocks. According to 2007 World Bank statistics, 56.5 % of Cambodia's total population lives on less than \$ 2.00 a day and 28.3 % lives on less than \$ 1.25 per day (The World Bank 2011a). When having to cope with certain shocks, many choose to reduce the amount and quality of their daily food intake, purchase food on credit, cut healthcare expenses,

sell their belongings, and increase their household debt (Ministry of Environment of Cambodia, & UNDP Cambodia 2011). In addition, many of the poor will need to relocate because of forced evictions and landlessness.

Migration is expected to affect the poor as a consequence of climate change. As natural disasters and climate-related shocks become more prevalent, it is expected that the rural poor will have little choice but to migrate towards other areas in search of arable land and work. This could have adverse effects on poverty because the family is often left without a father, further deteriorating the economic well-being of the household (Ministry of Environment of Cambodia, & UNDP Cambodia 2011). Urban areas will most likely see the largest increase of migrants, however, it is unlikely that Cambodia's primary cities of Phnom Penh, Battambang, and Siem Reap will be prepared for an influx of refugees needing special services, jobs, and housing. For example, Phnom Penh currently has a sizable population of squatters and urban poor communities numbering 250,000 people, or 20 % of the city's total population (United Nations 2011). Unable to afford decent shelter, many live in informal settlements and makeshift shacks with little protection or amenities. These settlements consist of rooftops (9 %), along railroad tracks (5 %), riverbanks and canals (26 %), and on open land (4 %). Urban poverty introduces additional problems, such as corruption, drug abuse, prostitution, and sex trafficking. With limited work skills and only a narrow range of industries and job opportunities available to them, many of urban poor work for as little as \$ 1 per day in factories, construction, street vending, scavenging, or as cycle-taxi and motor-taxi drivers (Asian Coalition for Housing Rights 2001). During economic downturns, workers who lose their jobs are forced to either return to their rural villages or remain in the cities, settling for work where conditions are often brutal.

One important mitigation strategy to alleviate poverty is education. One-half of Cambodia's population is under the age of 20, and each year, many of the young enter the work-force searching for new opportunities. The problem that many young Cambodians face is their educational limitations, which narrows future employment prospects. Although improvements have been made in the areas of education, there remain many problems. For example, rural families often have to choose between a child's education and the family's daily survival needs, especially during planting and harvest times. With all hands needed to assure a successful crop, children are often taken out of school throughout the school year in order to work in the fields. Additionally, many families don't have sufficient incomes to pay for school expenditures, such as school uniforms and fees, making the provision of education for their children difficult. For others, rising fuel and food costs leave parents with little alternative than to pull their children out of school in order to scavenge for food or to seek work to supplement the family income (International Institute for Educational Planning, & UNESCO 2011).

12.2.3.1 Manmade Threats to the Environment Versus Climate Change

In a recent conference report, "Southeast Asia: The Impact of Climate Change to 2030: Geo-political Implications," the National Intelligence Council concludes that

human-induced environmental challenges will be the greatest concern to the future of Southeast Asia (NIC 2010). Dam building on the Mekong River Basin, deforestation, and over-fishing are all potential threats to Cambodia and the region as a whole because these activities will not only add to the severity of impacts caused by climate change but could also threaten future mitigation strategies. Since the 1960s, eight hydroelectric dams have been proposed along the Mekong River in China and 11 in Southeast Asia. Coupled with deforestation, the three dams completed in China have negatively impacted local climate conditions, soil fertility, and water and fishery resources. Dams block important nutrients that migratory fish need to survive. In addition, dam construction slows river speeds, which increases the likelihood of saltwater intrusion into the Mekong Delta, an area critical to local rice production in Vietnam (Gray 2011). Because dam development changes the water flow volume and timing, water quality deteriorates, causing a loss of biodiversity of aquatic life.

Large dam projects will threaten the more than 60 million people who depend on the Mekong River Basin for their livelihoods and the health of their communities. The basin is one of the most plentiful inland fisheries in the world and provides a staple diet for 300 million people where 80 % of nutritional animal proteins come from fish. In Cambodia, inland fisheries contribute 16 % to the country's GDP and provide incomes, jobs, and food security. And, as previously mentioned, the Mekong River and its tributaries play a vital role in the flooding of the Tonlé Sap, which provides excellent growing conditions for rice and vegetables. As climate change results in rainfall variability, river flows will become increasingly unpredictable, more frequent droughts will make dam projects uneconomical, and extreme rainfall will cause greater dam failures and catastrophic flood releases (International Rivers 2011).

Deforestation is another problem for Cambodia where a high proportion of poor people rely on wood for cooking and heating. With less than 20 % of Cambodians having access to electricity, wood charcoal is the primary energy source for many families and accounts for approximately 80 % of the country's national energy consumption (United Nations 2009). However, large-scale logging for sale and export, illegal logging, and poor conservation strategies are other factors affecting deforestation in Cambodia.

12.2.3.2 Imagine Cambodia in 2050

Predictions are difficult to make as there are simply too many physical geography factors to consider, and culture is not stagnant as people change to adapt to the environment in flux. However, we offer various scenarios that consider how humans may react, adapt, and survive in the inevitable environmental changes. Imagine that the past 50 years leading up to the year 2050 have been a whirlwind of change as countries around the world adjusted to new paradigms of identity. Advancements in technology and communications democratized modern life by bringing information to people in the farthest reaches of the globe, opening an international dialogue never experienced before. The topic of climate change has been argued, defended, and debated, and mitigations have been enacted, retracted, and revised. The world

in 2050 is in a state of flux as a global population approaching 9 billion¹ deliberates a changing culture of uncertainty: a culture that calls for a new sense of morality, responsibility, and courage.

The climatologists were correct with most all of their predictions, that increased carbon emissions in the atmosphere would cause an approximate 2 °C (3.6 °F) rise in global mean temperatures by the year 2050. Again, they were correct in predicting that Cambodia's annual rainfall would increase up to 35 % and the average temperature would rise another 2 °C (3.6 °F) by the year 2100. It is undeniable that the climate is warmer than years past, and rainfall, or the lack of it, has become more variable. Natural disasters occur more frequently, such as droughts, forest fires, flooding, sea-level rise, and increased incidents of typhoons and landslides. The result is that the human toll has been significant where poverty, disease, loss of livelihood, threatened food and water security, mass migration, civil unrest, and border clashes have become a new norm, not only for Cambodia, but also for its neighbors, Thailand, Laos, and Vietnam. These countries, once fierce competitors over territory and borders, are now distracted by an even greater cause where climate change is demanding that they work more closely and collaboratively with one another in order to find solutions to the environmental and socio-political problems before them.

Protection and conservation of the region's water resources is the number one issue on the collaborative agenda. Connected by a vast network of river systems, the countries of Cambodia, Thailand, Laos, and Vietnam are creating strategies to protect their rivers from the kinds of irresponsible development that occurred the decades before. Although previously warned, once the ecosystems began to suffer, the river volumes crashed or dried up, and peoples' livelihoods began to disappear, only then did the countries wake up to the fact that to continue development at such a pace was unsustainable.

Poverty continues to be, a persistent problem in Cambodia and the region. Once an issue local in nature most countries dealt with the poverty within their own borders and localities. However, a variable climate that threatens food security and peoples' livelihoods is requiring that countries in the region collaborate to find strategies to cope with the growing poverty epidemic. It is important to assure regional stability as natural resources become scarce, and mitigations are being discussed between countries to address landlessness, poor nutrition, unhealthy drinking water, inadequate health care, education, and agricultural methods. The most practical way to deal with the consequences of climate change is to find strategies to lessen the likelihood of future poverty by providing resources in the native country where the poor at least have a chance to rebound from natural disasters and climate stress without having to divide or uproot their family to find a better life.

12.2.4 Culture-Shift in Cambodia: Imagine a Bright Future

For Cambodian Buddhists, "to be Khmer is to be Buddhist." With 95 % of Cambodians identifying themselves as Buddhist, many have a deep belief in the law of karma,

¹ 9 billion is the expected population in the year 2050

as evident in the notion of self-reliance and the consequences of human actions, reincarnation, redemption, and non-violence. Cambodian Buddhism believes that human suffering is inevitable, and non-violence and respect for all forms of life on Earth should be regarded in one's journey, despite one's suffering (Severino et al. 2010). The future of Cambodia depends on its people, at both the national and local level to work together to find solutions that best mitigate the consequences of climate change. Cambodian culture will shift from one originally born from courage and inventiveness (the Khmer civilization and Angkor Wat, 802 to 1220 CE) to one of endurance (foreign occupations throughout Cambodia's history), survival (civil war and the Khmer Rouge 1060s to 1970s), and finally to a culture of resilience (climate change into the twentyfirst century). The Cambodian people will be required to create adaptation strategies that will best serve their communities and assure their ability to rebound from climate shocks. It is here where education, poverty reduction, management of water and forest resources, and agricultural development are most critical, but the key component to success in all these areas is creating a culture of resilience where inner-strength and flexibility merge into an unwavering force.

Climate change has presented a profound challenge to Cambodia, the region, and the world where progress, fundamental to our human experience, must be interpreted and acted upon differently. Can we move into the future by practicing the right-action and respect for all living beings? Is it possible to have progress that includes respect for the environment and the natural world? Is resilience enough to get us through an onslaught of natural disasters and other consequences brought upon by global climate change? These are difficult questions to predict, however, the Cambodian people, known for their warm smiles and welcoming demeanor, will remain a strong people who are hopeful that a "bright future" will come if right actions are taken to bring peace and stability to a country that has been through so much.

12.3 Case Study of China 2050–2100

12.3.1 Introduction

China has one-fifth of the world's population, and has become the largest greenhouse gas emitter since 2006 (Vidal and Adam 2007),² although its per capita emissions are lower than many industrialized countries (International Energy Agency 2010). China is a country experiencing rapid economic growth, increasingly integrated into the globalization process in the last three decades. However, it is equally vulnerable to the impacts of global climate change as it compounds the pressures on the environment associated with rapid urbanization and industrialization (IPCC 2007; China's Progress Report on Climate Change 2009, 2010). As such, how China responds to global climate change has important implications for the future of the

² There is a debate regarding the greenhouse gas emissions data in China from different agencies. See Wang et al. (2010).

global condition (Watts 2010; McKibben 2011). Much of China's official discourse on mitigation strategies has been framed within enhancing the efficiency of resource usage and encouraging new technology development for alternative energy sources. There has also been call for changing lifestyles to be more low-carbon. Some Chinese authors began to question the current development path and call for the option to return to China's traditional ways of living in harmony with nature, including an article published in People's Daily newspaper (Lu 2011). This is in parallel with a growing discussion of global capitalism's role in contributing to climate change (e.g., Baer 2008). In particular, cultural shifts, taking place or desired, are worthy of further investigation within different social and political contexts, as they will shape peoples' behavior and adaptation to climate change.

In what follows, a brief introduction to China's basic profile is provided and a discussion of major observed changes regarding climate change in the country. This is followed by projections of the possible impacts of climate change at the end of this century as well as mitigation and adaptation strategies.

12.3.2 China's Socioeconomic and Natural Resources Profile

China has a total land area of approximately 9.6 million square kilometers (approximately 3.7 million square miles), with an extremely diverse terrain ranging from high plateaus and deserts in the west to plains, deltas, and hills in the east (CIA Factbook 2011). The arable land was estimated at 1,086,000 km² (419,307 square miles) in 2008, around 10 % of the world's total. The total cultivated area was around 1,225,000 km² (472,975 square miles), including the arable land and area with permanent crops (Food and Agricultural Organization 2011). Most of China is located in the northern temperate zone with an extremely diverse climate ranging from tropical in the south to subarctic in the north (CIA Factbook 2011). The population is unevenly distributed with 90 % residing in the eastern half. With the implementation of the one-child policy since 1979, China's total fertility rate has decreased from 6.11 in the early 1950s to 1.64 in the late 2000s (United Nations Population Division 2010). China's fertility is expected to remain low, although it is unclear whether the one-child policy will remain in place in the future (Riley 2004).

China has undergone tremendous social and economic changes after the implementation of the Reform and Opening policies in the late 1970s, which aimed to change a centrally planned economy to a market-oriented one. Since the economic reforms, China experienced an average of 10 % annual growth rate, and it became the second-largest national economy after the US in 2010. Its GDP per capita (PPP) is \$ 7,600 (2010 estimate), ranking 126th in the world (CIA Factbook 2011). The high economic growth rate has lifted millions of people out of dire poverty and brought forth the rise of an urban consumer class (Tilt 2010), but it has also caused enormous challenges, including growing social and economic inequality, environmental degradation, and mass labor migration (Riley 2004). This rapid wealth and social improvement has caused a surge in energy consumption (Table 12.1). China is the

Table 12.1 Energy production and consumption profile

Item	Data
Electricity production/consumption	3.451 trillion kWh (2008 est.)/3.438 trillion kWh (2008 est.); both ranking 2nd ^a
Electricity exports/imports	16.64 billion kWh (2008)/3.842 billion kWh (2008) ^a
Oil production/consumption	3.991 million bbl/day (2009 est., ranking 5th)/8.2 million bbl/day (2009 est., ranking 3rd) ^a
Oil proved reserves	20.35 billion bbl (1 January 2010 est.) ^a
Natural gas production/consumption	82.94 billion cu m (2009)/ 87.08 billion cu m (2009) ^a
Natural gas proved reserves	3.03 trillion cu m (1 January 2010 est.) ^a
Coal proved reserves (million tons)	114,500 (2009e) ^{a, b}
Coal production/consumption (million tons oil equivalent)	1552.9/1537.4 (2009e) ^{a, b}

^a CIA Factbook (?)

^b BP Statistical review of world energy (2010)

world's number one consumer of coal and the third largest consumer of oil in 2009 (Riley 2004). Much discussion has focused on China's coal production and consumption, especially because the scale of its demand and supply has a significant impact on greenhouse gas (GHG) emissions (Rui et al. 2010). Coal has dominated China's energy supply since the 1950s, which currently provides two-thirds of China's energy demand (Sun 2010; Ma 2010). While China's energy policy implemented in the 1980s attempted to reduce reliance on coal, the share of coal in total primary commercial energy has always been higher than 60 % (Sun 2010). More recently, the Chinese government has focused on nuclear and alternative energy development (CIA Factbook 2011) and made efforts to phase out inefficient production plants (Ma 2010). However, a significant reduction of coal energy production remains very challenging in the foreseeable future (Sun 2010) as coal has been a key element of China's economic growth (Rui et al. 2010).

Cities have been recognized as important sites to address the climate change challenge (Schroeder and Bulkeley 2009). Satterthwaite's research (2008) suggests that cities are responsible for 75–80 % of the world's greenhouse gas emissions, including direct emissions derived from production and indirect emissions from consumption. Meanwhile, cities provide opportunities of innovation and new ideas to combat climate change (Schroeder and Bulkely 2009). Thus, China represents a significant case study when examining the impact of urbanization, associated climate change challenges, and opportunities.

China's rural-to-urban migration is unprecedented in modern times. Beginning in the mid-1980s, the implementation of the household responsibility system resulted in significant agricultural growth. This created a wide wage gap between the urban and rural areas. In addition, the persistent labor demand from industry in coastal regions has contributed to phenomenal rural-to-urban migration (Meng and Zhang 2001; Zhao 2003). For example, it is estimated that the number of migrants has increased rapidly from 8.9 million in 1989 to 23 million in 1994 (Zhao 2003). China's urbanization rate rose from 20 % in 1980 to 46.5 % in 2009. The urbanization rate is

projected to increase beyond 70 % by 2050 (Steinbock 2010). As such, the need for more urban infrastructure and services will increase, begging the question of how to manage high energy consumption and lower greenhouse gas emissions of city dwellers in big cities (Lei et al. 2011).

12.3.3 Observed Climate Change Trends in China

The models developed by the 2007 Intergovernmental Panel on Climate Change (IPCC) predict that the global average temperature will increase between 2 °C and 5 °C (2.6 to 9 °F) (Chap. 3 by North of this book; IPCC 2007). In the past five years, the official discourse in China has paid more attention to addressing climate change issues than it has in the preceding years as is evidenced by the state's recent publications of annual assessment reports (Ma 2010).

In particular, it is noted that the average surface temperature in China has increased by 1.1 °C (1.98 °F) from 1908 to 2007, slightly higher than the global average increase during the same period (China's Policies and Actions for Addressing Climate Change Progress Report 2008). The northwest, northern, and northeast parts of China have been more affected by the warming trend, while the region south of the Yangtze River has had a less significant warming trend. The temperature increase is more significant in winters such that there have been 20 consecutively warmer winters from 1986 to 2005 (China's Policies and Actions for Addressing Climate Change Progress Report 2008). The warmer climate has caused less rainfall in northeast and northern China. However, increased precipitation is seen in western China, areas close to the Yangtze River Valley and the southeastern coast of China (IPCC 2007). Water deposits in the form of glaciers are melting at a higher rate in recent years in northwest China (Pu et al. 2004; IPCC 2007), reducing in volume by 21 % in western China during the past decade (PRC National Communication on Climate Change 2004). The long-term impacts of glacial retreat are the drying of major rivers in northwestern China as their primary water source is from glaciers (Cyranoski 2005). Rising temperature has led to permafrost degradation such as in the Yellow River source region in western China (Ding et al. 2005).

In the past 50 years, significant changes in the frequency and strength of extreme weather events have been observed. For example, north and northeast China have experienced stronger droughts, while southeast China and the downstream region of Yangtze River have had higher rates of flooding (Lei et al. 2011). The runoff from several major rivers has decreased significantly during the past two decades (Wang et al. 2009), a result of climate change and unsustainable resource extraction (Wang et al. 2003). In order to meet current rising water demand in the north, the Chinese government plans to carry out an ambitious project to divert water from Yangtze River in the south to the north.

Where some areas experience flooding, other areas are plagued by drought and wetlands are drying up due to a decline in precipitation (Pan et al. 2003). Though there is limited evidence of climate-related biodiversity loss in Asia, a significant

number of plant and animal species have moved to higher altitudes and latitudes due to the climate change in many parts of Asia (IPCC 2007). Rising sea levels along China's coastlines have been observed since the 1950s. However, over the past 50 years, the sea level is rising at an average rate of 2.5 mm/year (~0.1 in.) along the coast, slightly higher than the global average during the same period (Lei et al. 2011). Sea-level rise, along with severe droughts and unregulated groundwater withdrawal, have resulted in sea-water intrusion in the coastal region of China (IPCC 2007).

12.3.4 Imagining China in 2050–2100

It is difficult to predict the future, and it is equally challenging to precisely pin down the impacts of global climate change as it differs across scale and place. However, it is worth imagining what might take place in the future based on our current human practices and actions. This section seeks to sketch scenarios of the impacts of climate change on China, mainly through two perspectives: the socioeconomic condition and the predicted climate trends. Following these discussions of future social and physical changes is an illustration of the future impacts and vulnerabilities regarding food production, water resources, and ecological degradation along coastal regions.

Future Socioeconomics

The Chinese government views economic development as a key driver of future policy. In this regard, the state generally recognizes the importance of enhancing energy efficiency, but also maintains that economic growth necessarily increases the greenhouse gas emissions. An official report outlines several challenges regarding the future reduction of greenhouse gas emissions (China's Policies and Actions for Addressing Climate Change Progress Report 2008). First, there is a large population with lower-than-world-average GDP per capita. Second, the urbanization level is low compared to the world's average. Moreover, there is great regional disparity and inequality between the rural and urban population. Third, the level of scientific development and innovation capacity is low. As such, the government stresses that economic development and living standard improvements are still the most urgent task China faces (China's Policies and Actions for Addressing Climate Change Progress Report 2008).

In the next few decades, China is projected to continue its economic growth, although the rate of GDP growth may be slower than the past. China is forecasted to surpass the United States as the world's largest economy in the 2030s, with a GDP per capita at around \$ 30,000 (Dadush and Stancil 2009). According to the 2010 Revision of the United Nations World Population Prospects, China's population is estimated to be 1,295,604 by 2050 and 941,042 by 2100 (United Nations Population Division 2010). While the population is projected to fall in the next century, it is very likely that growing resource and energy consumption will produce greenhouse gases.

China has a large population living under poverty, a factor that has contributed to an influx of rural to urban migration. Along with the rapid urbanization processes, poverty will pose enormous pressure on the environment in China. Already experiencing resource depletion, China is facing “very grave” environmental issues, acknowledged by its officials (New York Times 2011). The current problems of environmental degradation (e.g., air and water pollution, soil erosion, and biodiversity decline) and climate change share some key traits regarding their sources. As pointed out in Ma (2010), they are both caused by the country’s single-minded, GDP-oriented growth strategy and its heavy reliance on coal. Meanwhile, similar solutions can make improvements, such as stronger environmental standards, reforestation, and developing more renewable energy sources.

Future Climate Trends

Based on IPCC’s Fourth Assessment Report (AR4), warming will accelerate in the twenty-first century compared to that of the twentieth century. Among the seven sub-regions of Asia identified in AR4, the warming trend is stronger over South Asia and East Asia and greatest in the continental interior region. The models also suggest that there will be an increase in annual precipitation in most of Asia during this century but with regional and seasonal variations (IPCC 2007). The predictions written about this region are not based on IPCC’s worst case model, but the chapter in this book written by Michael Jennings suggests that the next century will be affected by IPCC’s predicted A1FI SRES scenario, the worst projection.

The warming trend in China is expected to accelerate in the twenty-first century. The ground temperature in China can be 2.3–3.3 °C (4.14–5.94 °F) higher by 2050, and 3.9–6.0 °C (7.02–10.8 °F) higher by 2100 (PRC National Communication on Climate Change 2004). The warming will be stronger in the northern areas than in the southern regions. In particular, the temperature in northwestern China may increase by 1.9–2.3 °C (3.42–4.14 °F) by 2030, projected increase by 1.6–2.0 °C (2.88–3.6 °F) in southwestern China, and in the Tibetan Plateau it may increase by 2.2–2.6 °C (3.96–4.68 °F).

Average precipitation in China is predicted to increase in the next 50 years. By 2050, the precipitation may increase by 5–7 %, with the largest increase occurring in southeastern coast (Lei et al. 2011). In the North China Plain, it is expected to have less precipitation, which will intensify the existing water shortage in this region, a limiting factor on agricultural production and economic development. Melting rates of glaciers in the Tibetan Plateau and Tian Mountains in western China will accelerate, decreasing its area by 27 % by 2050 (IPCC 2007). This means ice storage in the high mountainous areas in western China will decrease, significantly affecting the seasonal glacier melt water flow to rivers (Ding et al. 2005). If the temperature rises by 3 °C (5.4 °F), the permafrost of the Tibetan Plateau will undergo severe loss of area by 58 % and a rising sea level. The frequency of extreme weather events is also expected to increase, which will have a large impact on socioeconomic development and everyday life (Lei et al. 2011).

Future Impacts and Vulnerabilities

Scientists have assessed the impacts of climate change on China since the 1990s. Overall, climate change may bring different challenges across the regions. For example, southern China may experience instability of agricultural production and more severe flood disasters, while northern China may have the aggravation of water shortages, and coastal zones may experience high incidence of typhoons and storms (China's Policies and Actions for Addressing Climate Change Progress Report 2009). Reports focus on the impacts most closely related to the economy, in particular, water resources, agriculture, natural ecosystems, and the coastal zones (PRC National Communication on Climate Change 2004).

Food Production and Water Resources

Climate change poses significant challenges to food security in China (IPCC 2007). There are different estimations on the impacts of climate change and CO₂ fertilization effect on crop yields (IPCC 2007). Simulation models based on the present cropping system, crop varieties, and management levels suggest that food production can be reduced by 10 % due to climate change and extreme climate events between 2030 and 2050. There will be an overall decreasing trend for wheat, rice, and maize yield in China (PRC National Communication on Climate Change 2004).

Adopting the A2 scenario by the IPCC,³ Wang et al. (2010) suggest that the projected impacts of climate change on grain production range from -4 to +6 %, and the effects on crop prices range from -12 to +18 %, depending on the assumptions regarding CO₂ fertilization. Specifically, if the CO₂ fertilization effect is not considered, grain production will fall relative to 2030 reference scenario, with rice dropping by 5.6 %, wheat 5.0 %, and maize 5.1 %. If the CO₂ fertilization effect is taken into account, rice production will decrease by 0.1 % during the projected period while wheat and maize production will increase by 5.9 and 2.1 % respectively. Overall, crops that depend on rain are projected to be much more severely affected by climate change than irrigated crops. Higher incidences of drought and rising temperatures will increase water demand per unit of cropland area and negatively affect crop yields. Wang et al. (2010) suggest that overall, given the assumptions noted above, the impact on China's grain self-sufficiency is moderate since the changes in trade account for a small percentage of China's total demand. This study also suggests that the reduction of crop yields without CO₂ fertilization will lead to the rise of crop prices, and in turn farmers' income will be compensated in this way. However, this will have significant impacts on consumers from the southern region for whom rice is a staple crop. In particular, the poor will bear more significant burden if the price of rice goes up.

³ Which assumes a heterogeneous world with continuous population growth and regionally-oriented economic growth.

The impacts of climate change on agriculture will have significant regional differences (Wang et al. 2010). In the northeast region, agricultural production will benefit from increasing temperatures. But the North China Plain, already facing water scarcity and rising temperatures, will experience more droughts and higher water demand. The projected precipitation decrease in this region will exacerbate water shortages and have significant impacts on crop yields. In northwestern China, projected increases of precipitation will not be enough to offset the chronic water shortages that limit agricultural production. Meanwhile, flooding in southeast China is projected to become more serious, and the average yields are expected to decrease. In other parts of south China, rising sea levels may lead to a reduction of crop areas (Wang et al. 2010).

Water usage and management has been a very important issue in China because of the small number of water resource per capita (around 30 % of the world average level) and uneven distribution of water in the country.⁴ In the next 50–100 years, the mean annual runoff is likely to decrease in some northern provinces and regions, while it is likely to increase remarkably in water-abundant southern provinces and regions. As such, climate change is likely to increase the frequency of droughts and floods, and it will intensify the water scarcity condition in northern China. “In most provinces, water supply and demand will show general imbalance in the next 50–100 years” (Shen 2010, p. 1067). Climate change will further aggravate the per capita water shortage problem in western China. Such trends will generate tremendous challenges for agricultural and industrial development, drinking water needs, and settlements close to the flood plains.

Ecosystem Degradation and Coastal Regions

Rising temperature will have impacts on the distribution of vegetation zones. Climate change will have the most obvious impacts on the forests in southwestern, central, and southern parts of China. While climate change will not have obvious impacts on the geographical distribution of forest, the productivity and yield of forests might increase to some extent due to carbon fertilization. However, the forest fixed biomass might not increase because of the increased likelihood of more disease and pest problems with warming temperatures, coupled with the likelihood of forest fires with higher temperatures (Rosenzweig et al. 2001). With the advent of warmer winters, pests and insects will be able to survive in areas previously too cold for them (IPCC 2007). Rises in temperature may also lead to a greater possibility of forest fires and extending the duration of wild fire season, particularly in northern Asia (Vorobyov 2004). Forecasts predict that climate change can reduce growth of grasslands and increase the bareness of the ground surface, which in turn can lead to increased reflection of solar radiation, thus adding to the acceleration of grassland degradation (Zhang et al. 2003; cited in IPCC 2007).

⁴ http://www.fao.org/nr/water/aquastat/countries_regions/china/index.stm

Simulations model relative sea-level increases over China's five typical coastal zones, ranging from 31 cm to 65 cm by 2100. This will result in greater coastal erosion with adverse effects on fresh water supply along the river mouth (PRC National Communication on Climate Change 2004) and causing havoc on the livelihoods of the large coastal population, about 60 % of China's total population.⁵ For example, a cost-benefit analysis predicts that the cost of adaptation to a 65-cm sea-level rise in the Pearl River Delta, located in southern China, will be approximately \$ 400 million (Hay and Mimura 2006).

The poorest and marginalized populations will suffer the most from the fragile ecosystems in "geographic peaks" such as the Tibetan Plateau (Watts 2010). For example, many nomads' livelihoods in western China will be heavily impacted by climate change due to grassland degradation. Water scarcity, along with other environmental degradation, may lead to large groups of environmental refugees. The impacts may also result in more conflicts and tensions among different ethnic groups (Watts 2010).

12.3.5 Mitigation and Adaptation Strategies

This section discusses the mitigation and adaptation strategies in China from both state agencies and non-governmental agencies, which have also shifted over time based on various economic, social, and political conditions. The international community has increasingly called for global cooperation to address climate change. With respect to mitigation policies, China has received both sharp criticisms and high praises from many observers and analysts. On the one hand, China stresses its priority of economic growth, relying on coal as the primary source of energy in the near future. While carbon sequestration technology has been considered an important development for China's energy production, the country's greenhouse gas emissions are expected to grow significantly in the next few decades. China pledges to cut its carbon intensity (emissions per unit of GDP) by 40–45 % from 2005 through 2020. To reach this goal, it has made significant strides in the last 5 years to address energy conservation, lower pollution, and develop a renewable energy industry through policies and incentives. Examples of China's proactive steps include published policies,⁶ detailed strategies,⁷ and programs.⁸ A 10,000 Enterprises Program has just been introduced in the 12th Five-Year Plan in 2011.

⁵ http://www.loicz.org/about_us/nodes/node3/index.html.

⁶ e.g., the first white paper on climate change, entitled "China's Policies and Actions for Addressing Climate Change," was released in 2008, subsequently followed by an annual report.

⁷ e.g., the newly released 12th Five-Year Plan has put climate change and environmental issues in primary position for the first time (Seligsohn and Hsu 2011).

⁸ e.g., the Top-1000 Energy-Consuming Enterprises Program, launched in 2006, sets energy-saving targets and monitors their implementation by China's 1,000 highest energy-consuming enterprises (Ma 2010).

Most recently, China has taken an aggressive push at home by setting legislative agendas and policies to address climate change (Ma 2010). For example, the government aims to produce 15 % of its energy from renewable sources by 2020, which is increased from 9.9 % in 2009. Developing hydropower and nuclear energy is also on the priority list of the state's plan. China is a world leader in small and large hydropower projects, and it is home to the world's largest hydropower potential at approximately 384 gigawatts (GW) (Tullos et al. 2010). If the nuclear energy production plan is implemented, China will become the world's highest installed capacity of nuclear energy (70 GW) by 2020 (Seligsohn and Hsu 2011). Other incentives include funding electric vehicle projects, issuing more stringent fuel efficiency standards for urban vehicles, and installing millions of energy-saving light bulbs in public facilities and locations throughout the country (Ma 2010). The government has mandated that all newly constructed buildings comply with energy-saving standards (Ma 2010). These incentives are embedded in the discourse of developing a "circular economy," which emphasizes resource reuse and recycling as well as a "low-carbon economy" (China's Policies and Actions for Addressing Climate Change Progress Report 2010). Consequently, China has become one of the most rapidly growing markets for green or renewable energy technologies. In particular, China became the world's largest market for wind energy and the world's largest maker of wind turbines (China's Policies and Actions for Addressing Climate Change Progress Report 2009) and solar panels (China's Policies and Actions for Addressing Climate Change Progress Report 2010).

China is currently focusing its energy on the production and supply side to reduce greenhouse gas emissions. Gradually, the focus will change to the consumption and demand side as well. There is advocacy for "low-carbon" lifestyles and "low-carbon" cities (Lei et al. 2011). The government has carried out a range of programs for public education, which includes projects such as "The Thousand Families Carbon Emission Survey and Public Education Project," "Plant Trees, Participate in Carbon Compensation, Reduce Carbon Footprint," and "Climate Change and Health" to guide citizens to cope with the effects of climate change and live a more low-carbon life (China's Policies and Actions for Addressing Climate Change Progress Report 2009).

Meanwhile, there are growing grassroots efforts in addressing environmental issues (Watts 2010). International non-profit organizations, such as the World Wildlife Fund, have also played an important role in addressing the impacts of climate change in China (Lei et al. 2011). In the discourse of the "low-carbon city" development, the current focus is to reduce the carbon emission intensity (Lei et al. 2011). The emphasis on promoting a low-carbon urban lifestyle includes developing more efficient public transits and green buildings.

While much attention has been given to urban lifestyles in addressing climate change, scholars have called for more attention to the changes occurring in rural practices to reduce carbon emissions (Jiang 2008). It is important to investigate the variable living conditions both in the urban area and rural regions to address effective ways of combating the effects of climate change. For example, many wealthy farmers

have started to use energy-intensive appliances, such as air-conditioners, refrigerators, and microwave ovens as well as coal for heating and cooking, while the traditional bioenergy sources like straw and animal waste have been ignored (Jiang 2008). Research on the usage of straw as livestock fodder to promote circular energy use in rural areas was carried out in the village of Jiangjia in Shandong Province. This village had a population of 923 and an average of 728 m² of land per person. In this project, straw was used to feed cows. The dung was converted into organic fertilizer and methane gas that was used as energy for heating and cooking. The villagers became self-sufficient in energy with a small surplus that could be sold to urban areas (Jiang 2008). As a result, the village increased its stock of cattle fifty-fold, which were fed almost entirely on previously discarded straw. Over half of the entire village (123 households) installed methane generators. Consequently, the entire village saved 41.6 t of coal, reducing emissions by 133 t in a year. Jiang (2008) further suggests that if a similar project is implemented into China's 3.2 million villages, the nation could reduce 853 million t of CO₂ emissions every year, a promising way of avoiding global warming in rural China in the second half of the twenty-first century.

Despite the advances China has made, mounting challenges remain. China's rapid industrialization and urbanization in the past 30 years at an unprecedented rate is achieved mainly through a "high-carbon" economic development path, resulting in severe environmental damages (Tilt 2010). Tilt's (2010) study of the struggle for sustainability in rural China provides a very insightful and thought-provoking illustration of how environmental problems are not limited to economic and technological issues but also highly embedded in certain social, political, and cultural conditions. While China has rich philosophical traditions in Taoism, Buddhism, Confucianism, and folk religion that emphasize harmony between people and nature, much of this environmental ethic has been erased from the collective consciousness in twentieth-century China through campaigns such as the Cultural Revolution (Tilt 2010, p. 5). The Mao era left a significant legacy where people view the environment as being separate from humans, and it is to be conquered for development and their well-being (Tilt 2010; see also Watts 2010). Yet, in recent years, there has been a significant shift in China's environmental discourse and practices, which show stronger efforts and commitments to the concept of sustainable development (Tilt 2010). As Tilt puts it, "The global discourse of sustainable development is currently undergoing a process of sinicization" (Tilt 2010, p. 12). There are also burgeoning collective efforts, termed as "civil society" by Tilt, in addressing and combating environmental issues. However, the concept of sustainable development itself is a point of contention as the central government, the district government, the township government, industrial managers and laborers, and farmers have different views of sustainable development. Moreover, these policy efforts stop short of "acknowledging and addressing the unequal distribution of environmental threats inherent in the capitalist development paradigm" (Tilt 2010, p. 160).

Overall, existing research in China has primarily focused on how the climate change impacts economic development. Much more research is needed to assess the impacts of the changes on the environment and how it relates to society. The mitigation and adaptation strategies noted previously are mainly focused on the national

level as this scale of policy making, along with global cooperation, has been recognized as an important means to combat climate change. From these policies, people are encouraged to live simpler lifestyles that rely less on fossil fuel and consume less. Yet, much of these strategies are framed within the global capitalism framework (Baer 2008). It is important to note that there has been growing environmental activism from both domestic grassroots organizations as well as international non-governmental organizations in China (Watts 2010). This is in parallel to the dynamic decentralization of China's political economy and globalization. The local media also plays an active role in reporting news related to climate change (Geall 2011).

While there has been a shift in the discourse regarding the need to address climate change in China's domestic policies, the prospect of increasing urbanization and economic growth, along with the rise of a new consumer class, poses difficult questions regarding resource depletion, environmental degradation, and greater emissions of greenhouse gases (Watts 2010). The recent renewable technology development in China, while praised by many observers, remains a small portion of the overall energy budget that heavily relies on coal. There are also questions about the degree of actual implementation of these environmental regulations and energy conservation. Richard Edmonds stated

China's environmental problems [...] cannot be solved solely through price reform or regulatory policies. If the country is to feed and clothe all its people and provide a good standard of living in the next century, China needs strict population control, extensive environmental education, increased wealth and infrastructure, political stability, and a more open society where information can be obtained and opinions freely expressed. The degree to which these goals are met in the coming years will have far-reaching implications not only for China's environment but for the whole earth (Edmonds 2003, pp. 276–278).

Moreover, a number of authors argue that global warming is “ultimately rooted in a capitalist treadmill of production and consumption” (Baer 2008, p. 59). Baer (2008, p. 61) continues to suggest that “We need to start thinking about an alternative global system, one committed to meeting people's basic needs, social equity and justice, democracy, and environmental sustainability.” This will, of course, be a very difficult task to create alternatives to meet the needs of over a billion people. Recognizing the possible directions and challenges in addressing climate change, a highly complex and dynamic process, is an important step ahead.

12.4 Philippines and Climate Change: Environment and Culture Fluxes

12.4.1 Introduction: A Brief Geography of the Philippines

The Philippines is an archipelago composed of more than 7,100 islands, and it lies within the region referred to as the “Pacific Ring of Fire.” It is characterized by three island groups known as Luzon, Visayas, and Mindanao. The topography of the bigger islands is generally composed of mountains, plateaus, and plains. The

mountain systems have a generally north-south trend, which greatly affects rainfall patterns over the country. These mountain systems are effective barriers against the monsoon winds (SW Monsoon) coming from the South China Sea during the summer and from the north and northeast (NE Monsoon) during the winter. They cause orographic rainfall that replenishes groundwater, dams, and irrigation systems in the country. However, more often the rains they bring are just too much to contain and thus results in flooding.

The Philippines is located in the eastern periphery of Southeast Asia between latitudes 4°23' to 21°25' N and between 116 to 127° E. Lying within the tropics, it is situated directly in the path of tropical cyclones that form over the northwest Pacific basin and those from the South China Sea. On average, approximately 19–20 cyclones enter the Philippine Area of Responsibility (PAR), either passing through or making landfall (PAGASA 2011). Either way, these cyclones induce the SW monsoon system that originates from the Indian Ocean and passes over the islands of Indonesia and the South China Sea toward the Philippines.

12.4.2 Climate Patterns Over the Islands

The Philippine archipelago lies in the northern tropics. It experiences warm to hot temperatures during the months of March to August, and cool to warm temperatures during the rest of the year. Humidity is high during the months of June to September, which is also the period when most tropical cyclones would affect the country. According to the Coronas classification, the country is divided into four rainfall regimes (PAGASA 2011, PIDS 2005) as given below.

Type I has two pronounced seasons: dry from November to April and wet throughout the rest of the year, with maximum rain period between June to September. The areas that experience this type are the western parts of Luzon, Mindoro, Negros, and Palawan. These islands are shielded by mountain ranges but are open to rains brought in by the southwest monsoon and tropical cyclones.

Type II is characterized by the absence of a dry season but with a very pronounced maximum rain period from November to January. Those areas located along the eastern coasts such as Catanduanes, Sorsogon, eastern part of Albay, eastern and northern parts of Camarines Norte and Sur, eastern part of Samar, and large portions of Eastern Mindanao have this type of climate.

Type III is where seasons are not very pronounced but are relatively dry from November to April and wet during the rest of the year. Areas in the western part of Cagayan and Isabela in Luzon Island, parts of Northern Mindanao, and most of Eastern Palawan experience this type of climate. They are partly sheltered from the trade winds but are open to the southwest monsoon and are also frequently affected by tropical cyclones.

Type IV is characterized by a more or less even distribution of rainfall throughout the year. Areas experiencing this climate include the northernmost part of the Philippines—Batanes, Northeastern Luzon, Southwest Camarines Norte, west of Camarines Sur, Albay, Northern Cebu, Bohol, and most of Central, Eastern, and Southern Mindanao.

12.4.3 Variability in Temperature and Rainfall Patterns

According to the study by PAGASA (2011), the mean annual temperatures in all areas in the Philippines are expected to rise by 0.9–1.1 °C (1.62–1.98 °F) in 2020 and by 1.8–2.2 °C (2.01–3.96 °F) in 2050. Likewise, all seasonal mean temperatures will also have increases in the said time periods with the largest temperature increase projected during the months of March, April, and May (PAGASA 2011).

The same study has projected varied trends in magnitude and direction of rainfall changes especially with regards to the behavior of the southwest and northeast monsoons affecting the country. The usually wet seasons will become wetter, and the usually dry seasons will become drier.

Variation in rainfall patterns determines to a great extent the cropping patterns in the agricultural regions of the country. An important factor that may influence this variability is the enhanced atmospheric greenhouse effect due to rising temperatures associated with increasing concentrations of greenhouse gases (Pajuelas 2000). Given the current trends and increasing variability in rainfall, many farming regions, particularly the rain-dependent farms, would be most affected. As various studies have shown, rainfall variability affects economic activities in agricultural countries, such as the Philippines, where rain-fed agriculture contributes a significant percentage to domestic production (Pajuelas 2000).

Jose and Cruz (1999) showed in their assessment of the country's water resources that changes in rainfall and temperature will affect the inflow of water into the reservoirs, particularly those that supply water to Metropolitan Manila. The results demonstrated that increasing variability in rainfall could likely decrease runoff and lead to an insufficient supply of water to the metropolis, worsened by the increasing demand for water as the population continues to grow.

Lasco (2007) showed that changes in rainfall and temperature could affect the major watersheds in the country and alter the streamflow. It was projected that by 2080 rainfall in one of the major watersheds of the country, the Pantabangan-Carranglan Watershed (PCW), will increase by as much as 12.7% while the temperature will increase by more than 5% of the average observed daily values between 1960 and 1990. This will cause an estimated 17% increase in the wet season streamflow and around a 35% decrease in dry season stream flow of the said watershed (Lasco 2007). Flooding may be expected in the areas surrounding the watershed and will likely affect the lowland farms. However, during the dry season, an increase in water shortage may occur due to the demand brought by growing population.

According to the IPCC (2007) report, the temperature has increased by 0.14 °C (0.25 °F) per decade since 1971. The frequency of hot days and warm nights also rose while the number of cold days and cool nights decreased. Subsequently, there has been an observed redistribution of rainfall over the islands. The trend shows decreasing rainfall over Luzon and some parts of Mindanao, increasing towards the Visayas in the central part of the Philippines (Anglo 2006).

12.4.4 Vulnerable Islands: What Lies Within?

The Philippines ranks the 10 most vulnerable country to climate change (Maplecroft 2011). In addition, according to a 2005 World Bank study, the Philippines ranks third after Taiwan and China, and Vanuatu among the countries most vulnerable to natural disasters, with the most number of hazard types and a 36.4 % of maximum population exposed to hazards (Alave 2011).

The geographic location puts it at risk of hazards (tropical cyclones, earthquakes, volcanic eruptions, El Niño-induced droughts, flooding, and storm surges) and increasing incidences of pests and diseases as consequence of exposure to these hazards.

Taking the case of Manila, this capital city of the Philippines is “extremely vulnerable to the effects of climate change due to a combination of exposure to hazards, poor socio-economic factors, and a low capacity to adapt” (Maplecroft 2011). This puts an estimated 12 million (National Statistical Coordination Board) Filipinos residing in metro Manila at risk of flooding and other typhoon-related events.

In September 2009, Tropical Storm Ondoy (International Name Ketsana) passed over the metropolis and induced the Southwest Monsoon. It dumped 455 mm (17.91 in.) of rain over a period of 24 h, of which 341 mm (13.42 in.) were received in just 6 h (PAGASA 2011). It was considered one of the worst flood brought by a tropical cyclone to hit Metro Manila in this century.

Experiences of intense tropical cyclone activity, such as tropical storm Ondoy, lead to deliberate shifts in lifestyle and adaptive strategies. Filipinos are known to be resilient people with their Christian faith as a pillar, which offers strength in times of adversity. To a great extent, their faith has helped them cope with hardships and has made them resilient. With the changing times, their faith has become even stronger. However, this has also enforced a “used-to-it” attitude that may be detrimental to their own adaptive capacities.

Since the tropical cyclone is a regular visitor to the country, it has become an integral part of life. Despite its regularity, the coping mechanism of the people is always tested whenever a cyclone hits the country. Every time this happens, loss of property, destruction of public infrastructure, and loss of lives and livelihoods put the Filipino spirit to test. Most would say they have gotten used to this event and that they would be ready to face an even stronger one. However, as tropical cyclones continue to affect the Filipino society in varying intensities this “used-to-the-event” attitude may need to be assessed.

12.4.5 Storm Surge and Accelerated Sea-Level Rise

Tropical cyclone activity also puts the coastal areas of the Philippines at risk of storm surge aggravated by the accelerated sea-level rise (ASLR). Perez, et al. (1999) conducted a vulnerability analysis of sea-level rise of the cities and municipalities around the Manila Bay area from the physical and socioeconomic standpoints. The

results of the study predicted that 19 municipalities and cities of Metro Manila and nearby provinces could be inundated by a 1 m (3.28 ft) rise in sea level, which could further lead to saltwater intrusion that affect agricultural activity as well as water quality. Further, even if settlements along the bay survive this phenomenon, they could be vulnerable to severe storm surges. Based on the analysis of tropical cyclone formation trends and passage over the PAR, there is no increase in occurrence frequency, but there is a slight increase in the number of tropical cyclones with maximum sustained winds greater than 150 kph and above that exhibited during El Niño events (PAGASA 2011).

12.4.6 The Challenge of the El Niño (and La Niña)

With increasing greenhouse gas concentrations, Timmermann et al. (1999) showed, through the use of a global climate model that more frequent El Niño-like conditions and also stronger cold events (La Niña) may develop in the tropical Pacific Ocean. Since the first event of the El Niño phenomenon was recorded in the climate history of the Philippines, it has become one of the greatest challenges the country faced. Several major episodes (e.g. 1982–1983, 1997–1998), which resulted in severe drought conditions, brought devastating effects to the country. For a country whose agricultural production relies mainly on regular rainfall, severe episodes of drought threaten food security and economic growth. Drought could cause grave energy crisis that affect industries and the economy.

12.4.7 Adaptation Strategies

The Philippines has a population of more than 92 million in 2010 and is projected to increase to 120 million in 2025 and to 141 million in 2040 (NSCB 2012). Given the current rate of population increase, under common conditions and current trends of the economy and lifestyles, more pressure will be put on the country's dwindling resources (e.g. forests, land, water, etc.). As the country faces the challenge of climate variability and related disasters, it needs to rethink its adaptive strategies. Adaptation requires a change in mindset and collective action by the local communities. Numerous conferences, seminars, and workshops have been conducted on disaster risk reduction and management. However, best practices still need to be identified and shared.

A shift in thinking toward safety of self and safety of family should be instilled in the people. Having lived with the hazard for a long time has resulted to the "used-to-it" attitude of most people, especially those who think that there's nothing they can do but accept their fate and therefore, they must learn to live with the situation. This kind of mentality has prevailed and strengthened (especially among the marginalized sectors, e.g. the informal settlers) maybe with the hope that a supreme being will eventually

help them overcome these adversities. This belief has reinforced the “come-what-may” attitude, which to some extent increases their vulnerability to disastrous events. Authorities come to rely on people’s resilience instead of properly dealing with the issue. This becomes a vicious cycle and does not lead to decreasing vulnerabilities, but instead, increases the people’s risks.

12.4.8 Climate Change as a Moral Issue

Climate change is a reality. It is not only an environmental or a cultural issue, it is even more of a moral issue. According to the statement of the United States Catholic Bishops’ Conference in 2001, “global climate change is not about economic theory or political platforms, nor about partisan advantage or interest group pressures. It is about the future of God’s creation and the one human family. It is about protecting both ‘the human environment’ and the natural environment” (Lieberman 2012).

The following guiding principles may be taken into consideration as we take responsibility of the Earth’s resources for those who come after us: “acting with a sense of prudence in the face of uncertainty; protecting the poor and most vulnerable; working toward a common good; and promoting human solidarity—with one another and with future generations” (Lieberman 2012). Lieberman further states that in order for people of faith to address issues on climate change, they should also understand the science. Activities should be focused on grassroots efforts to educate people and shape individual behaviors related to consumption and energy use, as encouraged by Dan Misleh, Executive Director of the Catholic Coalition on Climate Change.

12.4.9 Cultural Shifts Due to Environmental Fluxes

Environmental changes brought by climate change would likely bring about cultural shifts in different sectors of society. Temperature changes could bring significant shifts to agricultural patterns as the temperatures that exceed threshold values may cause spikelet sterility in rice (PAGASA 2011), which could lower yield production. This may be further aggravated by consequent changes in rainfall patterns. Since rice is a staple in the Philippines and in Southeast Asia, other crops, such as corn, may gradually become the staple crop as more areas used to growing to rice may not be productive anymore. In addition, increasing variability in rainfall patterns could lead to rain-fed farms converted to either corn fields or residential areas use as population pressure increases.

12.4.10 Future Scenarios: Philippines 2100

Considering the current trends and changes in both the physical and human geography of the country, two scenarios are predicted for the Philippines. The first is the path toward a grim future and the other toward a hopeful and brighter one.

Scenario 1: Environmental Shifts in an Archipelagic State and Negative Possibilities

At the rate that the sea level is rising and the coastal areas are being inundated, more and more islands, whether inhabited or not, will be submerged under water. It is predicted that, by 2100, the rise in sea level will be between 0.5–1.2 m (1.64–3.94 ft) (Mann and Kump 2008). Based on the simulation done by Muto et al. (2012) for Metro Manila, the city will experience an average of 29-cm (11.42-in) rise in local sea level in 2050 given a global temperature rise of 2 °C (3.6 °F). This may intensify flooding in most parts of the metropolis, while drought conditions may become severe in other parts of the country. Intense monsoon activity may enhance rainfall amounts, as in the case of tropical storm Ondoy in September 2009.

More people will be affected to the negative effects of flooding. Flooding has its own adverse impacts aside from loss of property and lives. For those who survive, there is the likelihood of contracting flood-related diseases, e.g. *Leptospirosis*.

Agricultural lands used for planting rice will be greatly reduced and the uplands will become the remaining frontier for agricultural production. However, not all upland regions can be used for agriculture due to steep slopes and limited water supply. Eventually, despite the need to maintain our forests, the increasing demand for land will soon give in to the demand for development as migration from inundated coastal lowlands will continue. This scenario may seem remote at the moment, but unless we do something about mitigating and adapting to these environmental fluxes, it is likely that the future generations will inherit this scenario.

Scenario 2: Cultural Shifts and Positive Possibilities

In order for a country like the Philippines to become more resilient and adapt to the negative effects of climate changes, gradual shifts in culture and attitude, including the mindset of the Filipinos, should take place. Either deliberately or by chance, there is a need to rethink adjustment processes from the individual level. Certain aspects of the Filipino psyche toward disastrous events need to change. One aspect is the “used-to-it” attitude previously mentioned. For most Filipinos, this attitude and their faith in the Almighty being has helped them cope with disastrous events with the hope that they will eventually overcome the situation. This attitude must be adjusted.

Disasters should be seen as reasons for adaptation toward climate change. People should rethink their strategies when afflicted with calamities and examine why they were affected in such manner. It is important that we know why we are vulnerable and how we are being affected by the changes in our environment. Adaptive capacities at the local level should be enhanced and developed even if it calls for a change in lifestyle of all the individuals in a community.

Maybe the challenge of climate change will propel the Filipino society to unite and adapt to the adverse effects. We must learn from the lessons of past events and work toward the strengthening of societal bonds that keep people united and strong.

Scientific and pragmatic solutions should be accompanied by a change in how we think—a change in perspective and a move toward greater valuing of the environment and living in harmony with it.

As the Philippines braces itself against the effects of a changing climate, it faces the challenge of what lies in the future. The disasters in recent years have taken a significant toll on hundreds of human lives and property in the country, yet, life must continue. As the challenge of global warming continues to be felt and as humans struggle to abate its effects, the social tapestry of the lives of the Filipinos is remolded over and over within the complex web of uncertainties with the hope of a better Philippines in 2100.

12.5 Climate Change and Culture-shift in Vietnam 2050–2100: Imagining a Future

12.5.1 Overview of Vietnam

Vietnam, officially the Socialist Republic of Vietnam, is situated in Southeast Asia. It borders China to the north, Laos and Cambodia to the west, and the East Sea, also known as the South China Sea, in the Pacific Ocean to the east and south. The total inland border of the country is 3,730 km (2,317 miles) with a coastline 3,260 km (2,025 miles) long. The mainland country lies between the latitude of 8°02' N to 23°23' N and longitude of 102°08' E to 109°28' E. The north-south length of the country is 1,650 km (1,025 miles), and its width, stretching from east to west, is 600 km (372 miles) at the widest point in the north, 400 km (248 miles) in the south, and 50 km (31 miles) at the narrowest part in Quang Binh Province, at the center of the country (Socialist Republic of Viet Nam Government Web Portal 2013). The total land area is approximately 331,051 km² (127,819.51 miles²) (General Statistics Office of Vietnam 2010). Hanoi is the capital of Vietnam, and Ho Chi Minh City is the country's largest city.

Vietnam occupies the easternmost part of the Indochinese Peninsula, a rugged, elongated S-shaped strip of mountains, coastal plains, and river deltas. The mountainous and highland areas, with altitude higher than 300 m (984 ft) above sea level, cover two-thirds of the country's territory. Ecologically, Vietnam is divided into four regions. The first region in the north and northwest is the mountainous southerly extension of China's Yunnan Plateau. The country's highest peak, Fan Si Pan (3,143 m or 10,311 ft), is located near its border with China. East of the highlands is the Red River Delta (Hong River Delta), a triangularly shaped lowland along the Gulf of Tonkin (an arm of the East Sea). To the south, the Truong Son Highlands run north-west to south-east, and an associated coastal plain forms the backbone of central Vietnam. The fourth and southernmost region is the Mekong River delta, a depositional area of flat land.

Vietnam has a dense river network containing 2,360 rivers with a length of more than 10 km (6 miles). The total length of all the rivers is 41,000 km (25,475 miles), and 3,100 km (1,926 miles) of canals, with a total flow of nearly 300 billion m³ of water (Water Environment Partnership in Asia n.d.). Vietnam has 15 river basins with an area of more than 2,500 km² (965 miles²) of which ten river basins are over 10,000 km² (3,864 miles²). These account for 80 % of the total area of Vietnam. However, two-thirds of the water resources originate in catchments outside the country, making Vietnam susceptible to water resource decisions made in upstream countries. The rainfall and runoff distributes unevenly over space and time. The rainy season accounts for 65 to 90 % of total annual rainfall in a three to six month period from May to October.

Vietnam has a population of approximately 85.789 million (Central Population and Housing Census Steering Committee (CPHCSC) 2010). This makes the country the third most populous country in Southeast Asia after Indonesia and the Philippines and the 13th most populous in the world. The average annual population growth rate between 1999 and 2009 was 1.2 % (Central Population and Housing Census Steering Committee (CPHCSC) 2010). Vietnam is in a post-demographic transition as evident in the population age structure. The proportion of population between 0–14 years old has decreased from 43 % in 1979 to 25 % in 2009 while the proportion of population between age 65 years and older has increased moderately from 4.8 to 6.4 % in the same time (UNFPA 2010b). The population density of Vietnam is 259 people per km², which is higher in the delta and coastal areas. Of the total population, approximately 76.3 % live in rural areas. Agriculture, forestry, and fishery sectors account for 53.9 % of the labor (Central Population and Housing Census Steering Committee (CPHCSC) 2010). Vietnam is home to 54 different ethnic groups. The Viet (Kinh) people account for 87 % of the country's population, living predominantly in the lowland areas, and the other 53 ethnic minority groups, over 8 million people, are scattered across the country, but mainly in the mountainous areas. Among ethnic minorities, the largest ones are Tay, Thai, Muong, Hoa, Khmer, and Nung with a population of approximately one million each. The smallest groups, Brau, Roman, Odu, each have several hundred people (The Committee for Ethnic Minorities n. d.). In 2007, the country's religions have totaled 23 million people, including Buddhism (10 million), Catholicism (5.9 million), Hoa Hao (1.4 million), Cao Dai (3.2 million), Christianity (1 million), Islam (0.67 million) (Lu 2009).

The Socialist Republic of Vietnam is a one-party communist state. The administrative hierarchy is composed of four levels: central, provincial, district/quarter, and commune. Administratively, Vietnam is divided into seven economic regions (Northern Midlands and Uplands, Red River Delta, North Central, South Central Coast, Central Highlands, Southeast, and the Mekong River Delta), and they include 63 provinces and municipalities, 642 districts, and 10,472 communes. At the central level, the National Assembly, the highest legislative body, is elected through a countrywide general vote. The government is the highest executive body of the state. At the local level, People Councils are elected through a general vote at the corresponding level (province, district, and commune). People Committees are the executive

bodies that are responsible to both the electors and the higher administrative authorities. The government, chaired by the Prime Minister, supervises provincial activities and adopts or rejects their decisions through the respective ministries. The provincial governments represent an important center of power and play a major role in formulating local development strategies. At the lowest level, a commune consists of several villages, which are a form of household community. Commune People Committees assign village heads who manage grassroots administration (Sekhar 2005).

Vietnam remains a politically stable and fast-growing economy. Since embarking on social and economic reforms in 1986, the country has become one of the fastest developing countries in the world and one of the best performing economies in the world in the last decade (World Bank n. d.). Real gross domestic product (GDP) has grown by 7.3 % per year on average between 1995 and 2005, and the per capita income increased by 6.2 % per year. In U.S. dollar terms, per capita annual income rose from \$ 260 in 1995 to a 2007 level of \$ 835. Vietnam entered the ranks of middle income countries by surpassing \$ 1,000 per capita in 2010 (World Bank n. d.). Agriculture is still playing an important role in the country's economic development, employing approximately 50 % of the workforce in 2010 (GSO 2010). The main exports are petroleum, marine products, rice, coffee, rubber, tea, garments, and shoes.

12.5.2 Climate Characteristics and Climate Change

The country's climate is influenced by (a) an inner tropic location (b) territory located in the boundary between the continent and ocean, and (c) diverse topography. Vietnam has a typical humid tropical monsoon climate. The mainland stretches for more than 15 degrees in latitude and is located in the tropical zone. The climate is characterized by high temperature and humidity all year round, especially in the rainy seasons. The average temperature is fairly uniform across the whole country and ranges from 21 °C (69.8 °F) in the north to 27 °C (80.6 °F) in the south. In the summer, average temperatures across the country is 25 °C (23 °C Hanoi, Hue 25 °C, Ho Chi Minh 26 °C).⁹ Vietnam receives a large amount of solar radiation with the number of sunshine hours from 1,400 to 3,000 hours/year. Average annual rainfall is from 1,500 to 2,000 mm (55.11 in. to 78.74 in.) and an average humidity is 80 % (GSO 2011).

Located in the boundary between continent and ocean, the climate is dominated by two main circulation systems: the Trade winds and Asian monsoons. Interacting with the Trade winds, the monsoons create a unique climate pattern which is characterized by seasonality.

Tropical monsoons occur throughout the territory of Vietnam, forming in regions with markedly different climates. Vietnam's climate changes by seasons and regions from low to high elevation, from north to south and from east to west. Due to the strong influence of the northeast monsoon and East Sea, the average temperature in

⁹ 80 °F (73 °F Hanoi, Hue 80 °F, Ho Chi Minh 79 °F).

Vietnam is lower than the average temperatures in many other countries in Asia at the same latitude. The climate features are split between north and south at latitude of 16°N marked by the Hai Van Pass. The region north of the Hai Van Pass is in a tropical monsoon climate with four distinct seasons (spring, summer, autumn, and winter), which are influenced by the northeast monsoon and the southeast monsoon. It has a long winter from 2 to 3 months, with average temperature lower than 18 °C (64 25 °F). The region south of Hai Van Pass is less affected by the northeast winter monsoon, and it is characterized by a tropical climate with high temperatures all year round, which is divided into two distinct seasons: dry and rainy. The annual average temperature is higher than 25 °C (80 °F) and no month is lower than 20 °C (68 °F). Due to the topographical structure, the climate is clearly differentiated by elevation. Although primarily a tropical country, Vietnam has subtropical and temperate climate regions. Some areas, such as Sa Pa and Mau Son in the north, have occasional snow in the winter, which is unusual for a tropical country. Vietnam is affected by some frequent adverse weather conditions, such as hurricanes,¹⁰ floods, droughts, hot and dry *foehn* wind, hoarfrost, and drizzly rain (Lap 1979; Thao 1990).

Climate Change Trends

Although there are some discrepancies in the results of research, it has been shown that Vietnam is undergoing a climate change. Evidence includes an increase in the temperature, changing rain patterns, and more occurrences of extreme weather patterns. In the last 100 years, the annual average temperature in Vietnam increased 0.1 °C (0.18 °F) per decade from 1,900 to 2,000, and 0.7 °C (1.26 °F) during 1951–2000, suggesting that temperature rose faster in the latter half of the century (ADB 2009). The rainfall does not have a clear and consistent trend but in comparison with the previous decade, the rainfall in recent years has decreased in most areas in the north but increased in volume and intensity in most southern regions (Cuong 2008 cited in ADB 2009). Both sets of data are consistent with projections of increased precipitation near the equatorial region (MONRE 2008, 2009). Data from tidal gauges along the Vietnam coasts show that sea-level rose at the rate of about 3 mm (0.12 in.) per year during the period of 1993–2008, while that at Hon Dau station in the north of Vietnam rose about 20 cm (7.87 in.) in the last 50 years (MONRE 2008).

Extreme Weather Events

In Vietnam, extreme weather events have increased and changed in the past several decades. These events take the form of typhoons, droughts, flooding, and heat waves. Over the last 50 years, the peak month for typhoon landfalls has shifted from August to November, and most of the storms now occur later in the year (ADB 2009; MONRE

¹⁰ Each year, there are between 6 to 10 storms and tropical low pressures.

2008, 2009). Typhoons have also tended to move to the lower latitudes. Droughts and floods now occur with greater frequency than before and affect mostly the central coastal provinces.

In the northern lowland area of the country, heat waves occur mainly in the summer, while in the south, they occur in the spring to summer period (ADB 2009). According to data of the Institute of Meteorology, Hydrology and Environment (ISPONRE 2009), in the period of 1961 to 2000, the cold front frequency has decreased by 0.49 events per decade, from 268 events in the decade of 1961–1970 to 249 events in 1991–2000. In that same period, tropical cyclone frequency that affects Vietnam has decreased by 0.43 events per decade, from 74 events in 1961–1970 to 68 events in 1991–2000. In fact, the decreasing trend of cold front and tropical cyclone frequency began in the time frame of 1971–1980, and it has been most obvious in recent years (ISPONRE 2009). In 1997, Hurricane Linda, an unusual storm, speedily formed and landed in the south of Vietnam, which is recorded as occurring only once in a century. In the twentieth century, Linda was the second largest, strongest, and most dangerous storm that caused damage and serious injury. It was responsible for 3,000 deaths (Hong 2006). In November 1999, a flood occurred in the central region of Vietnam, which held a record over several decades for its precipitation duration (Zoleta-Nantes 2007). Within 245 h, rainfall reached 1,384 mm (54.5 in.) in Hue, the highest rainfall recorded in the history of hydrology in Vietnam and ranking second after the world record of 1,870 mm (73.6 in.) measured at Reunion Island in Thailand Pacific in 1952 (UNCCD 2002). In 2008, Hanoi was hit by its worst floods in 35 years, causing massive damage and some 20 deaths while destroying 50,000 hectares of crops. As a result, the food prices at some Hanoi markets temporarily rose as much as 500 % during a week (VOA news 2008).

Climate Projection

There are different future scenarios for climate change in Vietnam developed by various international and national organizations. An updated version of these scenarios was officially published in 2009 by the Ministry of Natural Resources and Environment of Vietnam (MONRE), entitled, “Climate Change, Sea Level Rise Scenarios for Vietnam.” The MONRE scenario is the Vietnamese government’s official climate change scenario. This is the basis for impact assessment and building support programs to respond to the climate change in Vietnam, and it is widely used among agencies and institutes. According to MONRE (2009), which models a medium emission scenario, by the end of the twenty-first century, the mean surface air temperature in Vietnam will increase 2.3 °C (4.14 °F) as compared to 1980–1999. The predicted temperature increase is shown in Table 12.2. Following the increase of the average temperature in winter, the temperature in the northern climatic zone, including northern and northern central of Vietnam, would increase faster than those in southern climatic zone.

Table 12.2 Predicted temperature changes in Vietnam

Climate zone	Expected temperature Increase (°C)	Expected temperature Increase (°F)
Annual mean	1.6–2.8	2.88–5.04
Northern midlands and uplands	2.5–2.6	4.5 °F to 4.68
Red river delta	2.4	4.32
North central	2.8	5.04
South central coast	1.9	7.74
Central highlands	1.6	2.88
South	2.0	3.6

The Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report projects that rainfall may increase in intensity; however, this may occur in a shorter period, leading to flash floods and greater run off (ADPC 2003).

In Vietnam, an upward trend in the mean sea level has also been observed at an average increase of 2–3 mm (0.08–0.12 in.) per year (ADB 2009), or at a rate of 2–4 cm (0.78–1.57 in.) per decade, with the sea-level rise likely to be in the range of 65–100 cm (25.6–39.4 in.) at the end of this twentyfirst century (ISPONRE 2009).

Impact of Climate Change

A study of 84 countries reveals that Vietnam is among the countries most affected by the adverse impacts of global climate change (Dasgupta et al. 2007). In particular, the sea-level rise makes a large impact on land, population, GDP, urban areas, agriculture, and wetlands (Dasgupta et al. 2007). Seventy-four percent of the population of Vietnam is concentrated along the coastal plains and river deltas, which would be most affected by sea-level rise. A 1 m (3.2 ft) rise in sea level would directly affect almost 10 % of the current population (Dasgupta et al. 2007). In addition, the transportation infrastructure lines in the coastal areas (e.g., 1A Nation Highway, North-South railway) would be destroyed or damaged by the sea-level rise, alluvial sedimentation, and natural disasters such as typhoons and flooding. Abnormal fluctuations in the rainfall and upstream dam systems, which are controlled by neighboring countries, create a challenge for hydrology power stations in predicting flow rates (ISPONRE 2009). A warmer climate will also impact the seasonal structure of vector-borne diseases and infectious diseases, such as malaria, synoptic filariasis, Japanese encephalitis and other diseases common in humid tropical regions, which are exacerbated by warmer temperatures (ISPONRE 2009).

It is likely that climate change will impact both the natural and socio-economic environments in Vietnam. However, water resources and agriculture will potentially be the most vulnerable to impacts.

Impact of Climate Change on Water Resources

Vietnam has abundant water resources, but it is facing many challenges in management. The current challenge involves water resources management within the nation

and with neighboring countries, namely the uneven distribution of water resources due to diverse topography, water quality degradation due to economic activities, urban water pollution, and water shortage especially in the dry season. In the context of climate change, these challenges will be more intensified and severe. The management of water resources in Vietnam will be one of the most challenging topics this century as the impacts of climate change on water resources are interrelated with consequences for agriculture, river deltas, forests, coastal ecosystems, diseases and human health, and national security (NIC 2010).

Climate change may cause more frequent and intense storms in addition to the effects of El Niño and La Niña. These factors will lead to extreme events such as larger and more frequently large floods in the rainy season and more severe droughts in the dry season. The impact assessment of climate change on water resources in Vietnam river basins showed the strongest changes to occur in the Mekong and Red River Delta (ISPONRE 2009). In both these river systems, the decline in annual run-off is likely to be higher for low flow, and the surplus in annual run-off is likely to be higher for flood-top discharge. In medium and small rivers, annual run-off would likely reduce or increase by a similar or higher amount (ISPONRE 2009). In the Mekong region, the dry season rainfall will continue to decrease by at least 60 % in 2030 and by 90 % in 2050 as compared to rainfall at present (ADPC 2003). During large flood periods, the flood area of this delta can cover over 3 million ha (nearly 90 % of total land area), which will flood urban areas as most cities are slightly over 1 m (3 ft.) elevation. For the Red River Delta region, the climate change will likely increase upstream flooding by about 20 %, with flood peak discharges increasing by 11 to 25 % in 2100. Coupled with rising sea levels, rising water levels along the rivers may lead to endangering safety system reservoirs upstream and the nearly 3,000 km (1,864 miles) of dikes that protect the delta. This will result in excessive runoff and water flows to ecosystems that are already fragile due to poor land use planning and unsustainable use. Massive flooding, landslides, severe erosion of river banks, and sedimentation are possible scenarios.

Water quality is affected by many factors. Discharge from the industrial sector, urban activities, and agricultural production are its primary contributors. To exacerbate the problem, climate change is a factor that is leading towards declining water quality on a large scale due to increased drought and saltwater intrusion. In deltas and coastal areas, long dry seasons and decreased rainfall increases the risk of salinity, especially in the Mekong Delta. As sea level rises by 1 m (3 ft) by 2100, the area with salt concentration of 4 g/l will increase to 16,370 km² (6,320 miles²), and the total land area affected by salinity will rise up to 3 million ha. Water intrusion can reach 25–40 km (15–24 miles) inland in Red River Delta, 30–40 km (18–25 miles) in the central coast region, leading to land degradation and water pollution (Hoc 2009). Salinity will have a negative impact on the ecosystems, affecting brackish water and coastal living creatures (e.g., arcas and oysters), reducing mangrove forests (ISPONRE 2009), and leading to the decline or disappearance of subtropical fish, which have a high commercial value. In the context of global climate change, reduced rainfall especially in the dry season, when combined with droughts and floods, create a higher risk of water shortage.

The climate change, which will cause more serious water shortages and degradation, may threaten about 10 % of the population (8.4 million people) in Vietnam with a lack of fresh water by 2050. The central highlands, Mekong Delta, and central region will face serious water shortages when the dry season becomes longer and harsher. To regulate and allocate water resources, many multi-purpose reservoirs (e.g., irrigation, hydropower, aquaculture), have been or are planned to be built in Vietnam. During the dry season, there are conflicts between the irrigation, hydropower, and waterway navigation. Hydropower companies need water for producing power while agriculture requires water for irrigation and waterway navigation needs water to increase the water depth for waterway transportation. To preserve and protect the aquatic environment, the minimum flow in the rivers must be preserved while rice paddy fields need large volumes of water during the driest months. During the flood season, the dam's owners tend to release more water downstream for the safety of the dam while it should be stored in reservoirs for flood mitigation purposes. The situation may become even worse when conflicts arise from shared water resources with upstream countries. Almost 60 % of Vietnam's average yearly surface water flows are generated from other countries, especially from the Mekong River and Red River. The quantity and quality of the surface water depends on the use of water in the upstream countries. Ninety-five percent of the water in the Mekong River comes from outside of Vietnam, but it contributes about 50 % of national runoff. In the Mekong River, more than 50 reservoirs and spillways have been or are planned to be built. The dam is likely to cause droughts or large floods in the entire region (Nhuan et al. 2010). Some areas located both along the coast and rivers downstream, especially in the central coastal areas with narrow territory, are at highest risk of severe water shortage in dry season and extreme flooding in the rainy season. Moreover, these areas are often situated at the end node of the irrigation system, making the water shortage problem more serious.

Impact of Climate Change on Agriculture

In Vietnam, climate change is expected to have a severe impact on the agriculture sector. Climate change and sea-level rise can lead to reduced/loss of agricultural land, changes in structure and distribution of plants and animals and a reduction of food production. These will put domestic food security in danger and could lead to market fluctuation in world agricultural exports. The impacts of climate change on agriculture are even more serious because of several factors:

- The agriculture sector is distributed on plains and low lying coastal areas, making these areas vulnerable and most affected by climate change and sea-level rise;
- The level of agricultural development throughout the country is different across the regions. There is an overlap of a small, scattered production with relatively large scale, modern production, leading to poor adaptability of the sector; and
- There is a fight for the control of water resources for agricultural production.

These impacts are clearly demonstrated and may differ in scales, magnitudes and consequences between the agro-ecological zones.

Large areas of agricultural land in coastal wetlands, such as along the Red River Delta and the Mekong River Delta, will be occasionally affected by flooding and permanent sea-level rise. The wetlands that are affected and threatened by sea-level rise could be 1,700 km² (656 mi²), which is about 60 % of Vietnam's coastal wetlands (Hanh and Furukawa 2007). With a 1 m (3 ft) sea-level rise, this could lead to a loss of 40,000 km² (15,444 miles²) of land, occupy 21.1 % of the total land area in Vietnam (Hong 2006). Recently, the total paddy land area in Vietnam is approximately 40,000 km² (15,444 miles²), and it is estimated that half of this will be lost due to induced flooding and sea-level rise by the end of this century. In the Red River Delta, a loss of 5,000 km² (1,930 miles²) of paddy rice area will lead to a decline in rice production of about 2.7 million t per year (based on 2007 rice yields), which is equivalent to about 13 % of the 2007 total rice harvest in the delta (Hanh and Furukawa 2007; BingXin et al. 2010). In addition, an area of 15,000–20,000 km² (5,761–7,722 miles²) of agriculture land, mostly paddy rice land in the Mekong River Delta will be lost due to salinization or flooded areas (Hanh and Furukawa 2007). In a year with high flooding, over 90 % of the Mekong River Delta area will be flooded four to five months and over 70 % of the area will be affected by salinity greater than 4 g/l during the dry season (Hoc 2009; ISPONRE 2009). This delta, a “rice basket” that feeds as much as half the country's population, is the most at-risk area for climatic or environmental disruption (NIC 2010). Agricultural land area is further affected by desertification from droughts. Land degradation could reduce agriculture production and lead to potential risks. In the future, the north central region and central highlands will be the most vulnerable to drought, while the south central coast is at high risk of desertification. The situation is compounded by another factor in addition to climate change—the conversion of agricultural land to urban and industrial uses. The total land use for urban construction was 630 km² (243 miles²) in 1995, but it had increased nearly six times, reaching 3,251.95 km² (1,255.6 miles²) in 2005 and 3,909.14 km² (1,509 miles²) in 2007 (GSO 2011). The urbanization is fueled by an increasing population growth in the urban centers, either by birth or internal migration.

The temperature changes in Vietnam will impact farming practices as the planting boundary of tropical trees/crops will move towards higher mountainous regions and northwards. However, the adaptation of subtropical plants will become narrower. By the 2070s, the mountainous tropical trees will be able to grow at an altitude of 100–550 m (328–1,804 ft) higher than present and will move 100–200 km (328–656 ft) northwards in comparison with the present location (ISPONRE 2009). A change in plants/crops structure and the time of harvest will occur in some regions to adapt to climatic shifts, particularly with the increase and fluctuation of temperature. The number of days with temperature less than 20 °C (68 °F) will steadily decrease, while the number of days with an air temperature more than or equal to 25 °C (77 °F) will steadily increase, primarily in the mountainous areas of the north and the central highlands (ADPC 2003). In the north, long winters with an average temperature of lower than 20 °C (68 °F) for 25 to 30 days is a strong advantage in growing crops adapted to subtropical and temperate climates, such as cabbage, beans, and potatoes.

When the temperature increases from 2 to 3 °C (3.6 to 5.4 °F), winter in the north could be shorter thus affecting these winter crops.

Crop yield reductions due to climate change will vary widely across agro-ecological zones in Vietnam. The yield decline is estimated to be 4.3–8.3 % by 2050 in the Mekong River Delta, and more severe in the Red River Delta, estimated at a 7.5–19.1 % reduction. The central highlands tend to have the greatest crop yield decline under both dry and wet climate change scenarios (BingXin et al. 2010).

Sea-level rise has led to the decrease of mangrove and indigo forests as well as the forests planted along the coastal zone of south Vietnam. It is possible that the tropical forests may expand into higher mountainous regions and northwards with increasing temperatures. The threat of animal and plant species extinctions will increase with some important timber plants, such as aloe wood, boswood, textured wood, and siadora Vietnamese to become endangered. The increase in temperature and drought intensity may also lead to increasing occurrences of forest fires as well as the distribution of plant pests and diseases.

12.5.3 Imagine Vietnam from 2050–2100: Cultural Change

Socioeconomic Picture of Vietnam from 2050 to 2100

According to the United Nations' World Population Prospect, Vietnam's population peak is anticipated to be 104 million in 2045, and then it will decrease gradually to 82.6 million in 2100 as the population growth most likely stagnates (UN-DESA 2010). In 2050, Vietnam's population size should rank 15th worldwide and 3rd in Southeast Asia. During the three decades after 1975, the Vietnamese population was subject to some remarkable transformations: a reduction of the percentage of children (age 0–14), an increase of the percentage of people of working age (age 15–64), and a gradual increase of the percentage of elderly (65+). The household structure is becoming smaller in size with a lower dependency rate (UNFPA 2010a, 2010b). In the near future, Vietnam may enjoy the advantage of its Demographic Bonus period, but it also would have to consider the challenge of a rapidly aging society. The UNFPA population projections indicate that Vietnam will begin to experience a stage of Demographic Bonus from 2010 onward, and that this stage will last for about 30 years.

A Total Dependency Ratio, which is defined by United Nations, is the ratio of the sum of children (age 0–14) and the sum of elderly (65 and over) per 100 persons age 15–64 (UN-DESA 2010). The Demographic Bonus occurs when the total dependency ratio is less than 50, meaning that a person of a non-working age will be supported by more than two working-age persons. This trend can provide a country a great opportunity to increase its saving and socio-economic development during a certain period. How this demographic opportunity can be fully grasped depends on whether social, economic, and political institutions can realize their potential.

The early awareness of reaching this period of Demographic Bonus provides a great opportunity for Vietnam as the country can plan for high quality education and training, the full use of its labor force for economic growth and development, improvements in health care especially for youth and adolescents, and the design of a comprehensive social protection system (UNFPA 2010a, 2010b). At the same time, Vietnam must be aware of its rapid aging population trend, which may happen faster than the GSO indicated (GSO 2011b). The Vietnam population has officially entered the “aging” phase since the number of people over 60 accounts for nearly 10 % of its population due to rising life expectancy and falling birth and death rates. When the rate reaches 20 %, Vietnam will enter the “aged” population phase. The aging period in Vietnam will take only 15 years, which is much shorter compared to 40–100 years for western countries, 25 years for Japan, Malaysia, China, Thailand, and Indonesia, and 20 years for Singapore and Korea (Japan Center for Economic Research 2007). A rapid aging population rate may cause more stress on the society in terms of social welfare, including pension funds, and healthcare services for the elderly people—especially those in rural areas, and inequality between generations. It also impacts economic growth, investments, and savings. As the country has less time to prepare, a rapid aging population will be a burden for the development of the country unless appropriate policies, such as pension, insurance, health care policies, etc., are developed.

Economically, Vietnam is considered to be one of the 13 new emerging economies by PricewaterhouseCoopers UK (PwC 2011) or grouped as one of the 11 “Fast Growing, Converging Economies” by the Asian Development Bank (ADB 2011a). Vietnam is expected to enter the top 20 economies rankings in 2050,¹¹ and it has strong potential to maintain very high annual growth rate in the future (PwC 2011). Vietnam’s current average productivity and lower education level across the population, as compared to China and most other growing economies, means the country still has room to continue its relatively high potential growth rates. However, while it has a high potential growth rate, Vietnam’s GDP will only be 10 % of the US even by 2050, and hence it cannot be classed as a large economy when compared to China and India (PwC 2011).

Vietnam has a bright future, but it must overcome some major challenges and risks in order to sustain its growth momentum to enter a new level of economic development as an industrial country. These challenges include:

1. increasing inequities and disparities;
2. risk of falling into the Middle Income Trap;
3. competition for limited natural resources;
4. global climate change and sea-level rise (ADB 2011a).

Among these mega challenges, the risks and challenges of the “middle-income trap” and climate change sea-level rise seem to be the most critical to the transformation and development of the country in this century. Since 2008, Vietnam has surpassed the low-income group countries and is entering the middle-income group with high

¹¹ Ranked 14th with GDP at PPPs rankings, and 18th with GDP at MER rankings.

growth rates having been maintained for years. However, Vietnam is vulnerable to the “middle income trap.” A developing nation gets “trapped” when it reaches a relatively comfortable level of income but cannot seem to make the next big jump into the true big leagues of the world economy, with per capita wealth to match (Schuman 2010). The growth of Vietnam now relies heavily on trade openness,¹² resource extraction, and low value-added manufacturing industry. Meanwhile, productivity and innovation is crucial for sustainable growth to help Vietnam escape from this trap. Its success in avoiding the middle-income trap will determine whether Vietnam will join the first group of developed economies in Asia by 2050 (ADB 2011a). Global warming and climate change is perhaps the single most important long-term challenge facing humankind this century and beyond (ADB 2011a). In Vietnam, the climate change and sea-level rise are grand challenges to development, affecting every aspect of the economy, cultural practices, and people’s way of life.

Culture-Shift

Through thousands of years of formation and development, Vietnam has a rich culture, shaped by wet tropical monsoons and a society based on paddy rice/agricultural production. Entering the twentyfirst century, both elements will have fluctuating impacts on the formation of Vietnam’s culture in response to climate change. On the one hand, agricultural society in Vietnam is gradually shifting to an industrial society and may become a post-industrial society at the end of this century. On the other hand, natural environments in Vietnam are facing profound changes due to global climate change.

The first change is associated with the urbanization and industrialization process, leading to rapid expansion of urban space and growth of the urban population. At the same time, the agricultural sector and rural areas are shrinking at a fast rate. These dichotomous processes may positively influence the acceptance of modern culture. These could also facilitate the transformation of the small farmer life-style to an industrial city way of life. However, this change may reduce the diversity and special features of culture associated with paddy rice agriculture in addition to adversely affecting cultural tradition and changing the architecture landscape that has existed for thousands of years in rural areas.

Sea-level rise is associated with the second change. Climate change and sea-level rise will lead to the changing characteristics of the humid monsoon. The characteristics of humid monsoon tropical climate, combined with frequent natural disasters, have dominated many production activities and people’s lives, making the desire to conquer and control nature become the thousand-year aspiration in Vietnamese culture. With a rice civilization that depends mainly on nature, the Vietnamese worship nature in production and daily life. So in the future, how might climate change

¹² e.g., official development assistance (ODA), foreign direct investment (FDI), remittances, investments in stocks, real estate etc.

impact the Vietnamese culture? At the moment, it seems that people are responding by migrating as a way of adaptation.

Migration

Vietnam has experienced an exponential increase in the movement of people both within and outside its borders over the past 20 years. Migrations in Vietnam, mainly internal, encompass permanent movements as well as those that are short-term (temporary) or seasonal in duration. Migration stems from and drives a country's social and economic development. Most migrants move for economic reasons, including those who move looking for work, intending to increase their incomes, or improve their living conditions. Vast numbers of migrants move off farms during low agricultural seasons and go to industrial areas and urban areas for employment. The majority of migration flows are to urban and industrial areas where employment opportunities exist. Migrants may end up in low-skill jobs, such as house-keeping, construction work, or labor in factories, especially in the textiles, apparel, and shoe industries. During the harvest seasons, many poor agriculture-based households seek to work as hired laborers (GSO and UNFPA 2006; GSO 2011; Dun 2009; MONRE and UNDP 2010; UN 2010).

Migration in Vietnam is now driven primarily by economic and social forces but climate change will be an additional factor, especially from the middle of the century onwards. Migration patterns and flows will be more complicated and in constant flux as a result of shifting demographic structures, economic development, and climate change (MONRE and UNDP 2010; ADB 2011b). Vietnam ranks sixth among countries in the world with the highest proportion of its population living in low elevation coastal zones. A 1 m (3 ft) sea-level rise means that 10.8 % of the Vietnamese population could be affected—the highest percentage among the 84 countries analyzed (Dasgupta et al. 2007). A large number of people will have to move due to climate change and environmental degradation, including the sudden onset of extreme climatic events (MONRE and UNDP 2010). Climate-induced migration will occur both within the country and across borders as well. In Vietnam, similar to other Southeast Asia countries, there are two main dynamics likely to recur in internal migration: movement into cities and movement away from vulnerable coastal areas (NIC 2010). The combined impact of sea-level rise, increased storms, flooding, declining fisheries, and degradation of coastal ecosystems will make coastal areas of Vietnam become less hospitable and economically viable, forcing massive rural coastal populations to relocate (NIC 2010). There will be two flows of those forced migrants: to urban areas and upland areas. A mass population movement from the countryside into the cities probably will be the most significant aspect of internal migration throughout Vietnam. Big cities such as Hanoi, Ho Chi Minh City, and Da Nang are still likely to be overwhelmed by the magnitude of internal population movement in the country. The urban population in Vietnam will increase rapidly from 25.4 million in 2009 to 65 million in 2050, accounting for 60 % of the total population, and it will reach more than 70 % in 2100 (GSO and UNFPA 2006).

Vietnam is also a country at great risk for mass inland migration (NIC 2010; ADB 2011b). Migrants are likely to move to a region's main city located a short distance from home. The second general movement will be from lowlands to uplands, but the direction across regions will differ. The people from Red River Delta will likely move to northern midlands and mountainous areas while the people from the central coast will likely move west and to Laos. Those from the Mekong River Delta will move southeast and to Cambodia. The central highlands and southeast areas will be the receiving area of migrants throughout the country, while the Mekong Delta region will be the largest export of migrants as a result of increasing sea level (NIC 2010; ADB 2011b). The population growth will be highest in the central highlands and the southeast while lowest in Red River Delta and Mekong River Delta (GSO and UNFPA 2006).

Migration will likely drive livelihood diversification and change cultural practices at different levels (MONRE and UNDP 2010; ADB 2011b). In Vietnam's northern uplands and central highlands, diverse cultures are characterized by ethnic minority communities. The climate change may cause forced migration of these ethnic minority people, leading to the disappearance, decrease in size, or change in the communities' customs and traditions. Along with the disappearance of traditions, cultural assimilation may occur as migration brings together different ethnic communities. For example, people in coastal lowlands that migrate to the mountainous areas will bring their lifestyles, which may lead to cultural assimilation, disappearance of local customs, and the formation of new ones. These changes may lead to new cultural practices in production, professions, community relationships, networks, habits of resource use, and awareness. In the face of increasing risks and vulnerabilities induced by climate change, people may live more consciously, more disciplined, and more integrated in small communities. However, the conflict between communities due to increased competition for resources and living space is also possible. Migration may affect people at various levels, such as the family/household, changing the relative power/relationship of household members. Studies in Vietnam show that migration is usually a household livelihood diversification strategy rather than a strategy taken by individuals. Male members of the family emigrate to seek alternative income sources for the family, and younger male household members are often encouraged to seek outside employment (Dun 2009; MONRE and UNDP 2010). As a result of key male members of the household becoming seasonal or long-term migrants, feminization in rural areas is increasing, resulting in more women participating in farming than men. Remittances may help reduce financial vulnerability for left-behind aged and female household members. Women still carry the main responsibility of caring for family as well as farming. On the one hand, women take care of the elderly and children, whereas on the other hand, women work harder in more difficult conditions and limited resources. Aged female household members and children are more physically vulnerable during such natural disasters as flooding, typhoons, or landslides when the male household members are absent. To cope with these increasingly frequent extreme events, more support from local government and organizations will be needed (MONRE and UNDP 2010).

Livelihood Diversification

Climate change will not only contribute to the acceleration of livelihood transformation but also stimulate the diversity and complexity of this process. This transformation will be most profoundly reflected in agriculture. In Vietnam, the climate change will exacerbate resource degradation, especially resources for agricultural production and development, creating more challenges for peoples' livelihood. The agriculture sector is affected by the impacts of climate change as well as urbanization and industrialization. Together, these factors will narrow the scale of production. Confronted with the challenge to survive and develop in transitional times, transformation and diversification in agriculture is an effective solution to adapt to and mitigate the huge impacts expected from climate change. In Vietnam, this process will take place rapidly and in the following complex ways:

1. transformation within the agricultural sector and from agriculture to other sectors;
and
2. change in agricultural practices.

In terms of territory, livelihood transformation will occur most strongly in the coastal areas along the central coast and in two rural deltas of Vietnam where they are influenced by urbanization and sea-level rise. Transformation from agriculture to non-agricultural sectors is positive only when the farmers are well-trained and prepared. The highest concern relates to the poor and unqualified farmers who are forced to change their livelihoods because of land loss or faced with risks in agricultural production. With few options, these farmers usually move to cities to work as construction workers or the informal sector. This phenomenon will increase in the coming decades as climate change impacts become more severe. The shift in this direction will take place most commonly in the central coast and Mekong Delta regions where climate change is expected to impact millions of hectares of agricultural land. Those who choose to continue operating in the agricultural sector will diversify activities to minimize and adapt to increasingly harsh climate conditions. Climate change will markedly decrease biodiversity and the coastal and inshore resources of Vietnam, so in the future, offshore fishing activities will expand and attract more labor than inshore fishing. Aquaculture will expand with larger surface areas, including areas transferred from flooded rice fields. Moreover, when food production declines significantly in the two deltas of the country, priority must change to human consumption and food security rather than for other purposes. In such conditions, using less starch feed than livestock is an advantage of the fishery development. The shift in the structure of agricultural products will lead to changes in the diet of Vietnamese people. Currently, the diet of Vietnamese people has a high proportion of animal protein and salt (animal protein proportion is about 33.5 %). In the future, the protein supply from aquatic species (e.g., fish, shrimp) and vegetables will increase while animal protein will be reduced.

Change in Agricultural Practices

To adapt to climate change conditions, farmers will be more active in the choice, use, and improvement of crop varieties for their ability to adapt to climate change conditions. They will be more interested in such properties as short growing durations as well as drought-tolerant, salt-tolerant, and naturally hardy crops. For example, drought-resistant crops include sugar cane, neem, peanut, sesame, and dragon fruit, which are likely to be planted in the central region due to their ability to withstand drought or an unpredictable water supply. In the Mekong Delta, the salt-loving and salt-tolerant crops, such as floating rice and salt-resistant rice, will occupy a high proportion in plant/crop structure. Because of the climatic changes, the farmers may accept low-yield, low-quality crop varieties but have greater tolerance to environment stresses and less-favorable production conditions. Farmers in many parts of the central coast will select shrimp and fish species with smaller sizes and shorter growth durations to avoid flooding or drought periods. In the Red River Delta, when winter temperatures increase 2–3 °C (3.6–5.4 °F), the farmers will have to select new potato and legume species with better growth capability in warmer conditions, and at the same time, use alternative varieties to maintain the production and role of winter crops in new climatic conditions. Small-scale farmers may be interested in traditional or native varieties with lower yields, but these plants are well-adapted to local changing conditions.

Vietnamese farmers have traditionally used the almanac to determine the timing of farming activities such as sowing, planting, and harvesting for each particular crop. However, the seasonal calendar may have limited use in the abnormal and complicated climate change conditions. With support from the government and NGOs, farmers will have the flexibility to adjust to seasonal changes, and with time, to make updates of weather changes such as frequency of cold fronts, storms, and floods. Adaptation is region specific. For example, farmers in the central coast area will need to calculate appropriate time for seed sowing and stocking fish in order to avoid the dry period and be able to harvest before the flooding period. In the Red River Delta, farmers will need to adjust sowing and planting time for winter crops that need low-temperatures. Farming models/practices will be more diversified to overcome the effects of climate change specific to each local area. Over the coming decades, sloping land cultivation will be more common throughout the mountainous areas of Vietnam. In this model, the plants are cultivated in accordance with the terrain slopes with forest plantations on the top of the hill where the slope is often greater than 25 degrees. Hillsides with a slope from 15 to 25 degrees are best used to cultivate fruit trees mixed with legume species, which can add nutrients to the soil. Food crops, such as upland rice and maize are placed in areas with a slope lower than 15 degrees. In the context of agriculture, land loss and degradation occur in lowland regions, mountainous areas are not affected directly from sea-level rise. With approximately 40,000 km² (15,444 miles²) of unused land area, the mountainous areas will have a more important role as reserve space for agricultural activities. In the Mekong River Delta, flooding will impact economic activity. During the flooding seasons, farmers may develop diversified fish farming with eel, snakehead fish, and climbing perch

in ponds. They will rotate this with rice fields and harvest when the flooding season ends. In a context of a transitional and challenging agriculture under stressful environment and rapid urbanization, farmers must find ways to adapt and mitigate risks and vulnerabilities. Moving to find alternative livelihoods, diversifying agricultural activities, changing and improving practices are possible ways/strategies for living with climate change.

Changing Way of Life

Climate change may affect the maintenance of cultural traditions but also create new cultural features. With an increase from 65 to 100 cm (25.6–39.4 in.), sea-level rise could submerge thousands of historical and cultural monuments and villages where many of the oldest cultural traditions in Vietnam exist. Climate change may also cause a serious degradation of the cultural works and natural spaces associated with community activities. These effects will make it difficult to maintain cultural activities and associated community customs and festivals. The timing of such activities as crop production, planting of seeds, and harvest time is likely to change to adapt to climate change. Consequently, the customs, practices, and rituals will gradually change. Climate change may increase the risk of poverty and social inequality in Vietnam. It will severely affect the majority of the poor, particularly people living in extreme environments. Many poor households' income generation activities depend on, and are vulnerable to, seasonality. This is especially true for people living in areas affected by flood or drought, in particular the poor in rural and coastal areas, because the agriculture and fishing sectors are particularly vulnerable under climate change. The most significant impact is on groups that live at the poverty threshold, who have limited assets, and those who are financially vulnerable to sudden weather events. With those impacts, the risk of increasing the poverty rate is great. The fight against poverty in Vietnam will be more intense with the millennium goals of poverty reduction being seriously affected. Visionary policy to support the vulnerable population is needed, from improving access to finance services (credit, savings, insurance, and pensions) to skills training for alternative occupations.

Climate change is likely to increase peoples' sensitivity and awareness to environmental-related issues. The public awareness of climate change and other environment-related issues remain weak in Vietnam. People are often passive and underestimate natural disasters with no plan, strategy, or adequate preparation and even ignoring or being indifferent to warning messages. However, facing increasing frequency and intensity of natural disasters, they will be aware of the risks, trends, and impacts of climate as well as actions to improve community resilience. In high-risk areas, people will pay more attention to the information that is required for survival. In particular, the "disaster map" or "risk map" will become a useful tool to plan prevention and specific characteristics in each locality. In the future, a disaster management community-based model will be useful for planning purposes. There is a need to transition to an economic growth model that is more eco-friendly yet able to sustain the lifestyles of future generations. Some examples of local and national

actions include protection of natural resources, agricultural practices, and weaning from fossil fuels. Creative designs of buildings and indeed entire cities are needed to protect forests and green areas. In Vietnam, public perception plays an important role in the fight against climate change. Sensitivity to environmental issues among the educated urban elite is important, but it may not translate into action in the rural periphery where it is most needed. One of the most important roles civil society can play regarding climate change is to help translate sensitivity into action on the climate change issue. Currently, people have little awareness of climate change, though this is improving from efforts in the training and deployment of community education projects.

Policy

Many Vietnamese and international agencies are now paying more attention to the issue of climate change. The Vietnamese scientific authorities are often reacting to the threat with such actions as investing in research and planning as well as being responsive to international initiatives to better understand and mitigate climatic issues (Fortier 2010). For example, Vietnam ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1994, and the Kyoto Protocol in 2002. It approved the National Target Programme in Response to Climate Change (NTP-RCC) in December 2008 (MONRE 2009).

Along with NTP-RCC, the Prime Minister has ratified the Policy Matrix Frame Phase Three in 2011 with three key pillars that include adaptation, mitigation, and framework institution (Government of Vietnam 2011). The adaptation pillar focuses on the development of climate-resilient goals for improving the resilience of water resources, integrated coastal management, natural resources management, infrastructure, health, agriculture, and food security. Mitigation addresses goals of lowering carbon uses by exploiting energy efficiency potentials, promoting renewable energy development, strengthening waste management, promoting greenhouse gas emission reduction in agricultural production and food security, strengthening forest management, and working on effective development of carbon sinks. The climate change policy and institutional framework are associated with three goals of strengthening the preparedness to formulate, prioritize, and implement climate change policies, strengthening the financing framework, and disseminating climate change information to the public (Government of Vietnam 2011).

Civil society and academic organizations are also mobilizing to address climate change adaptation and mitigation objectives. International organizations and agencies are coordinating efforts and have pledged significant resources to a range of climate change related activities (Fortier 2010). International programs support Vietnam's transformation of policy into action and assist with the coordination among relevant ministries in policy development; promote the integration of the response to climate change related issues through local plans and development projects, etc. However, national climate change strategy is also criticized as it seems to provide an illusion of intervention and security but largely fails to identify and mitigate the

underlying causes of climate change or to lay the groundwork for a robust mid- and long-term adaptation strategy that can cope with yet unknown levels of climatic and structural changes (Fortier 2010). It is also limited in specifying associated activities and solutions.

In the current period, economic development is the principal overt state priority in Vietnam, along with other Southeast Asian countries. For over 20 years since the *Đôì mới* (renovation) launch, the development strategy in Vietnam has focused on high economic growth rate, increasing prosperity, and poverty reduction. Therefore, sustainability and environmental issues are often disregarded. The effects of climate change will remain as a mega challenge to national security and economic viability so that the government authorities will have to show their greater concern about environmental challenges and social well-being (NIC 2010).

Political space has been created through the emergence of civil society (village and local organizations, NGOs, environmental groups, etc) as the basis of independent networking. This significant political opening has allowed some level of autonomous research, programming, and engagement with authorities on issues pertaining to economic and social development, including responses to climate change (World Bank 2009 as cited in Fortier 2010). Climate change is likely to expand civil mobilization that potentially leads to more open political processes. Vietnam probably provides the strongest example of this process in the region (NIC 2010).

The impacts from climate change are emerging as the biggest environmental problem and a significant challenge for the development of Vietnam in the twenty-first century. It affects almost every aspect of nature and society, and these effects intensify socio-economic constraints and hinder the development of Vietnam. However, optimistically, climate change could be considered a trigger for individuals to change their way of life for a better future, for example, to become dynamic farmers or more practical planners. This, together with a strong strategy, vision, and determination will help Vietnam to successfully fight to mitigate the impacts and effects of climate change and move towards sustainable development.

12.6 East and Southeast Asia: Conclusion

Asia has historically been at the mercy of environmental and climate-driven disasters. The impacts of such disasters not only cause physical damage to buildings and infrastructure, but can also threaten water and food supplies, cause a rise in diseases, and negatively affect peoples' livelihood and sense of well-being (UNFCCC 2007). Over the past decade, the Centre for Research on the Epidemiology of Disasters (CRED) has repeatedly recognized Asia as the continent with the highest number of geophysical and hydro-meteorological disasters to occur in a given year (Guha-Sapir et al. 2011). Monsoons, typhoons, droughts, and tectonic shifts of the Earth's crust that cause earthquakes, landslides, and tsunamis are regular occurrences in the region. Some recent and notable events include the "Flood of the Century" in Bangladesh (1998), the deadly Indian Ocean Tsunami

(2004), Cyclone Nargis in Myanmar (2008), the Sichuan Earthquake in China (2008), and the combined flooding and associated landslides, tropical storms, and typhoons that occurred in China, the Philippines, and Taiwan during 2009. Most recently, the 9.0-magnitude Tohoku Earthquake and tsunami devastated Japan on March 11, 2011, where approximately 27,000 people were killed or remain missing (Earthquake Engineering Research Institute 2011). The economic costs of Tohoku disaster have been enormous. Billions of dollars have been required to recover from damages, such as rebuilding torn infrastructure, disruptions in livelihood, and environmental fallout.

In the wake of recent global natural disaster occurrences, the twenty-first century is now bearing witness to the consequences of global population growth and humankind's unsustainable demand on the Earth's natural resources. An increase in the atmospheric concentrations of greenhouse gases, primarily carbon dioxide, that are produced by fossil fuel burning, are impacting the climate at an escalating rate. The question of whether or not CO₂ emissions are directly responsible for reported increases in natural disaster occurrences in a given year is a topic of continued debate. However, scientific data is beginning to support the fact that natural disasters are indeed occurring with more frequency and with greater intensity than ever before.

The IPCC Fourth Assessment Report (Cruz et al. 2007) predicts that the "area-averaged annual mean warming will be about 3 °C (5.4 °F) in the decade of the 2050s and about 5 °C (9 °F) in the decade of the 2080s over the land regions of Asia as a result of future increases in atmospheric concentration of greenhouse gases" (Cruz et al. 2007). The report also predicts "sea-surface temperatures will increase 2–4 °C (3.6–7.2 °F), causing an increase in tropical cyclone intensities by 10–20 % in South, East, and Southeast Asia" (Cruz et al. 2007). Heat waves, heavy precipitation events, and cyclones with larger peak wind speeds and heavier precipitation will become more frequent (Cruz et al. 2007). Such climate trends have already been observed throughout Asia, particularly as an increase of warmer temperatures and heat waves, extreme rains, areas affected by drought, and the number and intensity of cyclones, typhoons, and tropical storms (Cruz et al. 2007). For example, China, Cambodia, the Philippines, and Vietnam have all experienced an increase in damages caused by cyclones having greater intensity. Although the total annual rainfall has decreased throughout Asia, the intensity of rainfall events has occurred more frequently, causing floods, landslides, and mudflows (Cruz et al. 2007). Rainfall is expected to increase over much of Asia as the climate change is expected to affect the behavior of the Asian monsoons. For example, it is projected that the summer monsoon will be of shorter duration, however, rainfall events will become more intense, which will increase damage in flood-prone areas (UNFCCC 2007). By 2080, it is projected that the average number of people affected by flooding will rise from 1.7 million people (1990 levels) annually to 21 million (Penny 2008).

The characteristics that make the region vulnerable to the impacts of climate change include a high rate of poverty that spans across many Asian countries, the susceptibility towards endemic illnesses, and dense populations that reside along

coastlines and low-lying areas. Other vulnerabilities include the region's water resources, agriculture, and food security, as well as the ecosystem and biodiversity (UNFCCC 2007). These are summarized below.

Poverty is a significant problem in Asia where a high percentage of the Asian population is living below social and economic poverty thresholds (Cruz et al. 2007). Southeast Asia accounts for half of the world's poor where, with a population of 1.3 billion, 85 % live on less than \$ 2 a day (World Bank 2011a). In East Asia, the most populous region with nearly 2 billion people, 50 % live on less than \$ 2 a day. In South Asia, with a population of 1.3 billion people, 84.8 % of its people live on less than \$ 2 a day (World Bank 2011b). With 39 % of Asia's poor living in areas susceptible to drought and desertification, the region is at great risk to the consequences of climate change (IFAD 2011).

The poor, ethnic, and religious minorities as well as those living in rural areas are most vulnerable because they do not have the resources to recover from climatic shocks as readily. Many live in extreme poverty and are illiterate, making it difficult for them to initiate more sustainable solutions for themselves. Instead, they are forced to focus only on their daily survival needs. The risk is compounded by their dependence on the natural environment for their livelihood, such as agriculture. A changing climate will likely limit the set of choices that are available to the poor, and they will be forced to make decisions that will further hinder their recovery and development. For example, if the climate change impacts crop production, there may not be enough nutritious food available for many families, leaving them with no other option than to cut back on their daily nutritional and caloric intake. Communities will suffer as individual emotional and physical health, infant mortality, and education will all be negatively impacted (Fuentes-Nieva and Seck 2010).

As the poor come under stress due to failing crops and water issues, malnutrition becomes more prevalent, which can lead to widespread famine and epidemic diseases such as dengue and malaria. Poverty, inadequate hygiene, and the effects of high temperatures all lead to increased endemic morbidity and mortality caused by diarrhea and disease (Cruz et al. 2007). Areas susceptible to drought, flooding, and coastal waters with high levels of cholera bacteria are vulnerable to increased illness and death as these types of climate events occur more often (Cruz et al. 2007). The old and urban poor populations in temperate and tropical Asia will likely experience higher instances of mortality and morbidity in the summer months due to frequent and longer durations of heat waves and humid conditions (Cruz et al. 2007).

The IPCC predicts that severe losses to agriculture will result because of high temperatures, severe drought, flood conditions, and soil degradation (Cruz et al. 2007). Since the mid-1990s, droughts have been increasing in parts of China, Myanmar, Laos, Philippines, Indonesia, and Vietnam, and in 1997 and 1998, a decrease in rainfall was responsible for significant damages to crops, water shortages, and forest fires in various parts of the Philippines, Laos, and Indonesia (Cruz et al. 2007). Another problem is a rise in sea level and the ingress of seawater into coastal areas, causing rivers to become brackish or saline. This will severely impact river communities that rely on food production for their livelihood and particularly those that grow rice and wheat (Cullen 2010).

The relationship between climate change and agriculture is an important issue, especially in areas where rice is not only a means of subsistence but also a profitable commodity. The International Rice Research Institute (IRRI) reported a 15 % drop in rice yields, primarily due to a frequency of hotter evenings (The Asia Sentinel 2010). IRRI also predicts a 10 % decrease in rice yield for every 1 °C (1.8 °F) rise in growing-season minimum temperature (Cruz et al. 2007). Decreasing yields will become a critical problem in the region as the ability to produce higher agricultural yields to feed local populations as well as a rising global demand is threatened.

The IPCC predicts that the climate change will have a direct impact on sea-level rise (Cruz et al. 2007). The main causes for sea-level rise are thermal expansion of seawater due to rising surface water temperatures and glacial melting. Rising surface water temperatures will produce tropical storms of greater intensity with increased storm-surge heights and stronger winds, resulting in coastal damage along populated coastal areas. Other problems include coastal erosion, saltwater intrusion into estuaries and aquifers, displacement of wetlands and lowlands, degradation of coastal agricultural areas, and increased susceptibility to coastal storms (Cruz et al. 2007). Coastal inundation and erosion are expected to impact fisheries and coastal agricultural areas, threatening loss of livelihood and causing food insecurity.

Currently, the rate of sea-level rise in the coastal areas of Asia is reported to be between 1–3 mm (0.39–0.118 in.) per year, which is slightly greater than the global average (Cruz et al. 2007). It is estimated, however, that this figure will double in the next century to at least 4 mm (0.16 in.) per year (Thurman et al. 2001). Put another way, it is estimated that an increase in temperature of 1 °C (1.8 °F) will cause a sea-level rise of about 70 cm (27.56 in.) over time (Thurman et al. 2001). Bangladesh, India, China, Vietnam, Thailand, Indonesia, and the Philippines are all at risk of flooding and loss of coastal ecosystems as a result of future climate change (World Bank 2011a). Cities that are situated on coastal lowlands and river deltas, such as Bangkok, Manila, Singapore, and Ho Chi Minh City, are also most likely to be affected.

Changes in precipitation will affect regional water resources and put many localities under severe water stress, however, impacts will be positive in some areas and negative in others (Cruz et al. 2007). This change in precipitation, known as rainfall variability, has been observed throughout Asia in recent years, where North and Northeast China, Northeast India, Indonesia, the Philippines, and some areas of Japan have observed decreasing rainfall occurrences. Western China, the Changjiang Valley, the southeastern coast of China, Bangladesh, and the Western coast of the Philippines have experienced increasing rainfall occurrences (Cruz et al. 2007). Decreased rainfall will lead to water shortages, drought, and land degradation, which could affect one billion people in this region by the 2050s (UNFCCC 2007). The increasing precipitation will increase runoff by 10–40 % by the year 2050, especially in areas at higher latitudes and in some wet-tropical locations, including populous areas in East and Southeast Asia, leading to flooding that will severely impact freshwater availability throughout much of the region (Cruz et al. 2007). The IPCC predicts that freshwater availability in Central, South, East, and Southeast Asia, particularly in large river basins such as Changjiang, is likely to decrease due to climate change

(Cruz et al. 2007). Other areas that will be impacted are irrigation systems, fisheries, aquaculture, and hydropower output.

Biodiversity in Asia is threatened by land degradation due to overpopulation and development activities, such as infrastructure development, pollution, deforestation, and land use change. Other factors include over-grazing, over-fishing, species invasion, and over-use of fresh water (Cruz et al. 2007). The ecological stability of mangroves, coral reefs, and wetlands are especially threatened by climate change. Decreasing precipitation and drought are drying-up wetlands in the delta regions of Bangladesh, India, and China. Many plant species are moving to higher latitudes and altitudes as a consequence of observed climate change in many parts of Asia. Fresh water and seawater fisheries are negatively affected both by a rise in surface air temperature and rainfall variability. Increasing air temperatures are causing a decrease of oxygen in water, especially at higher altitudes (UNFCCC 2007). The rainfall variability is affecting fish migrations from rivers to floodplains, thus affecting spawning outcomes and growth (UNFCCC 2007).

A hurdle now exists in the form of global climate change, where it is becoming more apparent than ever that a balance with the natural world will need to be restored and maintained if we are to proceed toward a brighter and more prosperous future. The postmodern culture has assumed that advances in technology and science can solve our problems and that our advancement depends on “democracy and the unquestioned rights of the individual” (Adams 1997). There is no question that we have the means to live in balance with the natural world; however, we often lack the commitment to do so.

In the year 2050 and beyond, mankind will continue to seek a better future and new frontiers. Some suggest that by 2050 humanity will be harvesting much of its energy needs from space and will be busy setting up galactic space colonies. Having conquered nature by consuming all the natural resources on Earth, we will have no choice but to take to the sky to find other resources to consume. But first, before we abandon our planet for something better “out there,” we must first come to terms with the “noise of mankind” and the chaos we have created in our recent history so that we do not repeat our mistakes in future generations.

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Part IV

Inhabiting an Imagined World: Better or Worse? Four Interpretations

This final section is one I think of as the book's "fancy" in the older romantic sense of a creative act of perception (World English Dictionary 2012). More speculative, subjective, personal, and even perhaps idiosyncratic than its predecessors, this section presents four competing visions of the "after" world we have previously imagined. One (Nemeth) employs the language of satire to explain and even defend a coming "totalitarian utopia." Another (Pappin) is a bird's eye guide to postmodern environmentalism's trajectory, and two (Smith and Gare) are passionate *cris de coeur*, heartfelt protests frankly reminiscent of the declarations of the prophets of old.

David "Jim" Nemeth advances the perversely positive thesis that courageous decisions, shared sacrifice, and favorable fortune manifested as a totalitarian utopia could make for a happier fin de siècle c. 2100.

In his chapter, "The Postmodern Environment," Gladden Pappin shows the origins of the contemporary understanding of the environment in a change in the meaning of nature. He suggests that the phenomena of climate change and culture shift are related through modern philosophy's critique of nature as a moral standard. We think of the environment as what is left over after we manipulate nature through technology. We want both technology and the preservation of the environment without a strict moral standard based in natural right or natural law. But because saving the environment is beyond our own power, Pappin suggests we look to the larger forces of the market and the state to lift from us the burden of responsibility. Our knowledge of the environment is only partly direct, mediated through statistics, scientific interpretations, and popular presentations that we have difficulty verifying. Pappin critiques the tension at the heart of our thought—wanting to control nature and save nature at the same time, without returning to nature as a moral standard. For Pappin, the question is not one of academic postmodernism but of our attitude toward science and nature, knowing, as we do now, that they stand in tension. What postmodern is, he says, is to want the benefits of controlling nature without seeing its manipulation up close, and to want the preservation of the environment without viewing it as good for the soul. The tension between these two impulses, he says, cannot be resolved.

Jonathan M. Smith suggests that postmodernism is the end state of a successful Gnostic movement (i.e., where transcendent knowledge is attained via personal/inner experience) to abolish the world and throw open the infinite possibilities of nihilism. This has been accomplished by secularist doctrines that obliterate the transcendent

ground of being and by multicultural policies that are bringing us all to Babel. Without sacred or social warrant, meaning appears arbitrary, the inner life atrophies, and we become “hollow men” (see T.S. Eliot’s 1925 poem). The soul as traditionally conceived was instinct with striving, fear, guilt, and gratitude, but all of this withers under nihilism, where lives are no longer lived under judgment. We are instead cosseted by therapeutic doctrines that are permissive and exculpatory. Under this tutelage, our sense of guilt over personal moral failure dissolves. In its place, there grows, among the hollow men, a gnawing social guilt for collective crimes against victim groups and the environment and a fervent desire for redemption. This is the source of the postmodern apocalypse of global warming, even if the worst projections prove correct. Hollow men see it as a time of tribulation, a cleansing fire, through which we must pass if we are to enter the millennium environmental stewardship and social justice.

Using the notion of “colliding with reality” as a theme, Arran Gare examines the conflict between radical environmentalists and their opponents in response to climate destabilization. One ecological crisis after another of increasing magnitude, which could culminate in a runaway greenhouse effect, has led these environmentalists to believe that modern civilization is colliding with the reality of nature’s dynamics, revealing the fundamental deficiencies in the traditions of thought dominating this civilization. At the same time, this has revealed the existence of a strong and deep rooted counter-tradition, the radical enlightenment. With its roots in the Renaissance, it is to the radical enlightenment that we owe our heritage of democratic institutions, appreciation of cultural diversity, belief in the significance of all life, and many of the most important advances in science. Embracing major advances in theoretical ecology, the radical enlightenment is now crystallizing in the call for an ecological civilization committed to reviving democracy, achieving a world order based on justice and creating an economy that augments rather than undermines the resilience and stability of the ecological communities of which we are part. The reality that these environmentalists have collided with is that despite the apparent strength of their challenge to mainstream culture, a strength based on a recovery of a tradition, which allows them to integrate post-mechanistic science, the humanities and the arts and the commitment to freedom, democracy, and the future of civilization, they are failing to have any significant influence. A new global ruling class, the “corporatocracy,” has emerged, which through its capacity to co-opt opposition and control the minds of and dehumanize the people who will suffer most from ecological destruction, has used these “post-humans” not only to subvert democratic institutions and undermine people’s freedom, but to invert the meaning of words and subvert the very language through which democracy and freedom could be understood and defended. This “inverted totalitarianism,” to use the language of Sheldon Wolin, has entrenched the trajectory of modern civilization towards global ecological destruction. Despite the bleakness of this picture, Gare argues that environmentalists have reason for optimism in the long term.

Very different interpretations, yes, but united in their aspiration to help the reader attend to “thick” questions, those of significance and meaning: who and what are we—and the world—becoming and, so what?

Chapter 13

The Postmodern Environment

Gladden J. Pappin

Abstract The significance of nature changed with the advent of modern science. What had been a term of moral import became an object of studied conquest. “The environment” is that part of nature not appropriated by science, which makes possible man’s conquest of the rest. Science encourages human beings to distrust their ordinary experience of nature. Because nature is volatilized by science, modern citizens require science and the media to inform them of the condition of nature. Nature can no longer be preserved just through the cultivation of one’s land. But the loss of belief in modern ideals has given way to the fragmentation of postmodernity. Modern democracy, which encourages that fragmentation, inclines men to defer to the “immense beings” of government and nature. We pass off to government and the market the task of preserving nature. Protection of the environment has no explanation outside our free arrangement of the signs of our world—as an object of changing consumer fashion or a sign of one’s social status. We want the benefits of liberty and technology with the assurance that we do nature no harm, and take from nature no guidance. We distance ourselves from the control of nature and from restrictions on that control. The market and the law assume the ecological burdens we refuse to meet and hide from us the manipulation of nature that always frightens us up close.

13.1 Introduction

When catastrophe strikes our environment, we would presumably—if we are spared—take note. The difficulty emerges in the distance between catastrophe and our present comforts. To foresee catastrophe requires that we imagine a world, as the title of the present volume indicates. When we take that step and imagine catastrophe, what images come to mind? The sober debate over future catastrophe occurs within the scientific community, specifically among those who explain our destiny through numbers. The temperature, the levels of the rising seas, the number of species, the proportion of carbon dioxide in the air, the countably dwindling reserves of natural resources: numbers indicate the severity of our course, and prophesy a coming catastrophe. Another number is price, as a poor harvests mean higher prices for food

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and dwindling oil reserves mean higher prices for energy. The image of catastrophe draws on a second source, the art of apocalypse: high-grossing, high-definition fantasies of what may happen. Hollywood's images give us a clearer view of catastrophe than if we lived through it. Even before modern media, the residents of Pompeii would doubtless have preferred to read Pliny's letters instead. When it comes to catastrophe, firsthand is never best.

To this extent, we have already taken note of an event that has not yet occurred in order to prevent the catastrophe we fear. Everyone knows what might happen to the fragile planet, and few Westerners have not opted at least once, however inconsistently, for something considered more environmentally friendly. Although pollution is today not primarily a moral phenomenon, we have retained the need to be clean. When made into a comprehensive obligation, the need to avoid pollution has all the stringency of the Mosaic law. With the whole environment at stake, nothing can be spared. But if the stakes are infinite, if we might irreparably alter not our plot of earth but the whole environment, why are we not doing more? If we have already imagined what will happen, why is our effort not more comprehensive? We have already witnessed the environmental apocalypse a thousand times over, but our progress toward averting catastrophe is slow and halting.

Suggestions for preserving the environment are everywhere today. They range from the heroic to the mundane. The heroic supports going off grid, being carbon neutral, and producing no waste. The mundane: don't flush twice. Taken together, they would easily match the Mosaic law in rigor, and exceed it in its stakes. God had already promised not to destroy the earth again after the flood, so the mixing of milk and meat would provoke his wrath but not lead to the destruction of the world. Penance could atone for a moral wrong, but the environment may not be repairable. If we do not take responsibility for it, nothing we can do makes up for it. Since the weight of this burden is total, we seek to alleviate it every way we can. And in the consumer society to which we still belong, the option to go green presents itself as an option among others, made known to us through marketing. Behind every option is an entrepreneur, and within every entrepreneur is the desire for profit. Since profit comes from the satisfaction of needs real or perceived, the need to go green can be satisfied through the market. Short of becoming entirely self-sufficient, we satisfy the ecological imperative through our purchases: we buy organic, sustainable, natural products. The law of ecology is dissolved through the ease of the market. As soon as the coin in the coffer rings, carbon from the atmosphere springs.

No part of the ecological law is higher or lower. Its seriousness is proportionate to the consequences of our violation. Those consequences, however, do not match the higher or lower character of our deeds. Recycling is the most obvious example of this phenomenon, since it concerns waste—not the lowest part of our nature but something lower than our nature, an excess to be kept out of sight. If we consider *information* to stem from our highest aspects—our mind or “soul”—then we see the opposite tendency at work. Information wants to be free, we are told, and the economists add that as its price drops to zero, demand goes to infinity. The physical accumulation of waste threatens our environment. Everyone, though, senses that the mental accumulation of information threatens *us*. As the burden of remembering everything falls upon us, we pass off the burden to databases, which in promising to

remember everything, assure that we remember nothing.¹ The term *media ecology* is then no accident. What characterizes the world from our perspective is a disjunction between the environment surrounding us materially and our mental participation in the environment of networks. What is the relationship between these two ecologies?

Near the beginning of his *Idea for a Universal History*, Kant suggests the usefulness of statistics for discovering certain trends in human actions that would not be apparent individually. The “annual statistics” of marriages, births, and deaths, he says, “prove that they are just as subject to constant natural laws as are the changes in the weather”—erratic case by case, but with an overall direction (Kant 1991).² Kant’s critique of the attempt to know human nature in itself is compatible with the divining of hidden trends through statistics. So too with the natural world, statistics indicate nothing regarding the essence of nature or its purpose, but give human beings access to climatic trends otherwise inevident. The way that we know about the natural world is indicative of the loss of its meaning. Left without a way of understanding nature in itself or the tendencies of man’s nature, we seek the next best approach to knowledge in statistics (Lange 1881).³ The two sorts of statistics are even related, for the partial control over nature given to us through meteorology shows up in the statistics of our mortality—not in overcoming death but in predicting and thus avoiding dangerous weather.

For everyone save a few scientists, knowledge of climatic statistics arrives through the media, and carries along with it a putative doubt concerning our ordinary experience of the natural world. When we experience a hot or cold day, for example, and consider its relation to our knowledge of the climate as a whole, we interpret it not on the basis of our own experience but on the basis of what we know from modern science. A hot spell is never just a hot spell. To those concerned over the likelihood of global warming, a hot spell confirms the trend in a way statistics never could. To the oddly named climate skeptics, a cool summer occasions ironic asides about the pervasiveness of global warming, evident everywhere (they suggest) except here. The naive sentiment recorded by Daniel—“O ye cold and heat, bless the Lord”—takes a back seat to the significance of cold and heat for the state of our environment.⁴ Regardless of whether we observe cold or heat, at a deeper level what we observe is the state of our own panic.

The networks which report to us news of the natural world confirm for us the existence of something outside themselves. Accepting this knowledge requires taking a different view of nature from the one that we would otherwise have. Traditionally, knowledge of the natural world came from direct experience at home and in travel, from natural histories like Pliny’s and Seneca’s, from maps, illustrations, bestiaries,

¹ “Data banks . . . are ‘nature’ for postmodern man” (Lyotard 1984).

² On the place of averages in Kant’s aesthetics, see Zammito (1992). See also Hacking (1990) and in general Gigerenzer et al. (1989).

³ Hence the early emphasis on statistics by Friedrich Albert Lange at the birth of the Marburg school of neo-Kantianism. On Kant, empirical psychology and “moral statistics,” consult Lange’s *History of Materialism and Criticism of Its Presence Importance*.

⁴ Dan. 3:67 (Douay Version), recorded in other versions as the apocryphal Song of the Three Holy Children, v 49.

mythology, and reports from afar (Grant 2007; Steel et al. 1999; Ziolkowski 1993; Kavey 2007; Daston and Park 1998).

Today the reports we receive tell us about the world in the way modern science expects the world to reveal itself. Heidegger spoke of the way that physics, because of its insistence on viewing nature as a “coherence of forces calculable in advance,” arranges its experiments to see how nature would reveal itself if this insistence accorded with the truth (Heidegger 1977). The view that nature’s health may be tracked by certain statistics is part of a larger view that reveals nature as a set of countable forces. The ability to calculate nature’s path opened up the possibility of its manipulation through the phenomenon we know of as technology. Insofar as climate science is a part of science, it participates in the same revelation of nature’s number which is the wellspring of modern technology. Now we are both small and great—the “pale blue dot” of Carl Sagan’s sacrificial minimization, and the very thing we must give everything to save. From that standpoint, catastrophe began long ago. But by virtue of what climate science fears in our future, it offers to put the brakes on the technological manipulation of nature. Climate science would appear to be modern science’s saving grace: the restoration of a horizon by the threat of catastrophe (Benjamin 1968).

This view of nature keeps us at a distance. Heidegger’s observation is phrased in a different way through a comment of Marshall McLuhan’s not long after the Soviet Union put the first artificial satellite into orbit. McLuhan used the term *environment* to designate that part of the world, both human and nonhuman, that acts as an unnoticed background for activity. Art, by contrast, brought elements of our environment to our awareness; art then was an “anti-environment.” From the moment that men were able to place artificial satellites into orbit around the earth, the earth ceased to be part of the environment and became displayed to us as a work of art. The advance of technology allows the old to remain, not as a natural environment but as a work of art made available to us along with the new technology (McLuhan and Paker 1968; McLuhan and Watson 1970). The observation of the earth through satellites makes the earth passé as nature, present instead as an object of ecology (McLuhan 1974). The earth appears onscreen rather than beneath our feet. The view is freely rotated, freely zoomed, freely available, and thus discounted. Since every part of the earth is visible to us, *our* plot of earth becomes precarious by losing its claim on our attachment. Our view dilates to include the whole, but it is a whole accessible to us only through a medium in which it does not exist.

13.2 Territory, Politics, and the Soul

Thus far we have touched on communication as an aspect of the human environment through which we learn of the condition of the natural world (Baudrillard 1981).⁵ The other aspect, however, is the modern city itself. The immediate environment in which we find ourselves keeps the natural world at an ever receding distance. The modern

⁵ Consider in its context Jean Baudrillard’s assertion that today “our true environment is the universe of communication.” Baudrillard echoes McLuhan’s remark that now “we live in an electric information environment,” in McLuhan and Fiore (1968).

city is a product of the rational control of nature in which it is no longer necessary for most men to spend most of their time laboring on a farm, still less hunting for food. The premodern city took the point of its relationship to the natural world with the utmost seriousness, and not only because of the more limited power that it exerted over nature. It did so for an entirely different reason—a reason that symbolizes the difference between the premodern and modern attitudes toward nature, and which helps to explain the place of environmentalism in postmodern culture.

When Plato and Aristotle considered the possibility of a site for the city, they considered its location a crucial matter, and their concern continued in the thought of modern philosophers, such as Machiavelli and Montesquieu (Machiavelli 1996; Montesquieu 1989; Bodin 1576). The basis of Plato and Aristotle's concern for the city's location, however, differs from the concern found among the modern philosophers. Consider first Socrates' noble lie in Plato's *Republic*, told to the guardians of the city being founded by himself and his two interlocutors. That lie, the story of the beautiful city's autochthony, comes about not, as it might in our time, from a desire to teach the oneness of all beings, but from a need to make the city's guardians loyal. The guardians must believe that they and the citizens they protect were born of the same particular plot of earth. Today loyalty to one's city seems arbitrary in a world of free and easy movement, transparent borders, and generalized compassion. The noble lie has been replaced with the assertion of our common ancestry, a possibility compatible with the global sensitivity that we prefer to cultivate. Though modern science attempts to free us from nature's threats to us (and even, through climate control, from nature's minor discomforts), in the same proportion we fret over the long-term costs of our mastery.

The classical philosophers aimed at two goals in considering the proper nature of a city's territory. The first was *self-sufficiency*, a hospitable land that brought forth enough food to nourish the city's residents without dependency on another city. The second was *virtue in the citizens*, or, as Aristotle put it, the ability "to live at leisure in liberal fashion and at the same time with moderation" (Aristotle 1984).⁶ Secondary to this concern was the need for a territory that would stand up well in military battles. The sea symbolized both the possibility of trade and the dangers caused by having too many traders and hence too much exposure to foreign citizens and their customs. Colder climates fostered spirited freedom but without the ennobling influence of thought and art; warmer climates encouraged thought and art but, lacking spirited freedom, led to the tyrannies for which Asia was Aristotle's emblem. Aristotle adds that a city should pray to obtain fair winds and healthful water, strong fortifications (tall in monarchies, level in democracies) and defensive walls.⁷ He compares the usefulness of walls to the importance of mountains. In both cases, natural and manmade, the presence of walls enables the safety of a good city.

In Plato's *Laws*, the Athenian Stranger gives advice to his comrades, Megillus and Cleinias, on the founding of a new colony in Crete. During the Stranger's outline of

⁶ Since too much food can be as dangerous as too little, Aristotle notes that Minos, the Cretan legislator, arranged a "beneficial scantiness of food."

⁷ Athens was divided into those of the hill—the popular party—and those of the plain—the wealthy.

the regime of this city, he reminds his interlocutors that “some places differ from one another in their tendency to breed better and worse human beings,” for the winds, sunlight, and water all have their effects, and vegetation “can provide better or worse nourishment not only for the bodies but also for the souls” (Plato 1980).⁸ At the outset of his inquiry into the new colony, the Stranger’s concern is to know where the city will be located with respect to the sea, so that he can judge whether the location is suitable for “the acquisition of virtue” (Plato 1980). But he recognizes as well that much is out of human control, as when “bad weather comes and frequently lasts many years” (Plato 1980). The founder of a new regime has some ability to select a beneficial site but lacks control over the vagaries that disease, epidemics, or weather might cause. Since nature cannot be conquered, founders must select those sites where nature has been hospitable, and legislators, who lack the leeway of founders, must bear in mind the effects of the natural world on the character of their citizens.⁹ Failing these things, Plato and Aristotle do not hesitate to observe the beneficial effects of periodic cataclysms. A catastrophe can cure human decadence.

The thread visible in these comments is a concern for character and the soul, and for the dilemmas presented by men’s need to live together in political society. In an agricultural society, the natural world could never be merely a background, but Plato and Aristotle also did not assert that its features determined men’s deeds. Their concern with what we call the environment was thus secondary to their concern for human virtue. It would be misleading, however, to call the philosophers’ view *anthropocentric*, since that term applies to the human mastery of nature advocated by the moderns as well as to the human contemplation of nature advocated by the ancients.¹⁰ The ancients did not assert nature’s manipulability through technology, even in the strong visions of teleology that we find among the Stoic philosophers. Stoic teleology was made compatible with a monism, which asserted the continuity of all nature and God’s immanence in it. The Pythagoreans, following a somewhat mystical way of life, abstained from meat partly from a belief in reincarnation, but also for the sake of the “best education”—a concern for the soul. In the highest portrayal of the contemplative life at the end of his *Ethics*, Aristotle asserts that the contemplative life is wholly self-sufficient, having no need of external goods. Though such a life seems inaccessible to any human being, it is apparent that a life devoted to contemplation would not require the unlimited acquisition of natural resources (Cicero 1933; Siculus 1946; Iamblichus 1991; Aristotle 1975). Such a life would not be devoted to the preservation of the environment, but neither would it lead to its exploitation or devastation.

⁸ Ernest Barker draws attention to Plato’s geological description of Attica in the *Critias*, (Barker 1918). On Greek philosophy and the environment, see Carone (1998), in Robinson and Westra (2002). On the Greeks themselves and the environment, see Hughes (1996, 2006). Also consider Westra and Robinson (1997).

⁹ Because of this, one cannot succeed in the attempt to found an approach to the environment on the basis of the Platonic or Aristotelian account of the virtues.

¹⁰ Aristotle suggested that man was perhaps not the most important being in the universe, and Socrates’ turn to the human speeches was motivated out of a desire to understand the nature of each of the beings (Plato 1998, Aristotle 1975).

In briefly examining the contributions of premodern Christianity, one encounters the famous thesis of Lynn White Jr., blaming Christianity for the modern ecological crisis.¹¹ A parallel theme runs through other scholars who critique “instrumental reason” either as a feature of Western thought as a whole or a necessary development within the West. The highest medieval equivalent to the contemplative philosophical life—the monastic life—had *ora et labora* as its motto and cultivated the fields with gratitude to God.¹² Returning to a more political standpoint, the considerations advanced by Thomas Aquinas at the beginning of the second book of his *De regimine principum* indicate that the conditions of the natural world play an important role in his thought, and he draws on the works of Vegetius, Aristotle, and Vitruvius.¹³ The selection of a temperate region and suitable location within it is the first task of city’s founder. A temperate region is helpful for health, for maintaining safety through war, and for moderate political life. In his continuation of Aquinas’s work, Ptolemy of Lucca points out the need on the one hand for “natural riches” such as “farms, vineyards, groves, forests, and preserves of various animals,” and on the other hand for “artificial riches” such as gold and silver coins. Aquinas also explains the traditional teaching against cruelty to animals on the basis, in the highest respect, of its deleterious effects on the character of the men who perpetrate it (Aquinas 1947–1948, 1975). The dominion of man was for the sake of goodness, not power.

13.3 Modern Politics and the View of Nature

A new view of nature’s potential emerges in Machiavelli’s *Prince*. In the fourteenth chapter of that book, Machiavelli says that a prince must dedicate himself above all to the art of war, so that even in times of peace he will not let slip a moment that could be of service in preparing for war. A prince must “learn the nature of sites, and recognize how mountains rise, how valleys open up, how plains lie, and understand the nature of rivers and marshes—and in this invest the greatest care”¹⁴ (Machiavelli 1998). Though the most commonly noted importance of Machiavelli’s remark lies in his

¹¹ The vast literature on the White thesis has several bright spots, among which see especially Fortin (1996).

¹² On man’s dominion over nature, see Ps. 8:8 (DV): “Thou hast subjected all things under his feet, all sheep and oxen: moreover the beasts also of the fields.” But on agriculture’s dependency on God, see Ps. 64:12 (DV): “Thou shalt bless the crown of the year of thy goodness: and thy fields shall be filled with plenty.” In the context of gratitude for God’s providence, see Ps. 106:37 (DV): “And they sowed fields, and planted vineyards: and they yielded fruit of birth.” See Chap. 48 of the *Rule of St. Benedict* on labor. For a recent study of monasticism and the environment, see Arnold (2012).

¹³ The translation is contained in the work by Ptolemy of Lucca, with portions attributed to Thomas Aquinas, *On the Government of Rulers: “De regimine principum.”*

¹⁴ “Every valley shall be filled; and every mountain and hill shall be brought low; and the crooked shall be made straight; and the rough ways plain” (Machiavelli 1998). In Plato’s *Laws*, the Athenian Stranger suggests spending “not less than one day every month” on preparation for war, or more if need be. Machiavelli by contrast suggests exercising the art of war “in peace . . . more than in war.”

giving primacy to war over peace, a further consequence is the treatment of the land as a site of battle and nothing else. In observing the nature of one's own territory, one considers not only how to defend it, but how one might attack a province similarly arranged. The prince concerned chiefly with war cannot be a philosopher-king concerned chiefly with the soul. The territory no longer becomes suitable with regard to the possibility that one might live a good life there, but rather with regard to its advantages in the war from which human life can never rest. A more developed science would later allow princes to overcome deficiencies in their territories—a development within Machiavelli's scheme, less grand than the change in orientation that Machiavelli himself proposed. If the primary difficulty is war, then a city's territory cannot be the backdrop for the good life, and the soul is not of primary concern. If tranquility and virtue cannot mix, then a prince must seek from his territory knowledge, as Machiavelli puts it, which is "useful." Useful knowledge is promiscuous rather than proprietary. Self-knowledge, recast as the knowledge of one's own territory, helps one conquer others.

The emergence of nature as an obstacle to be conquered would appear to raise the question of the character of man, the would-be conqueror of nature. But it was just that question, the disputable status of man's purpose or good, which the philosophers who focused our sights on nature also sought to bracket. Attention to what men need from the earth appears coordinate with the disappearance of man's soul as an object of contemplation or element of political life. To speak of man's environment it is not necessary to know what man is, or even to make an assertion regarding what is good for him. John Locke's political teaching follows this very contour. He excludes the care of the soul from the concern of civil magistrates, but he includes among civil interests the "Possession of outward things, such as Money, Lands, Houses, Furniture, and the like" (Locke 1983). In the state of nature and even occasionally in civil society, men's possessions stem from the application of their labor to things of the world provided by nature or by God for the nourishment of mankind (Locke 1967). Since Locke's analysis of men's property depends on their needs rather than on a study of the soul, property takes its place as a civil concern separate from the soul. The environment (our word, not Locke's) is thus the world minus what men have improved and appropriated to themselves. But since men constantly make elements of the environment into their own property (as they do even in breathing), they must have some concern for it. Now the environment, the unappropriated world, becomes a concern not for the sake of our souls but for the sake of our needs and wants. The environment is either potential property or detritus. If our mastery of nature is through the control of chance, our environmentalism emerges from the need to control the consequences of the control of chance.

Through their manipulation by human science, the objects of the natural world that we appropriate cease to be part of nature and take their place in the story of human progress. God's command to "subdue the Earth," says Locke, means to "improve it for the benefit of Life" (Locke 1967).¹⁵ Since history is the sign of the progressive

¹⁵ John Locke, *Second Treatise of Government*, chap. 5, para. 32. See para. 33 for the equation of appropriation and improvement, and para. 44 for the connection of improvement to "Invention and Arts." See also Harrison (1999).

conquest of nature, what we conquer becomes part of history, and what remains is the environment. Nature becomes known for its usefulness. The environment is that part of nature useful to man as a context for man's mastering the rest of nature. The assertion that nature is conquerable goes hand in hand with the view that the perfection of man's nature is of doubtful importance to political life. That assertion brings nature to mind while never ceasing to consider nature the site of a potential war, not only of men against other men but of men against those very aspects of nature that could disrupt men's designs.¹⁶ Once nature becomes available for manipulation through science, its preservation too becomes a human task. Natural history museums appear alongside museums of human history since the principle of innovation which guides modernity has consigned both nature and culture to the past.

The preservation of the environment had been an epiphenomenon of the concern for the soul, but it comes to depend on conscious effort. Technology collects parts of nature to be rearranged in the history of progress. Nature as it was known prior to becoming the object of technology becomes the prehistory of progress. The notion that one could not tame the heat of summer becomes a memory. In the same manner, the critique of modern science launched by Rousseau transforms the natural condition of man into an historical development, unknowable except through a speculation whose necessary steps have the character of a foggy memory. Rousseau can approximate the prescientific understanding of nature only through his solitary walks and his inquiries into botany, attractive to him since botany studies a part of nature below that of animals (Rousseau 2000; LaFreniere 1990; Lane and Clark 2006; Lane 2006). But that move requires a willful departure from the present situation in awareness that one is departing from it. A modern who walks alone has to label himself *un promeneur solitaire*, and Rousseau commits his experience to writing.

13.4 Environmental Science and Postmodernity

Today, the difficulty regarding the preservation of our environment is often framed as a contest between scientists on the one hand and those who doubt or discredit the conclusions of science on the other—whether they be religious adherents, corporate apologists, or postmodernists. To speak of science in this limited way—science is that which warns of catastrophe—is strange, for science created the conditions in which the environment has become an object of human conservation. The environment is an indirect creation of science, volatilized and made historical through technology, a patient whose condition is apparent not from looking but only through tests. The range of perspectives in this volume adds further complication to this common framing. Those who adhere to deep ecology, for example, praise the conservation of the environment not for the sake of modern science or for the sake of human living, but for its own sake—a view with roots in the disparate teachings of Rousseau, Spinoza,

¹⁶ In book 1, chap. 6 of Machiavelli's *Discourses on Livy*, the factional conflict of rich and poor endemic to political life finds its solution in the imperial expansion upon which the few and the many alike can agree. The technological project moves from the imperial rule of one city over another to the command of man over nature.

and Heidegger (de Jonge 2004; McWhorter and Stensad 2009). Others do not object to the accomplishments of modern science, but rather, as the phrase *green technology* indicates, they want the advantages of science while minimizing the side effects.

Let us return to a more ordinary level than these theoretical considerations, but a level at which we can see more clearly certain theoretical implications: the level of the consumer and the citizen. As citizens and consumers concerned with the state of the environment, we are still generally not conscious of the direct relationship between our actions and their consequences for the environment. Only the statistics tell us what is really happening, and *everything* we do can be tallied with a measurable effect however small. Because science dissociates us from expecting to see the consequences of our actions, and because as human beings we still expect nothing less, a space opens for savvy entrepreneurs to let us know (for a premium) that we are making a difference. Just as voting does, following the ecological law involves a question whether one small action can really have any effect. We do not require a sophisticated critique of science in order to doubt the connection between ourselves and the environment, or even between statistics and the world as we observe it.

A now classic definition of postmodernism emphasizes the loss of belief in metanarratives—with the forgotten qualifier that this loss of belief is a “product of progress in the sciences” (Lyotard 1984). An environmentalism dependent on science would seem to be threatened if it were called into doubt by the prevailing winds of postmodernism. Because postmodernism encourages doubt about metanarratives, it encourages the acceptance of a multiplicity of particular narratives with nothing to guide the whole. Stories interpreting the importance of the earth for particular peoples or places then appear to offer a way to match the lack of belief in science with a practical result favorable to the environment¹⁷ (Gare 1995). Postmodernism, however, faces the difficulty that it can never return to particular narratives without the lurking suspicion that its return is arbitrary. The unironic experience of a narrative cannot be recovered, and the call for narratives that herald the importance of place still stems from an environmentalism lying beyond particular narratives. And today, no narrative takes effect without the compulsion of the market or the compulsion of the law.

Once “incredulity toward metanarrative” prevails, what then? We have hardly stopped being dedicated to the rational control of nature, even as we incline toward believing that the modern effort should be considered only one among others. Our doubt about the metanarrative has not left us any less absorbed in the project. The particular narratives—assertions about the truth of particular religions, the importance of particular nations—all remain as well. A better way of studying the postmodern condition emerges through emphasizing the status of what remains after modernity’s establishment of science. Just as modern science breaks apart nature to reveal its possibilities and manipulate them, so too it breaks the authority of cultural traditions, political arrangements, and philosophy. As with nature fragmented into manipulable parts, the cultural world appears as a collection of once-authoritative symbols freely

¹⁷ See Arran E. Gare, *Postmodernism and the Environmental Crisis* on Jim Cheney’s advocacy of “bio-regional narratives.” A similar theme emerges in the works of Wendell Berry on the importance of place and of his place—Kentucky. Praising both one’s own place and the importance of anyone’s place is symbolic of the self-awareness that postmodernism cannot slough off.

available for adoption and use by those with no other attachment to them. The elements of culture come and go under the law of fashion according to which one must have no hesitation either to upend an established convention or present it anew, freed or stripped of its prior significance. Dedication to the results of science is fully compatible with this cultural fragmentation. The world of virtual reality even combines the two, and occupies ever more energy of the scientific enterprise. Virtual reality enacts the promiscuity of all cultural signs, which one may view, enjoy, try out, or adopt at will. At the same time, it depends on the advances of computer science, a discipline whose innovators revel in playfulness and experimentation. Advancing the science that creates virtual reality requires no belief in historical progress or the universal validity of scientific inquiry. These observations favor Jean Baudrillard's suggestion that what is postmodern is "to play with the pieces"; postmodernity "is a game with the vestiges of what has been destroyed"¹⁸ (Gane 1993).

13.5 Democracy and Ecological Politics

In modern politics, fragmentation is a primary characteristic of democracy, appearing in men's love of independence. To understand postmodern life, it is then not necessary to appeal to contemporary theorists but to students of democracy and to Tocqueville, the chief of their company, who preceded postmodernism while anticipating many of its key observations. The intervening bodies that claimed men's allegiances prior to democracy—families, towns, guilds, associations, and churches—are fractured, and the subsequent isolation finds a partial remedy in the tendency of men to form voluntary associations (Tocqueville 2000).¹⁹ What effect does democracy have on men's relationship to the environment? Men's independence goes with their pride, but in the absence of associations and other groups, independence leads as well to the feeling of weakness (Tocqueville 2000). Out of this sense of weakness and the democratic inclination toward notions of a general character, two "immense beings" come into view: the whole of nature conceived so as to encompass even God, and the whole of a large, central government²⁰ (Tocqueville 2000). The first view, pantheism, descended in its modern form through the teachings of Spinoza. Democracy's notion of equality tends toward a statistical tabulation or counting of all human beings, who exert their power through the form of majority rule (Tocqueville 2000).²¹

¹⁸ For Baudrillard's observations on the phenomenon of postmodernity, my analysis draws inspiration from a number of Baudrillard's suggestions in other works. Baudrillard's comment echoes T. S. Eliot's line from *The Waste Land*: "These fragments I have shored against my ruins."

¹⁹ Alexis Tocqueville, *Democracy in America*, vol. 2, pt. 2, chap. 4–8, on associations; vol. 2, pt. 3, chap. 13, "How Equality Naturally Divides the Americans into a Multitude of Particular Little Societies"; vol. 2, pt. 4, chap. 2, p. 640, on the absence of "secondary powers."

²⁰ Tocqueville's use of the same term—*être immense*—for these two phenomena is noted by Mansfield and Winthrop (1999).

²¹ See Tocqueville, vol. 1, pt. 2, chap. 6, "On the Omnipotence of the Majority in the United States and Its Effects."

From there it extends to a counting of all beings through a physical science in search of universal causes. The fragility of men's independence and the subsequent tumult of their lives would first incline them to insist that God at least underlies the stability of the material order (Tocqueville 2000). The democratic mind's urge to discover unity everywhere, however, leads to the conclusion that all things "are considered as no more than diverse parts of an immense being which alone remains eternal in the midst of the continual change and incessant transformation of all that composes it" (Tocqueville 2000). A similar movement underlies democracy's inclination toward the concentration of power: proud but weak, the democratic citizen "naturally turns his regard to the immense being that rises alone in the midst of universal debasement" (Tocqueville 2000).

Since nature has been fragmented by modern technology, no particular piece of nature places a demand on us. Autochthony was always a myth, we have no local gods to worship, and the land, though we may choose to stay on it, could just as easily disappear beneath our running feet (Tocqueville 2000).²² The political union of American states transcends the natural divisions suggested by American geography, for the states are linked by commerce, a tie which binds in spite of every centrifugal force (Tocqueville 2000). In overcoming geography, commerce introduces into our relationship with the natural world a split analogous to that in the political world. Your land is your chosen land, picked because of opportunity rather than geographical necessity. Even inherited property offers a chance to start afresh since it does not impose itself as a law. Since your land is chosen, it is a source of pride. Since it depends on you, and you are alone, it is vulnerable. Since every other property depends in the same way, your view dilates from particular nature to the nature of the whole. The importance of the housing market rises against the pride of your home.²³

In the pantheistic view toward which democracy inclines, both the material and the immaterial—the nonhuman, the human, and the divine—are all enclosed within the whole of nature, of which God or the divinity is an aspect. The consequence for religion is that it comes to share many of the goals of democracy. In return, religion limits the democratic ambition to control nature in exchange for becoming the once-weekly reminder that not all things are material.²⁴ Just as democratic citizens bow to the people as a whole but bristle in conflict with one another, they sense the divinity of the natural whole but bristle at nature's particular irritations—for what is technology

²² Tocqueville, vol. 1, pt. 2, chap. 9, "Sometimes man advances so quickly that the wilderness reappears behind him. The forest has only bent underneath his feet; as soon as he has passed, it recovers" Hence the element of arbitrariness present in American movements back to the land, even while such movements offer a salutary limit on our feverishness. On technology in Tocqueville, see Schleifer (2000).

²³ On ecological concern as secondary to the concern for one's home, see Scruton (2011). Scruton emphasizes the continuing relevance of a conservative attachment to one's place, a phenomenon more difficult of access in America.

²⁴ "American priests do not try to attract and fix all the attentions of man on the future life; they willingly abandon a part of his heart to present cares; they seem to consider the goods of the world as important although secondary objects; if they do not associate themselves with industry, they are at least interested in its progress and applaud it" (Tocqueville 2000).

but the assumption by science of the task of smoothing out that bristling? The man who accidentally runs into a door curses it in anger—a pointless anger, since it wasn't the door's fault, but he has a point in the world of technology: next time, make the door sense your folly and soften your blow. Since God has given the world to man, nature is made to perform what would otherwise seem to be miracles.²⁵ The technological transformation of nature attracts the amazement previously attaching to miracles. Great discoveries appear not as miracles but as the “most magnificent effort of human intelligence” (Tocqueville 2000). Once nature is volatilized through technology, one needs a miracle to preserve it—a further work of technology rather than a dependence on God. In giving nature to us, God came to be seen to have given it away.

The view of pantheism is compatible with technological development in another way. The partial control of nature brought about through modern science highlights, and makes all the more unbearable, those parts of nature beyond science's control. Since we are only one part of nature, and nature is nothing but parts, our manipulation of “nature” is justified by being not nearly so serious—mastery not for the sake of ameliorating specific ills. The development of the modern economy has long since outstripped the possibility that it might be justified solely on the basis of need, for once invention takes on a life of its own, the chief need satisfied is our need for play. But since our conquest of nature is incomplete—since nature continues to elude our complete control—we pause to gaze upon the *immense being* of nature. Our failure to master all of nature compels us to excuse our failure through the very pantheism that authorizes nature's playful conquest. Gazing at the immense being, we are parts in awe of the whole; as proud parts, we reject the whole's insensitivity to our demands. Technology and environmentalism are two moments of the same postmodern condition that, according to Tocqueville, is the condition of democracy.

Yet if our weakness as individuals pushes us toward an awe for nature as a whole, what can a mere individual do in order to preserve nature as a whole? The question points in the direction of the other immense being, not nature but central government. Nature could not depend on particular men in order to endure. The dangers posed to nature by individual men, however, could be remedied by the central power on which democratic men depend and to which they defer. The vision of this power prophesied by Tocqueville is that of a mild and enervating administrative despotism, a stumbling-block to men's designs, keeping them in a sort of dependent childhood. The problems of democratic society seem too great to its citizens because they see a problem spread so wide that they have little hope of affecting it themselves. They withdraw from political concern for their fellows and hand over their responsibility to a government sufficiently large to administer a whole nation. The petty regulations Tocqueville fears have already begun to come to pass in our time. The question of saving the environment as a whole from a catastrophe, such as global warming, appears to require something well beyond private organization.

To preserve or save the environment through regulation by government matches together the two beings that most impress the democratic imagination. Here regulation of commerce and industry occurs not only to preserve the equality characteristic

²⁵ See Spinoza, “On Miracles,” chap. 6 in *The Theologico-Political Treatise*. For the transformation of natural deeds into miracles, see Machiavelli (1996).

of democratic citizens, but also to save the equal relation between man and nature. Even severe restrictions on pollution and technological development would not quell the desire for mastery of nature, for we still have no other way of life open to us. Yet the irritation of regulation at least verifies that something is being done. In the marketplace, the usual law of supply and demand delivers to us only so much preservation of the environment as is necessary to quell our guilt as consumers. Offering the highest quality for the lowest price is only the flip side of offering the lowest quality for the highest price. The result is that we insist on being told that even products of technology are natural. Environmentalism proves to be the fulfillment of our desires and, in a different respect, their complete restraint. In fact, the only restraint we know is the limit imposed by the preservation of nature as a site for human conquest and play. Our desires are both fulfilled and restrained through the image presented in their satisfaction. When we buy mass-produced milk, we prefer it to be labeled with rolling pastures and scattered cows. The product attracts us, but not its production—and in the world of opaque supply chains, producers are only too happy to comply. Green technology leads to the acceleration of technology's operation on the world, but with a restraint upon its consequences or externalities. Today we have no right to intervene in nature but no reason not to, with the result that our interventions need only be as clean as possible. We satisfy ourselves that we are doing good through our self-satisfaction.

The consequence is to delight in images themselves more than the images accompanying a particular product. We can create an image that induces delight and leaves no trace. Virtual technologies appear to satisfy this requirement in spades. They allow for paperless offices amid knowledge economies, and the energy required for computing technology is less obvious than that required to power machine technology. Cell phone towers replace smokestacks, data becomes a form of smog, and we worry about the electronic pollution of our bodies (and of bee colonies) (Shenk 1997; Blair 2003).²⁶ In the developed world, production no longer depends on mastering nature through the strength of our bodies. Why farm organically when you can farm virtually? When most citizens of the developed world do not need to farm, the answer cannot be *in order to eat*: so virtual farming—now provided as entertainment by the main social networks—allows us to delight in an activity whose harmless image is true. The consequences, however, are as hidden as our souls.

13.6 The Meanings of Nature

Many students of ecology have worried that the image of nature in modern culture has become too benign, and that environmentalism depends on a peaceful image of nature that cannot be sustained.²⁷ This diagnosis is right for the wrong reason. Ecology responds to the loss of nature as a standard for human deeds, and in that sense,

²⁶ The early work was David Shenk's *Data Smog: Surviving the Information Glut*. But the problem is not wholly new. See Ann Blair, "Reading Strategies for Coping with Information Overload ca. 1550–1700," in the *Journal of the History of Ideas*.

²⁷ For example, see Biro (2005), Morton (2007) and Žižek (2008).

ecology has always been without nature. Because nature is no longer a standard, it is superfluous to call for an “ecology without nature.” Ecology marks the absence of nature, for nature in its moral capacity required a concern for the soul that made the conquest of nature impossible and its preservation accidental, hence unknown.²⁸ The perceived beneficence of nature is an aspect of our memory of the time when nature was a standard, as in the assertions of natural right and natural law. Insofar as nature provided support for assertions of human nobility, nature seemed to be good but incomplete, still full of chance and misfortune, to say nothing of hostile animals and climates. We remember that nature was once good, but we forget that its goodness was as a standard, not only as a temperate climate. The idealization of nature as peaceful is a residue of the rejection of nature as a standard. Nature can no longer be viewed positively. It can only be pitied and, as with all things pitied, its hostility is excused through our guilt over having made it pitiable. The development of technology posed no collective action problem, but the collective action needed to avoid catastrophe does. In spite of what we say, it goes against our every impulse.

The attempt to master nature as the realm of chance depended first on an attack on nature as a standard of the good.²⁹ Nature in the moral sense then yielded to fortune as the prize conquest of science. The territory of one’s body, like the territory of one’s mind, shifted from being at its best a site of cultivation to being at all times a site for war—the political war against the vicissitudes of change, and the scientific war against the vagaries of nature. Treating physical territory in such a manner was itself an act of the mind. Tilting the balance against leisure and toward war, the modern shift threw leisure out of balance as well, and caused the romanticizing of a lost nature that had never existed—free from bad luck but somehow also free from science, a site only of peace. To stare at the wilderness is thus not to look into any human past, but simply at the counterweight to human activity that used to go along with it, not separated but present at the same time. Nature preserves simply add proof of the fragmentation of the modern world, where work happens far away and nature must be visited occasionally to verify its continued existence. But nature preserves, like parks, decorative greenery, trips to the bush and primitive art, do not signify any whole concern for nature or the human past. They are fragments to be played with like any others. They presume no whole way of life. Like the modern balance of powers, it is a balance among assertive, nonunified parts, with no moderation in the whole.

What was once nature now appears as environment, with fragmented and isolable parts able to be rearranged. Modern ecology thus does not depend on a Romantic idealization of nature, as though it contained no dangers. It depends instead on the pleasant thoughts that spring to mind from our experience of a nature put on display in a controlled fashion. The zoo, the park, the forest and the yard are all separably chosen and eminently agreeable portions of nature. Even where their locations are fixed, their arrangement within our lives is a function of our choice. They hold whatever meaning we happen to assign to them—their conquest and submission, their perseverance, their beauty. Nature became historical from the moment that modern science sought

²⁸ Consider Adams (1918).

²⁹ This development is found in Machiavelli’s *Prince* chap. 15 on the good, and chap. 25 on fortune.

to disassemble it and reincorporate its parts in the story of human progress. Our success in the conquest of nature destroys nature as an object of conquest. We have no choice but to arrange the fragments as environment, for what remains of nature has to be put somewhere.³⁰ If we claim that what we call “the environment” is really nature, we omit our selective view of it—through statistics and the media, indirectly and vacant of any moral standard, appearing either in selected places or at selected times. Without an ability to appeal from the environment to nature, our protection of the environment has no explanation outside our free arrangement of the signs making up our world—as an object of changing consumer fashion, or as a sign of one’s social status.³¹ The reappearance of nature in digital form, pictured and also quantified in every detail, allows it to remain at all events.

13.7 Postmodernity and the Prevention of Catastrophe

The complexity of modern technology required and benefited from the fragmentation of production in the division of labor. At the same time, technology made possible the long supply chains and opaque manufacturing processes that hide from us the stories of the products we buy and services we receive. Supposing a strict regulation of production might be necessary in order to avoid catastrophic climate change, how could we accept it? The separation from our environment made possible by labor-saving devices makes the danger posed to the environment difficult to measure. At the same time, our imperfect knowledge of production processes and supply chains means that we also have imperfect knowledge of their regulation by law. The shutting down of oil wells eventually affects the price of oil, but since markets attempt to price in future expectations, and regulation is nothing if not slow, even today’s price reflects certain anticipations of future supply. Many environmentalists call for a draconian regulation of industry for the sake of saving the planet, and they despair of the seeming indifference of “postmodern” youth who take scientific arguments to be just another way of describing the world. A mark of the postmodern condition, however, is not that one does nothing because of the multiplication of narrative explanations, but that one does everything. Doing and believing are forced into a separation opposite of their pairing prior to modernity.

When the law was believed to be divine, one could disobey (in violation of the law) without immediately lapsing into atheism. The tension between believing and not doing could be resolved either by doing or by admitting one’s disobedience. In modernity, the tension between believing and not doing—a tension we find unbearable—is resolved by not believing or by changing what one believes in order roughly to match what one does or wants to do. In postmodernity, one does without having to believe, and believes without having to do. For example, sexual promiscuity no longer requires dedication to sexual liberation, which was necessary only to break the original

³⁰ See Jean Baudrillard’s argument in “Design and Environment,” chap. 10 in *For a Critique*: “The great signified, the great referent Nature, is dead, replaced by environment, which simultaneously designates and designs its death and the restoration of nature as simulation model.”

³¹ See Jean Baudrillard, *The Consumer Society: Myths and Structures*.

taboos. Ecological theory was needed to break the taboo of modernity that technology would lead to endless progress. But to lose belief in modernity and to doubt its necessity are two different things. In fact, modernity can advance all the more when not burdened with belief. The multiplication of “memes” across networks symbolizes this promiscuity of interpretation. A picture is now worth a thousand ironic captions. The picture of our saving the planet can absorb any number of explanations: old-fashioned environmentalism, left anti-capitalism, Romanticism, deep ecology, shallow ecology, denaturalized ecology, Christian respect for nature, agrarianism, green progress, and many others.³² Today, the law admits as many interpretations as a text, because it does not give education and punishment as its explicit purposes. Some say environmental regulation is needed because it is good for business in the long run; for others, it is part of a war on the market’s ruthless exploitation of the environment. But the market also has shown its ability to be friendly to the environment.

Free markets deliver particular products under a multitude of different meanings or interpretations. They have every incentive to do so. The same car can exhibit sleekness and efficiency but also symbolize one’s rising social status or one’s acquired wealth. From the standpoint of the environment, a similar logic is at work. The question concerning the environment and the market is not whether market incentives will be insufficient for the task of saving the environment. The question rather concerns the direction of the impulse behind the environmental movement, not only in its mainstream versions but even in radical ecology. Nature, having been made an object of conquest by modern science, returns in two guises—and that of guilt and fear. Markets also operate on at least two levels: the desire for a product and for what it symbolizes. Markets operate more efficiently, however, when the need for a product and the desire for what it symbolizes can be disjoined and marketed separately or even in contradiction. An artificial product “MADE WITH NATURAL INGREDIENTS” satisfies those who want the artifice and those who want nature. But nature becomes an artifice insofar as it is a label, and artifice when it does not reflect the needs of our nature becomes caprice. The artificial, or art, may be less contrary to nature than nature used contrary to its purpose, because artifice avoids the question of appropriating nature. Hence artifice is no longer distinct from nature because art no longer complements or fulfills nature, and the “natural” we find in products is anything but. Since the only nature we know is artificial, it is no surprise to find it everywhere in the marketplace, the very realm of artifice, and its presence there does not stand in contradiction to the laws of the market. (And if the market has laws, how could it be in contrast? Nature’s availability on the market poses no challenge to the attempt to understand the compatibility of ecology and postmodern culture). Now the market allows you to fulfill in the same act, both the need for consumption and the need to critique it—as the Clear Conscience Café near my university indicates in its name. Among products marketed as green or eco-friendly, some involve the “green technology” that deep ecologists find insufficient; artisan craft products, by contrast, may not be marketed as green at all.

³² See, for example, the table “Environmental discourses and their relationship with modernity,” in Leigh Glover, *Postmodern Climate Change* on page 53.

Today, the law has no aspiration to outline a whole way of life. It does not prescribe for us what we ought to do although, as a part of democracy, it affects our choices by bringing to mind the notions of equality and freedom. The portent of an ecological crisis, however, confronts us with the consequences of the rational control of nature on which the modern way of life depends. That way of life seeks to take questions of the human soul out of the contentious realm of politics, and unite men on the basis of addressing the needs of their bodies. The soul's partisanship would be calmed indirectly through concern for the body.³³ If we undertook draconian regulations of business and personal consumption in the name of avoiding catastrophe, the law would not have to give any one account of its purposes; still less would it have to enunciate an ecological philosophy. We would not desire to control nature any less, but rather accelerate the shift of our desires toward digital rather than real satisfaction. The critical responses to modernity still function on its level: we pursue natural products and natural foods but not the life *according to nature* which was the byword of premodern philosophy.

Today we seek to distance ourselves as much as possible from the direct control of nature. You buy the car, but you don't mine the steel. That distance haunts our evaluation of the ecological crisis, too. Until it is too late, we have no way of evaluating whether the science is "real" or not. But science is still an attractive narrative. It extinguishes anxiety by assuring us of its accuracy. And it is another fragment that is available to entertain us in our boredom, employ us in useful tasks, or satisfy our curiosity. The postmodern condition encourages not only distance from the control of nature but distance from restrictions on that control. Why plant a garden when you can buy organic bananas marketed alongside the picture of a happy farmer with his tousled hair? Together the law and the market fulfill these impulses perfectly. They preserve us as consumers of images and signs, and as citizens subject to a law that does not guide. They alleviate the impossible burden of the ecological law and shelter us from the manipulation of nature that always frightens us up close.

The burden of ecology is impossible because it addresses to each citizen the infinite obligation to undo the consequences of something he had been able to participate in as a mere fragment. We cannot each bear the full burden of saving nature. Yet we would still like the conceit of participation and an increase of our notional power. It is the "collective action problem" of which we spoke earlier: the division of labor works well at breaking down nature, but does it work well at putting it back together? The distance from nature that is part of modernity distances us also from the ability to take ecological catastrophe seriously. At the very moment we sense its urgency, we face a disturbing conclusion. Long ago, our cultivation of the soil followed indirectly from concern for the very soul that has been cordoned off by modern politics. The fragmented ecology we see today is indeed evidence that the old impulse is still alive. That impulse is now split and refracted, a rainbow of interpretations marking our unwillingness to see nature destroyed again, and our inability to quicken the soul whose importance made the preservation of nature possible.

³³ On the indirectness of modern government, see Mansfield (1971, 1996).

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Chapter 14

Blissful Devolution: Our Rolling Judgment Day

David J. Nemeth

Abstract Let me sketch out here my vision of the cloistered cornucopia of AD 2100: Management of Planet Earth is entirely rationalized. Nature still nurtures. Artificial intelligence is history. The Machine has met its Master. The rich are enraptured. The poor are happy. The ducks of demography are all in a row. Never more is heard the discouraging word. Welcome to my sanguine vision of our future totalitarian utopia.

All is for the best in the best of all possible worlds. (Voltaire 1758)

Where ignorance is bliss, 'tis folly to be wise. (Thomas Gray (1742))

14.1 Part One

14.1.1 *The Old Professor*

The Old Professor was now at the window, staring out at the world. We students didn't know quite what to do. One minute ago, he had been at the chalkboard discussing food security and the population bomb. He had just finished drawing what he labeled a "resource pyramid" followed by the word "bananas" enclosed in parenthesis, at which point he stopped dead silent, paused for what seemed an eternity, then rapidly erased his pyramid in a cloud of chalk dust. In its place, he drew a big perfect circle and then a stick man and stick lady. They were standing together on the circumference line of the circle, facing the void within. They both had sad eyes and frowns. They were holding hands.

The Old Professor couldn't see us because his back was turned, but we were turning around in our seats quietly making big eyes at one another. Then, he wrote "ABYSS" slowly and deliberately in the center of the circle, dropped the chalk into the tray, stepped away from the blackboard, and surveyed what he had written. Then he turned to that big bank of windows on the right side of our classroom and strolled over to them.

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Granted, the view across campus from where he was standing was splendid any time of the year. It happened to be mid-December. He had clear view across acres of near-naked trees, cart-wheeling leaves, and brown grass. Class was in session but what was he up to? Without turning to face us he spoke “Please get up, come over here to the windows, and look out and tell me what you see.”

This we did. There were 25 or so of us, but we had ample space to view out, and while contemplating the question, some of us responded out loud: “grass” . . . “benches” . . . “dead leaves” . . . “students” . . . “trees” . . . “squirrels . . .”

“Yes!” He suddenly interrupted us. “Pay attention to those squirrels! Watch them for a while. Then tell me what they are doing.”

“Climbing trees” . . . “running around like crazy” . . . “chasing after each other” . . . “frolicking” . . . “engaging with nature” . . . “digging up nuts . . .”

“Stop there! Why are these squirrels frantically digging up nuts that they carefully buried only a few months ago? We stood there for a good 10 minutes going back and forth about winter, squirrels, nuts, and trees.

We students had pretty much concluded that the nuts were necessary as cached food resources for the survival of squirrels over the winter season. But the Old Professor then begged to disagree, demonstrating why he was a professor and we mere students.

He asked, “What percent of those nuts that the squirrels buried do you think they actually eat?”

We knew it was not 100 % so ventured to guess less: “90 percent?”

“Ha!”

“Eighty percent?”

“No way.”

“Seventy percent?”

“No.”

“Sixty-five percent?”

“Nope.”

“Then 60?”

“*Nyet!*”

And so on till he showed us his palm and divulged that had scientists observed and reported that tree squirrels failed to recover 74 % of the nuts they so carefully buried. “Do the math” he instructed.

So we did the math. Twenty-six percent was recovered food—and the rest added up to a lot of energy and time wasted. The Old Professor then waxed poetic, “Where the squirrels forgot to go, the little trees did grow.”

There was a long silence. Indeed, Nature seemed inefficient, but it turns out even *that* conclusion was not the lesson to be learned from the Old Professor’s squirrel story. Instead he concluded, “Now consider this: The squirrels are working for the trees—but *they don’t know it.*”

A Marxist in the class shouted out, “that’s brilliant!” A few students, the critical thinkers in the class, began to nod in confirmation at this unexpectedly profound aspect of the Old Professor’s convoluted squirrel story. Most of the rest, pretty much

a mindless majority, later on revealed in a straw poll that the Old Professor was himself nuts, but not dangerous.

Especially when the Old Professor returned to his podium, picked up lecture notes, and then paused on the way out¹ to pointedly ask all of us: “Who are *you* working for?”

I remember the day. It was a Thursday, December 14, 2000.² Vice President Al Gore³ on the previous day had conceded the Presidential election to Texas Governor George W. Bush. This was a significant tipping point for the fortunes of humankind in my estimation: without Al Gore in the White House, the long-rumored possibility of catastrophic anthropogenic global warming had finally teetered over into the realm of the real.

14.1.2 *The Lucky Ape*

A decade after Al Gore’s concession speech, Jim Norwine asked me to consider playing futurist by aiming my “secular postmodernist” perspective on the probable outcome of two trending and potentially high-impact contemporary issues—global warming and culture shift. These key considerations would constitute the core conceit of this edited book project. He specifically challenged me to consider writing a chapter that explored the possibility of the existence of a “sanguine” ecumene for humankind 100 years hence.⁴

I jumped at the opportunity, which set in motion a cascade of cognitive and creative processes culminating in the production of this essay. Jim Norwine and I had collaborated successfully before⁵ on a “new millennium” themed book project. In all honesty,

¹ Never to return. An earlier version of this squirrel fable appeared in Nemeth (2010). See also Raver (1994).

² *How the Grinch Stole Christmas* was number one at the box office. A cruel irony I suppose—if you voted for Mr. Gore.

³ While Al Gore is not considered a futurist, he did frequently use counterfactual (“what-if”) arguments in several books as a literary device in order to alarm the public about the threat of catastrophic AGW in the future (see Gore 1992, 2006; also Warf 2002). An Al Gore presidency in 2000 might have resulted in government AGW interventions in an attempt to “put the brakes” on anthropogenic-induced climate change. See *Intergovernmental Panel on Climate Change Fourth Assessment Report* (United Nations 2007) for validation of Gore’s fears, and also Lovelock (2009) and Smith (2011) for further validation. See Allegre et al. (2012) and Weinstein (2009) for arguments denying or rejecting the scientific basis for Gore’s fears. See Idso (2011) for a remarkably optimistic (although incredibly naive) analysis of the present and future state of the world.

⁴ Sanguine is a strangely, wonderfully ambiguous term. I first thought of “bloody” (perhaps involving zombies?)—but then settled on “blissful” as more logically hewing to Jim’s intended meaning.

⁵ I contributed a chapter also written from a sanguine secular postmodernist perspective for his co-authored book *Worldview Flux: Perplexed Values among Postmodern Peoples* (Norwine and Smith 2000).

I felt qualified because I had throughout my entire academic life brainstormed about possible futures for humanity featuring come-what-may scenarios.⁶

Over a lifetime, I had imagined, I am sure, only the top of the tip of the iceberg of possible scenarios. Of these, by the time my hair began turning gray, I had already winnowed these possibilities down into “most probables” and begun to contemplatively sketch out my “most likely” among these.

Jim’s timely invitation forced me leap from contemplation into a more disciplined writing mode for my forecasting. This has propelled me to relish here the opportunity to share and comment below on my snapshot view of a frankly endearing lucky ape who conveniently trips my shutter in 2100 CE where I can observe and describe it in broad strokes still enduring⁷ through precarious times while yet persevering, undaunted. I observe, for example, that the ape inhabits an overheated contingent world, but has adapted by adopting some fit strategies and stratagems for successfully surviving in this distressed but still nurturing new epoch in its epic history.

The subtitle of my essay “our rolling judgment day” acknowledges in long retrospect this always-endangered condition of humankind throughout its recorded history,⁸ yet aspires to celebrate the enduring survival of a species that (against-all-odds in a godless world)⁹ continues to evade complete erasure.

14.1.3 *The Fool Abandons His Garden*

When I first put fingertip to keyboard on this project, I was fortunate that materials relating to the significant topics of catastrophic anthropogenic global warming and

⁶ But then, what sentient and worldly cultural geographer has not similarly indulged in this sort of futuristic fantasizing?

⁷ That the human ape survives at all 100 years hence is a miracle. It has occurred specifically by editorial decree for the benefit of chapter authors like me, who otherwise would have nothing at all to write about. Dr. Norwine has shared his personal optimism with us, “My own belief that our species will survive into the 22nd century, notwithstanding a mean global temperature increase of $\sim 5^\circ\text{C}$ ($\sim 10^\circ\text{F}$)—which seems, as I write these words in the autumn of 2010, the most realistic projection available for 2100 (MIT 2009), might fairly be considered hopeful hunch at best, superstitious graveyard-whistling at worst” (Norwine 2010). Scripture, on the other hand, has humankind departing its earthly abode more abruptly: “the heavens will pass away with a roar and the elements will be destroyed with intense heat, and the earth and its works will be burned up” (2 Peter 3:10). “Catastrophic anthropogenic global warming” sounds like Peter’s prediction in detail and is about as ominous and upon us as a dire prediction can get.

⁸ Judgment Day (a.k.a. Apocalypse now) is like my neighbor’s lawnmower on Memorial Day. It often seems on the verge of kicking in but never does. Failing to do so, it gets rolled back into the garage till the next try. See the website “A Brief History of the Apocalypse” (Nelson 2011) for a long annotated list of Apocalypses that never happened and End Times that have yet to arrive. Also, see Boyer (1994) and Swyngedouw (2010).

⁹ The working hypothesis that “God is dead” is a secular postmodernist perspective for futuristic storytelling that neither assures pessimistic outcomes nor precludes optimistic outcomes. A review of the literature reveals that ironic and O. Henry outcomes seem to occur more often than not in the postmodern secular canon (see, for example, “The Gift of the Magi” in O. Henry (1923)).

culture change were already embedded throughout the lecture notes of my current courses.¹⁰ Still I scrambled to recall

1. what I already knew about these topics as addressed in the vast and varied sub-genres of futuristic fictions,
2. what more could be learned about these topic in these genres in the time frame I had available to prepare solid foundations for my own original contribution, and
3. what might constitute an original contribution; one that would not be perceived by my readers as god-forbid purloined or even suspiciously derivative of what was already “out there” in the public consciousness due to the creative efforts of other writers of futuristic fictions.

Also, I promised myself that above all that I would not mention “zombies”—and here I see I have already done so—twice!

Some months ago, I completed to my own satisfaction the first two of the above three tasks. The lessons of that enriching exploratory reading experience can be summed up in one profound piece of advice shared by the character Pangloss in Voltaire’s *Candide*, (1758) and which serves as epigraph to this chapter: “All is for the best in the best of all possible worlds.” Candide is the suffering protagonist in Voltaire’s critical satire of theories, emphasizing the heroic optimism of the intellect promulgated by Enlightenment philosophers Spinoza and Leibnitz. Voltaire has *Candide* driven by circumstance and constantly questing miserably through an absurdly dystopian world. Candide, everywhere a naïve and vulnerable stranger, is abused and exploited by locals who deprive him of all but the most fleeting asylum, peace, and pleasure.¹¹ His quest ends when he finally abandons his baseless optimism (foisted on him by Pangloss) and concludes that humans can discover happiness only when they cease questing to affirm their abstract contemplations and settle down to indulge in the simple life of “cultivating their gardens.”

An operatic version of *Candide* (1956) elaborates on Candide’s profound, climactic discovery when the entire cast joins happily in song:

We’re neither pure nor wise nor good;
We’ll do the best we know;
We’ll build our house, and chop our wood,
And make our garden grow.
And make our garden grow.

During my search to gain more geosophical insight¹² into the meaning of this epic wanderer, I strived to find some sort of artistic image of *Candide*, perhaps depicting

¹⁰ I teach Cultural Geography and Conservation and Resources regularly in a large public university at the undergraduate level and Philosophy and Methodology in Geography at the graduate level.

¹¹ Preston James cited the essayist and author Caball (1926) as the epigraph to his classic text in geographic thought *All Possible Worlds* (1972), “The optimist proclaims that we live in the best of all possible worlds; and the pessimist fears that this is true.” See Kotkin (2011) for an example of remarkable present-day Panglossian optimism.

¹² “Geosophy,” a term coined by John K. Wright (1947), means “the study of geographical knowledge from any or all points of view.” My research in search of “geosophical insight” specifically involved learning as much as possible about imaginative texts, maps, and images that relate to past,

Fig. 14.1 Artwork for Broadway musical *Candide*© Doug Johnson 1974



him in the existential context of his worldly misadventures. I hoped to isolate his image in my mind from those of others in the literary pantheon of suffering, perhaps self-deluded, wanderers in the world: Ulysses, Melmoth, Ahab, and so on.

Eventually I ran across the playbill for this opera mentioned above (Fig. 14.1).

The playbill depicted Candide moving ahead naively through a world of woes, somehow surviving all his misadventures in spite of himself.

This playbill image has a striking resemblance to this image of “The Fool” as portrayed in the most popular commercial deck of Tarot fortune-telling cards on the market (Fig. 14.2).¹³

Perhaps these corresponding portrayals of what is obviously the human condition (i.e., what being-in-the-world means) are a coincidence. However, I think they are a meaningful coincidence in a Jungian sense of the phrase.¹⁴ If so, the representation of the human condition in the images are ripe for exploitation and discussion purposes as I contrive to preface here my prediction of the “blissful devolution” of the surviving human race as I envision it to be in the Year AD 2100.¹⁵

present, future, and fantasy geographies. See, for example, Manguel and Guadalupi (2000) and Moon River (2011).

¹³ This image is from a scanned copy of “The Fool” tarot card that belongs to the Rider-Waite tarot deck. The card was published in 1909 and is now in the public domain.

¹⁴ See “synchronicity” and Carl Jung (Wilhelm 1967).

¹⁵ Not speculative fiction of a familiar sort (e.g., futuristic science fictions; fantasies and so on) but of a rare category responding specifically to the question “What will Being-In-The-World be like in a hundred years?” and for lack of a more appropriate name “geosophical speculation.”

Fig. 14.2 The Tarot card
“The Fool” printed in 1909



Let me play fortune-teller by briefly deconstructing through a casual discourse (rather than by lecture) the enigmatic message of the Tarot card “The Fool” as it pertains in general to the human condition by offering insight into what it means to be-in-the-world.

Where is this apparently vainglorious Naked Ape¹⁶ off to now? He is bound for the Year 2100 you say? He never seems to settle down or finish anything he starts, does he? His resume is long, but void of accomplishment. He never heeds sound advice in precarious circumstances. Meanwhile he seems hounded by contingencies. Yet he appears happy—even on the verge of a precipice. Old Sol has perhaps fried his brain. And what’s with the flower? Better he should carry a parachute.

Are those all his survival skills in one sack? It is not much to show for millions of years of evolution. Many say he is his own worst enemy and too smart for his own good. Now he is in a real pickle: Jim Norwine’s “double-whammy” has him on the move again.

He seems proud to be The Enlightened One. Will his rational mind save him in the end from his own self-destructiveness? If so, perhaps he is headed for a soft landing after all. Or, the unexpected may intervene: a helicopter—or even compassionate aliens from another galaxy—might swoop down and carry him off to tentative safety. This is until he again strays off in search of . . . whatever.

Adding to this what we have just learned from reading *Candide*, we might well be wondering why humans let their minds wander aimlessly into redundant abstract

¹⁶ The “Naked Ape” reference here is a tribute to the audacious honesty of the Desmond Morris book by the same title (1967), a precursor to sociobiology (see Wilson 1980). This book, and Morris’s follow-up book *The Human Zoo* (1969), are two of the early works in the field. See also *The Third Chimpanzee: The Evolution and Future of the Human Animal* by Diamond (1992).

realms and cul-de-sacs? Why don't they just settle down and grow turnips? Learning from turnips, they might themselves thereby become turnip-like and grow roots and dwell thenceforth in mindless bliss.

14.1.4 *Geosophysical Speculations*

Contemplating the human condition a hundred years into the future is a game anyone can play for both fun and profit. Predicting for profit may be second oldest profession on Earth. The lucrative entertainment industry today thrives on spinning dramatic scenarios of the human condition being lived in the context of spectacular futuristic and fantasy settings.

Seriously contemplating the future through the process of heuristic modeling, and undertaken as a public service, can also entertain but in the first instance aims to inform and influence those decision makers who control the power and resources. They alone as concerned individuals and groups can effectively intervene in the future as it unfolds while attempting to change its trajectory and outcome.

Warf (2002) argues against concocting postmodern “anything goes” counterfactuals and speculative fictions for the purposes of serious contemplation because as heuristic models their story lines must be perceived by readers as *credible* in order to be perceived as useful for educational, planning, and decision-making purposes. For example, the post-apocalyptic film *Waterworld* (released 1995) is too incredible to be taken seriously by most critical thinkers in responsible decision-making positions. Its story line projects approximately 500 years into the future “The polar ice caps have melted, covering the Earth with water. Those who survived have adapted . . . to a new world” (thus the title). Most survivors are moral degenerates. Some human survivors, the film speculates, have developed gills.

Granted, some futuristic blockbusters and critically-acclaimed favorites in literature and film were created mainly to entertain rather than elucidate, yet nevertheless they incorporate creative insights useful for seriously contemplative heuristic modeling of the human condition in a futuristic setting.¹⁷ The vast majority of futuristic or speculative fiction films (many based on popular and cult literary works) are dystopian science fictions and fantasies. Few have happy endings. Ambiguous outcomes at best are common fare in dystopian film scripts.

My “Blissful Devolution” for 2100 CE predicated on the Norwinian “double whammy” has been shaped in part under the influence of innovative ideas encountered while experiencing the following books and films: *Brave New World*, *Gattaca*, *Nineteen Eighty-Four*, *Blade Runner*, *Fahrenheit 451*, *The Hunger Games*, *Brazil*, *Soylent Green*, *A Clockwork Orange*, *The Man in the High Castle*, *V for Vendetta*,

¹⁷ The film *Three Days of the Condor* (1975) exploited the idea of government agents analyzing even pulp fiction for futuristic scenarios that, if realized, might endanger national security.

Harrison Bergeron, *Atlas Shrugged, Part 1*, *The Handmaid's Tale*, *Idiocracy*, and to a less-conscious extent other titles.¹⁸

My story aims to be original, though it more probably is unconsciously, unavoidably derivative.¹⁹ Also, it aims to be credible, notwithstanding some artistic (mainly stylistic) license. It is not, for example, apocalyptic or post-apocalyptic, and I have I think made no “incredibly speculative” science fiction or fantasy projections. Moreover, I’d like to believe my predictive scenario is not a sub-genre of speculative fiction at all, even though it is futuristic. For one, I consider my futuristic scenario to be “real” rather than fiction based on my self-serving interpretation of the controversial conceptualization of “the real” by quantum physicist Hugh Everett III.²⁰

Furthermore, I would like to call this game “geosophical speculation” for our discussion purposes here, for the principle question I have been asked to respond to is: “What will Being-In-The-World be like in a hundred years?”

It occurs to me after considerable thought, personal/professional experience, and close attention paid to the words of my colleagues in this collaborative compendium that, assuming away an apocalyptic event, increasing happiness is just around the corner and not that far ahead. I can easily envision this as a postmodern secularist. If I am correct, we have nothing to worry about as a species as long as we stay the present course, which means to abide, but also to aggressively discover and decide how turn our lemons, climate change and culture shift, into lemonade.²¹ We can conspire (plan) to survive, and implement our plan.

¹⁸ I am a firm believer and thus in agreement with Joyce Carol Oates and others who claim to believe that there are only two profound stories of significant interest to humans through the ages (as an examination, the popular canon of English-language literature and film—*Wuthering Heights*, *Pilgrim's Progress of Grapes of Wrath*, *The Terminator*—can demonstrate): (1) a stranger comes to town and (2) the quest. Since strangers are perforce on a quest, these two stories actually boil down to one epic story. The Arcanum of “The Fool” imaged in the Tarot deck seems to be the epic story reduced *ad absurdum*.

¹⁹ Ecclesiastes 1:9 reads “There is nothing new under the sun.”

²⁰ Controversial quantum physicist Hugh Everett III is known by his admirers as the godfather of the “many worlds interpretation” (DeWitt and Graham 1973). His contribution to science (which I apply here as a both a guide to and validation of my own futuristic storytelling) reassures me that there is an infinity of contingent yet real worlds (both past and future) that defies enumeration and inventory (DeWitt and Graham 1973). Moreover, the Internet-emancipated postmodern hypertext storytelling experience itself invites anyone to mix and match aspects of myriad contingency stories-previously-told with their own contingency story never-before-told. Postmodern storytelling described as “back to the future” genre deploys all these possibilities (realities; cf. Everett). Such emerging creative works characterized by their freewheeling remixes of unfiltered digitized source materials resulting in pseudo-original odd juxtapositions are recognized today as examples of deliberately recombinant or derived art forms and termed “mash-ups.” For example, see Grahame-Smith, Seth, and Jane Austen (2010).

²¹ “Abide” is an archaic word having the denotation “living in a certain place” and implies “living with things some might not find easy to live with.” Humans in most global warming scenarios will have to abide (and endure and cope with) increased heat and rising sea levels. “To abide” also has moral and ethical implications. My prediction scenario has humankind abiding into the future, but the high cost of abiding is socially constructing eugenics as a humane, progressive, and moral necessity (instead of the inhumane, despicable, and retrograde planning policy it was widely perceived to be after World War II).

14.1.5 *Sally Blue*

The Year is 2067. Sally Blue is at the desk to which she is assigned. She has a terrible headache from the heat. She looks up and across the shaded concrete for an answer.

“He was.” “He was not.” These are her choices.

A hot wind blows across the exam platform, drying the tears forming at the corners of her eyes almost as fast as they emerge. One nearly tracks down her right cheek all the way to her chin. It feels cool on her hot flesh, and the sensation makes her happy. Still, she sweeps it away with the brush of the back of her stamping hand. Time is up.

Across the pavilion, the proctor steps down from his elevated platform and began to walk in her direction. Sally has seconds only left to decide, but she has a notion of which of the two is the correct answer. She recalls that a bunkmate once told her to be careful and keep her notions to herself.

She presses her thumb again to the inkpad and stares at the exam sheet one last time.

The proctor is moving swiftly now in her direction. He is looking at his stop watch. Sally’s thumb, ripe red and ready, hovers over her choices. “He was.” “He was not.” She followed her hunch. Right or wrong, she knew she would be soon on the move again. She had moved several times before. She liked running with a new crowd. She had yet to fit in anywhere.

Back at the beginning when she was Sally Red and with her Main Gang, she was suddenly reassigned. Then again, when she was Sally Yellow, she was unexpectedly split from their ranks “for further consideration.” But then in no time at all, it seemed she was “Sally Green” and apparently moving up the ladder. So again she moved.

Sally Green of the “Big Green Crew” seemed the happiest days of her life. “Family is the most important thing” she often sang and whistled.

And now she was Sally Blue: “Who are you? I’m Sally Blue, and happy too! She giggled. Good times! Easy living! She would finish her exam and move on up the ladder—or not. Life was what it was.

She pressed her red thumb onto the white paper, forcefully yet carefully, inside the box. “Thumb inside the box!” was the cardinal rule. She had practiced many times just how to take the exam and was very good at not touching or crossing the boundary of any enclosure. The other box she did not touch.

“Perfect, Sally Blue!” said the proctor, nudging her hard on the shoulder. “Now stand up and follow the Rainbow Line—and keep whistling!”

She did just that and whistled while she walked step by step along the rainbow line under the vast canopy. She was now “Sally Rainbow” and on the move again! It vaguely occurred to her as meaningful that she had never in her lifetime ever met a sister or brother “Rainbow.”

The proctor watched her exit. He turned to her exam paper. He looked again briefly at her response. Sally’s red thumbprint was in the box on the right captioned “He was.” He pressed his own thumb on the surface of the ink pad and then into the box on the left, where the box was labeled “He was not.” The proctor then proceeded

to carefully fold the exam, contents inward, and the last thing he saw before the fold and crease was The Question—“Human.”

He too exited the concrete slab but via the white line. He was glad to be done with it for the day and headed back to his barracks for a shower. He was hot, *and* thirsty, *but* happy. His name was Bobby Tata, part of the Quality Control and Policy Implementation Expedition Team, just doing his job.

14.2 Part Two

14.2.1 *The Cornucopia of A.D. 2100*

Let me sketch out here the cornucopia of 2100 CE: The cornucopia I envision for 2100 CE is a horn-of-plenty-enough to enable to satisfy the needs and wants of humankind. Mine is a sanguine scenario based on tenable assumptions about present trends.

Jim Norwine’s “double-whammy” of climate change and culture shift is not only theoretically survivable but can be an unprecedented exploitable opportunity to improve the human condition dramatically without further reliance on economic growth ideology, large-scale consumerism, scientific advancement, or machine-dependency.

The “rolling apocalypse” in my chapter title implies that, short of the onset of a total life-extinguishing global apocalyptic event, the present managers of planet Earth may still have time to plan and implement draconian measures to postpone or preclude the final event. To the extent that combined climate change and culture shift are acknowledged by world leaders as a significant cause for alarm, it is in the self-interest of these managers of planet Earth to act rationally, quickly, and decisively to mitigate the most deleterious impacts of these recognized change drivers, thus creating a best of all possible worlds that successfully divert humanity from its present path toward self-destruction.²²

In general, a less-than-catastrophic climate change will probably result in global warming that causes the rapid redistribution (but not the elimination) of food resources necessary and sufficient for human food security and survival. As for dramatic and deleterious culture change, a rapid and decisive self-guided moral reconstruction of leadership among management can probably succeed to mitigate and perhaps remove entirely the problem of moral decay in human society that characterizes the culture shift.

The rational planning and early implementation of a strategic survival management plan seems to me already underway. Humankind will restructure its social,

²² The term “global warming” appeared first in the title of a scientific journal in 1975 (Broecker 1975) at which time it was modified by the adjective “pronounced” meaning measurably remarkable to the scientific community but not necessarily reason for public concern. “Catastrophic” becomes introduced into the public consciousness as a noun modifier, often accompanied by “anthropogenic,” only after the publication the 2007 IPCC Report (United Nations 2007).

economic, and political institutions accordingly, and will include the efficient redistribution within environmentally determined constraints both the mass and variety of humankind.

14.2.2 Management of Planet Earth is Entirely Rationalized

I envision that in 2100 CE aspects of life-management on Earth are reduced to strict cost-benefit analyses for decision-making purposes by an elitist consanguineous oligarchy managing a totalitarian utopia that is a monument to their will to not only to survive but improve the human condition given the opportunity provided by a near-catastrophic crisis. Decisions are constantly evaluated by close coordination between elite management teams in order to assure the continuous maintenance of their agreed-upon and entrenched “best practices.”

These practices are codified, and revisions to the code are discouraged and rare.²³ Rationalization of everything according to these comprehensive codes in order to optimize survival of humankind and the promotion of its collective destiny requires and reproduces an inflexible status quo. These codes were originally planned and drafted by oligarch-elites for oligarch-elites and enforced to ensure a prevailing temporal/spatial efficiency and stability in earth management processes. The codes are secular but treated as sacrosanct. A prelude to the codes includes their historical justification. This history as written is entirely self-serving to oligarch-elites who have carefully re-written their own history and the history of the world to ensure their own collective destiny as earth managers.

Oligarch-elites, in my prediction, define themselves as exclusively human. Once a class, they are now a race. I will call them Hoi Oligoi in this essay. The necessary and sufficient means for their survival (food, shelter, and clothing) are produced by disenfranchised humans who were also once a class, but are now a race. I will call them Hoi Polloi.²⁴

In sum, I predict that 100 years into the future a minority population of intelligent Hoi Oligoi will strictly follow an entirely rational comprehensive strategic

²³ Comparable for example to the Amish *Ordnung*, which is the German word for order, discipline, rule, arrangement, organization, or system, and it serves to regulate Amish private, public and ceremonial life. While the *Ordnung* as practiced at present among the Amish has local variations from group to group around the world, it could be adapted to standardization and codified and enforced to serve the purposes of a more centralized, totalitarian political system.

²⁴ “Hoi Polloi” (meaning “the many”) and “Hoi Oligoi” (meaning “the few”) are Greek-language phrases thought to originate in “Pericles’ Funeral Oration” as mentioned in Thucydides’ *History of the Peloponnesian War*. In modern English-language usage, “Hoi Polloi” denotes an undifferentiated mass of ignorant common folk (a.k.a. “the herd”) in contrast to an elite few—“Hoi Oligoi”—who lord over them. Huntington (2004) provides insight into the prevailing moral conditions under which global elites in 2010 CE might transform themselves into the Hoi Oligoi I envision in 2100 CE (note his critical use of the term “Arasu (2013)”). See also Rothkopf (2008) for *Superclass: The Global Power Elite and the World They Are Making*.

plan that has created a productive socio-economic cultural landscape where majority populations of productive Hoi Polloi abide happily—even if in a fool’s paradise.

14.2.3 Nature Still Nurtures

In every less-than-catastrophic anthropogenic global warming scenario generated by current climate models, chemical energy production on Earth (e.g. the food cycle) seems sustainable for humankind, although not at current population levels. In general, climate change is expected to increase yields at high and mid-latitudes while leading to decreases at lower latitudes. Africans, for example, would experience severe food security issues given the combination of current global warming and local population growth. In sum, food supplies for humans one hundred years hence will exist if rationalization of human numbers is addressed in a timely manner.

14.2.4 Artificial Intelligence (AI) is History

This term was coined in 1956 by John McCarthy who defined it as “the science and engineering of making intelligent machines” (Schofield 2011). By 2005, progress along these lines was going so well that the scientist/futurist Ray Kurzweil predicted with confidence in the title of his new book that *The Singularity Is Near* (Kurzweil 2005); the singularity being the time when machines with smarter-than-human intelligence would begin to roll off an assembly line most likely designed and manufactured by themselves.

2045 CE is that the tipping point according to Kurzweil, whence from thereon onwards, machine intelligence would continue outstrip human intelligence at an exponential rate, leading to (wait for it!) human immortality! They love us so, those machines we have come to depend on so much for our survival. They have worked for us and now they will *think* for us.

The optimism of technophiles at present knows no bounds. My first thought is that why teach machines the concept of efficiency in the context of increasing Fordist economic growth ideology—unless your goal is to extinguish the human species in the grips of robotic terminators? But we have all seen that movie or a variation of it (Fig. 14.3):

I predict that the combined threat of climate change and culture shift will be the wake-up call for the present managers of planet Earth²⁵ to act decisively to save themselves, as an elitist “culture” from self-extinction. They will reject the entire Enlightenment philosophical and political metanarratives along with the failed industrial mode of production and free market capitalism. They will adopt to build a simpler civilization that abolishes the established alienation of humankind and nature and select

²⁵ The current leaders of the global military, industrial, corporate complex.

Fig. 14.3 The singularity is here! Original drawing in pencil by Timothy Sanderson (2010)



survival strategies and stratagems associated with successful biologically-powered agricultural production systems and practices modeled on what are perceived to be successful ancient and medieval historic models.

14.2.5 The Machine Has Met Its Master

A sudden fear of failing that triggers a worldwide shutdown of the Enlightenment Project and its delusion of progress will set the stage for massive global, social, economic, and political reconstruction and a race against time. Climate warming and culture change pose an unprecedented challenge that, in terms of conflict resolution, cannot be dissolved (escaped), absolved (ignored), or resolved (win-win outcome). They can only be solved, which is a win-lose outcome.

Machines powered by non-vital biological energy for the first time in 400 years will not be deployed to attempt to solve the survival issue for the conflicted managers of planet Earth. Machines, when identified as the problem instead of the solution, are no longer maintained much less improved upon—thus losers. Science in the service of inventing new and advancing technologies is abandoned—thus losers.

And what to do about the dissolute masses propagated during in the era of culture change? In the context of the prospect of future food security issues, their large and growing numbers in this time of crisis, are similarly and rationally perceived from a neo-Malthusian perspective as a problem to the future survival of humankind—losers (Giroux 2009; Malthus 1789; Meadows et al. 1972; Le Guin 1974; Kotkin 2011).

14.2.6 *The Rich are Enraptured*

Conspiring to save humankind involves both risks and rewards for the managers of planet Earth. Their options are to either go down with the Titanic (extinction) or to succeed with their planning. If success means having made hard decisions, then leadership has good reason to be delighted with itself for accomplishing its goals.

Optimistic rational thinkers throughout human history have frequently observed that every crisis is an opportunity for change.²⁶ In a world transformed by rational decision-making that features a radically-changed moral climate, cause for redemption for making tough decisions may not even be required.

When leadership rejoices over its accomplishments, the histories they and their comrades write about themselves will highlight their courageous decisions and shared sacrifices. Then everyone has reason to rejoice.

14.2.7 *The Poor are Happy*

Here is sage advice worth contemplating: “Never forget public ignorance is a government’s best friend” (Unknown 2010). What government would not benefit from the cheerful optimism of its governed? How might a government accomplish a plan to deliberately create a cheerful optimism throughout its governed? We have all heard the homily “Ignorance is bliss.” So the answer to the question “How to create bliss?” might be “Create ignorance.”

Poor people²⁷ may be unhappy because they are intelligent enough to realize they are poor. Suppose they could be deliberately rendered less intelligent by their government to the extent they are no longer aware they are poor? This may sound too incredible and fanciful to deliberate on or discuss. However, consider North Korea, where the poor project a public image to the outside world that they are happy. The North Korean government has recently released the results of a “Global Happiness Index” that validates the image and implies that a totalitarian utopia is a feasible, noble achievement (Flanagan 2011).

The North Korean example demonstrates that a captive populace under totalitarian control can be successfully educated (brainwashed?) to *appear* happy. But can this

²⁶ Mao Tse Tung is said to have marveled optimistically in a time of terrible crisis: “There is great chaos under heaven and the situation is excellent!” Charismatic (predominantly male) leaders have, by definition, throughout history demonstrated they can take large masses of people where they otherwise would not want to go and actively engaging in doing things they otherwise would not want to do. Channeling humankind through real (or perceived) threats of climate change and culture shift to achieve a specified set of planned objectives 2100 CE would entail using the powers of charismatic male leadership in order to succeed. Patriarchy will persist into the future.

²⁷ For example, the 99 % in the news these days are shown in contrast to a “rich” 1 %.

populace be educated to *be* happy?²⁸ This seems a geosophical question and directly related to the futuristic scenario of “blissful devolution” as developed in this chapter.

Assuming for discussion purposes that their claim is valid, how long did it take the North Korean government to accomplish its “achieving happiness” goal? The Korean conflict ended in a truce in 1953, approximately 70 years ago. That is when the divergence of South Korean and North Korean cultures accelerated. Today, South Korea has the 14th strongest economy in the world. South Koreans consider themselves to be “rich” but are reported to be “desperately unhappy” because they “live in constant fear of unemployment, forced retirement, and major illnesses, which expose them to a life of penury” (Chang 2012). Another recent South Korean survey reports that “the happiness index for Korean teenagers was the lowest among the 23 OECD member states for the third consecutive year” (Song 2011).

North Korea is often described as “hermetically sealed” from the outside world. To the extent that this is so, the population can be described as “ignorant” of the situation of human condition as lived beyond its borders. Meanwhile the mass of North Koreans have been educated to perceive their own human condition as “happy.” In sum, the homily “ignorance is bliss” may apply here. Combine this homily with another (i.e., “public ignorance is a government’s best friend”) and it adds up to the proposition that a deliberate “devolution” of human intelligence can be achieved through education for political purposes (Iserbyte 1999).

I predict that in 2100 CE the Hoi Polloi will have been systematically dumbed down by Hoi Oligoi domestication specialists to the level of “moderately retarded” and an easily-managed herd mentality. The Hoi Polloi will be barely literate and no longer capable of abstract reasoning. Their perceptions of reality and memories of the past will be malleable. The history of the human race will be rewritten by the Hoi Oligoi, and in time, there will be no public memory by members of the Hoi Oligoi or Hoi Polloi of actual past events. The work force will consist of worker guilds organized into battalions, camps, and squads. Individual Hoi Polloi will initially have some horizontal mobility within the work force. Their labor assignments will be based on measures of their relative intelligence and capabilities. However, as devolution in intelligence among the Hoi Polloi proceeds according to plan, membership in the guilds will eventually be entirely inherited. Upward mobility in their society is impossible. A blissful herd mentality will prevail among equals.

²⁸ Consider culture not only as “learned behavior” but as “a proselytizing activity.” An astute government can both educate and re-educate its populace over time systematically through its applications of the arts and sciences of propaganda (Bernays 1928, 1969; Tye 2002). As my prediction for 2100 CE reveals, I do not underestimate a totalitarian government’s (as in the case of North Korea) transformative power of persuasion, if carefully planned. See Myers (2010) for *The Cleanest Race: How North Koreans See Themselves and Why it Matters*.

14.2.8 The Ducks of Demography Are all in a Row

The Hoi Oligoi must give their aggressive attention to rational population planning because continued human survival requires its ensuring sustainable future and collective destiny of its own population. Achieving and maintaining food production security under hostile conditions created by climate change is their main concern.

In hindsight from the Hoi Oligoi perspective of 2100 CE, if successfully planning and managing the re-educated populations of Hoi Polloi to ensure a productive, stable, sustaining agricultural enterprise was ever a challenging problem, the Neugenics Plan was certainly essential to the rational solution.²⁹

14.2.9 Never More is Heard a Discouraging Word

Blissful devolution once achieved means that no one among the Hoi Polloi need ever complain or explain. Most will not. Those who do will be rehabilitated or “put down” according to procedures described in the Demographic Plan for Managing Labor Resources.

14.3 Part Three

14.3.1 Koch the Fifth

Koch the Fifth was feeling good as he stood under a canopy erected on the ramparts of his castle, perched high upon a pinnacle overlooking the plantations of Thessaly. He gazed down upon his verdant, fruited plain (Fig. 14.4).

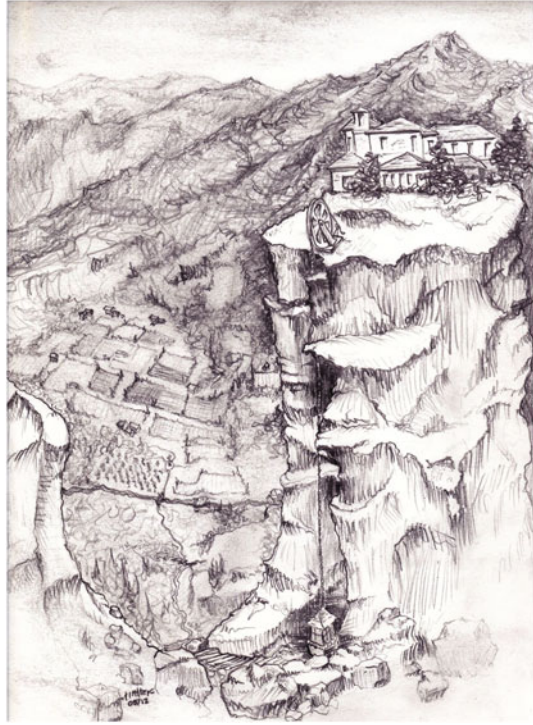
He was deep in thought. The Council of the Hoi Oligoi would be gathering soon far to the mountainous north as it had nearly every year for generations since 1971. For his small contingent, it would be a 21-day journey by ship to Parma, then steeply overland by buffalo cart.

Once there, encamped on the Lakebed of Davos, K5 and his cousins from all quarters of Europa would report on their achievements in the context of their shared Strategic Plan. They would, for example, go over the census tallies again and evaluate the current condition of the Hoi Polloi, then fine tune their Human Resources Plan for another year.

They would then discuss the progress of the Grand Economic Plan of the Hoi Oligoi. K5, together with his kinfolk, would deliver their annual regional and local reports; all tedious stuff, but necessary to “keep the cap on tight.”

²⁹ I recommend Brune (2007) and especially Lynn (1972, 1996, 2001) for any readers who might have thought that eugenics as part of a rational plan to “improve the human condition” has been condemned to the dustbin of history.

Fig. 14.4 The castle of Koch the Fifth, overlooking his plantations on the Thessaly Plain, circa 2100 CE. Original drawing in pencil by Timothy Sanderson (2012)



And then, finally, they would get into the revelry and fun-filled climactic event of the meeting that everyone agreed made their long, hot annual treks into the Central Alps worthwhile. They would visit each others' tents to eat duck stuffed with millet and barley cakes, all washed down with fine wines from Hungary. Then they would convene under the huge umbrella to listen as Representatives of the Inner Circle each shared riveting stories about their collections. Competition would again be stiff. Coveted prizes would again be awarded. Both winners and losers would shed tears. Following the Awards and on their final night of revelry, they would all dance to drums, blow their horns, drink soma, and then copulate.

Come dawn of the new day, the Contingents would decamp while shouting farewells and then slowly fade away into the distance toward the four quarters of the compass, not to reappear for another year. A disposal brigade from the Hoi Polloi would remain behind to sort through and recycle the litter. No longer by fiat but by custom they would sing and whistle while they worked. These were small but significant parts of the Big Plan for the Hoi Polloi. Know your place. Leave no trace. Be dutiful and content. It all added up to Living the Good Life—in spite of the heat.

K5 especially looked forward this year's meeting. He had a surprise to share with the leaders of his widely dispersed yet closely-knit extended family. Something novel that he thought just might bowl them over. He, like his father and grandfather,

specialized in collecting rare old documents salvaged from what was once the capital of Old Cathay, now inundated and drowned.

Several months previous, a member of his own brood of budding collectors had discovered in the cavernous vaults deep beneath his castle a bound manuscript with a pithy tale inside that on first reading made his head swim. K5 perceived the little story to contain an original idea that his own nascent civilization had no name for. He became convinced that the old Chinese story he had recovered from storage harbored a long-forgotten embedded idea at its core; a message with profound but long forgotten merit. There was not even a term extant to describe it. He set about to invent his own name for the idea and came up with “Enlightened Underdevelopment.” He imagined that given the fine reputation of his closest kin and together with his own oratorical skills, his discovery might earn him a high prize in this year’s initial Turn-of-the-Century Competitions. He became obsessed and threw caution to the winds.

Daydreaming, he envisioned himself reading it aloud to the attentive crowd from the high podium. His unsuspecting peers would at first be stunned, then rise to their feet in their multicolored silken robes and wave their hand fans above their heads while wildly shouting out their approval. The judges on the second tier of the podium would all be eyeballing each other and nodding in unison. Horns representing all the contingents of the Europa Confederacy of the Hoi Oligoi would then blast out their unique squalls in unison and loudly in cacophonous praise.

Once, suddenly awaking from his daydreaming, K5 pondered if there might, just might be a cool breeze blowing down from the mountaintops and across the stony lake bed as he made history on that eventful day. That would be a rarity he concluded and perhaps too much to hope for.

In the shade of his umbrella, he scanned again the verdant countryside of the plantation, which he called his “sincere” landscape. He saw the Hoi Polloi pushing and pulling their carts about along tiny paths ranging away from his family’s inaccessible perch where 1,000 years previous stone-clad monasteries of cloistered monks and nuns stood high and dry above a then (and still) fertile plain.

The Hoi Polloi appeared to be the size of ants. At the base of the mountain, they unloaded their tributes of food and water into the sturdy wicker elevators, and for a while, he watched them winch the heavy baskets slowly upwards hundreds of feet to the supply docks of his otherwise inaccessible castle. They were a virtuous, hardworking, and uncomplaining lot, living cloistered, protected lives: non-contemplative, naïve, and unworldly. He was their benevolent shepherd on high and the ultimate source of their simplicity, sustenance, and bliss. They were hardly aware anymore of how much they needed him, his crack management team, and Hoi Oligoi everywhere, all heroes, for having saved all humankind and habitat from a self-destructive blunder in which it had nearly combusted itself in an epic fit of consumption fueled by moral turpitude.

He turned his eyes to the manuscript in his hands and practiced his oratory for the umpteenth time.

14.3.2 *The Story of the Swape*³⁰

Tzu-Kung had been wandering in the south in Chhu, and was returning to Chin. As he passed a place north of the Han (river), he saw an old man working in a garden. Having dug his channels, he kept on going down into a well, and returning with water in a large jar. This caused him much expenditure of strength for very small results. Tzu-Kung said to him, “There is a contrivance (chieh) by means of which a hundred plots of ground may be irrigated in one day. Little effort will thus accomplish much. Would you, Sir, not like to try it?”

The farmer looked up at him and said, “How does it work?”

Tzu-Kung said, “It is a lever made of wood, heavy behind and light in front. It raises water quickly so that it comes flowing into the ditch, gurgling in a steady foaming stream. Its name is the swape (kao).”

The farmer’s face suddenly changed and he laughed, “I have heard from my master,” he said, “that those who have cunning devices use cunning in their affairs, and that those who use cunning in their affairs have cunning hearts. Such cunning means the loss of pure simplicity. Such a loss leads to restlessness of the spirit, and with such men, the Tao will not dwell. I knew all about (the swape), but I would be ashamed to use it.” (from the *Book of Master Chuang of Chou*; cited in Needham (1956)).

14.3.3 *K5 Makes Good Compost*

Koch the Fifth did not win the top prize. He did not win any prize. He was in fact arrested and carted off as a purveyor of a subversive idea almost immediately after sharing his “discovery” with a stunned and silent audience of his own blood kin during the height of The Competition.

For his actions alone, and on account of the due processing of his official trial and execution, the scheduled 2100 CE Turn-of-the-Century meeting of the Council of the Hoi Polloi at Davos concluding with the Collections Competitions awards ceremony had to be extended an extra day.

K5’s last words before the first stone was thrown as an attempt to deliberately cave in his cranium were “I do still believe that this Enlightened Underdevelopment idea has merit!” Unrepentant to the end, K5 was ultimately ineligible for exile as would have been assured by his simply claiming as his defense “madness due to sunstroke” (i.e., “solacy”). It was a rare sad day for the tight-knit Hoi Oligoi, whose members were normally absolutely opposed to killing any kin.

³⁰ Needham (1956). Some Amish farmers in the USA today have a similar notion of techno-selectivity. One Amish man expressed in terms much like those used by farmer interviewed by Tzu-Kung: It’s not just what or how you use a technology, but “what kind of person you become when you use it” (Igou 2003).

Fig. 14.5 “Untitled” by Congo, a chimpanzee artist, circa 1960



The Hoi Polloi whistled and sang while they carefully gathered K5’s remains into a hand-sewn sack made of hemp and carted it away to be tossed in the nearest pig sty.

14.3.4 *Epilogue*

The Grand Prize winner of the 2100 CE Competition at Davos was Slim, a second cousin of K5, and himself a collector of twentieth century paintings by gifted lesser-known artists. S4’s oration featured an untitled tempura on paper by “Congo,” a chimpanzee (1954–1964) (Fig. 14.5).

S4’s prize-winning story was thought to be the sentimental favorite of that year’s judges³¹ who, in addition, were no doubt enchanted to learn of this delicious piece of provenance in S4’s eloquent tale: a companion piece of Congo’s rare and delightful painting, also long ago acquired to be part of the Picasso Hoi Oligoi collection was originally purchased by Pablo Picasso (1881–1973) himself. Imagine that!

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³¹ Four subspecies of chimpanzees were listed as endangered on a 2011 list compiled by the International Union for the Conservation of Nature and Natural Resources (IUCN). The entire chimpanzee species was one of those wiped out during the Decade of Great Extinctions (2040 CE through 2050 CE), when AGW spawned toxicities and diseases wreaked havoc on both the mass and diversity of life throughout the biosphere. Four-fifths of the Hoi Polloi also perished. Miraculously, the Hoi Oligoi suffered no losses. Whether they benefited from a natural or an unnatural immunity has never been disclosed. Indeed the question is no longer relevant and therefore never raised.

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Chapter 15

The Guilt of Hollow Men: Global Warming as Postmodern Apocalypse

Jonathan M. Smith

Abstract Our traditional moral system will continue to lose authority with the rate of change likely accelerating. This is caused by secularism, which removes the ground from moral interdicts. The rate of change will accelerate as multicultural mixing of peoples denaturalizes moral conventions. One result will be what T. S. Eliot called “hollow men” who do not live under judgment. As Irving Babbitt and Philip Rieff argue, traditional inner life requires moral striving, guilt, fear, and gratitude, all of which are attenuated in our humanitarian and therapeutic society. Traditional morality is being replaced by ethics and personal guilt by social guilt over stolen privilege. This is not felt for personal failings, but, as Kenneth Minogue argues, for occupying a privileged place in what is perceived to be an exploitative system. This guilt is expiated by working to overturn the system and institute social and environmental justice. Whether or not global warming is occurring, persons suffering from the social guilt over stolen privilege need to believe that it is occurring. Global warming is for them a literal apocalypse, a vision of the end of the world as we know it, in which a time of tribulation ushers in a new age of social and environmental justice.

Contributors to this volume were asked to discuss the possibility that humanity will suffer a dual crisis in the 21st century. The editor postulates that this crisis will consist of the final collapse of traditional morality and the concurrent onset of disastrous climatic and environmental changes. He has invited the authors collected here to discuss the likelihood, potential scope, causes, and consequences of such a calamity. In this chapter, I primarily discuss the collapse of traditional morality, although I connect this collapse to the environmentalist’s apocalypse in my final section.

In my first section, I argue that traditional morality is indeed collapsing, and the rate of its ruin will likely accelerate in the years to come. The basic reason for the ongoing ruin is secularism, an ideology that removes the grounds of moral habits and conventions and tends in time to moral nihilism. The reason this ruin will likely accelerate is that we will find it increasingly difficult to sustain our groundless moral habits and conventions in the face of multicultural mixing of diverse peoples. Morality retains authority in two ways: because of a conviction that it is grounded in

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a transcendental reality, and/or it so impregnates the everyday life and practices of a people as to appear utterly natural and beyond question. Traditional morality may be able to retain authority among a people who are secular, provided they are not pluralistic. It may be able to retain authority in a society that is pluralist, provided its followers are not secular; but it is unlikely to retain authority in a pluralistic society populated by secular peoples (Kinneking 2009).

Some of the contributors to this volume are cheered by the prospect of moral collapse, seeing it as something akin to a forest fire that clears away dead timber and opens the ground to new growth. I do not share their expectation of millennial felicity, but I am instead one of those men who survey the road ahead with a scowl of apprehensive gloom. My purpose here is not, however, to wallow in pessimism, for pessimism is more agreeable to write than to read. What I will do, in my second section, is describe the atrophy of “inner life” in a nihilistic age without faith. This atrophy of inner life produces what T.S. Eliot called “hollow men,” men devoid of something their forefathers possessed.¹ Drawing on books by Irving Babbitt and Philip Rieff, I explain that what these hollow men lack is an inner life of moral striving, fear, guilt, and gratitude, and that they lack it because they have accepted the secular and therapeutic doctrine that we do not live our lives under judgment. As Philip Rieff put it, “the soul cannot be made therapeutic except at the price of its loss” (Rieff 2007a).

Hollow men are not moral in the traditional sense. They do not fear transgression or feel profound personal guilt. They neither repress their impulses nor repent over moral failing. Their attitude toward personal moral failure is permissive (it is not really wrong) and exculpatory (I cannot help myself), but they are at the same time often fervently ethical. As I explain in my third section, this means that they are acutely conscious of social guilt, or what I will call the guilt of stolen privilege, and consequently seek to expiate this guilt through social rather than personal reform. As Kenneth Minogue puts it, these hollow men “find their identifying essence in supporting public policies that are both morally obligatory and politically imperative” (Minogue 2010). Opposition to anthropogenic global warming would seem to be one such policy. Thus the collapse of traditional morality and concomitant atrophy of inner life are one reason that anthropogenic global warming is an apocalypse in which so many men need to believe today.

15.1 Decadence

To speak of the decline of traditional morality is not to prophesy an orgy of wickedness. Moral scruples are but one of many possible forms of social control, and there are often technical remedies to the most deplorable consequences of licentiousness. A surveillance camera may, for instance, prove more reliable than a conscience as

¹ Here and hereafter the terms man and men denote human beings, not human beings of the male sex.

an instrument of behavioral discipline, and even if it doesn't, a more violent society may still be less lethal if it keeps its emergency rooms up to date. So, an orgy of wickedness may or may not come.

What will come, and has indeed already come, is a deeper crisis of moral decline that we might call the apparent arbitrariness of meaning. This is happening because morality is not only behavior-controlling but also world-making. Rieff writes that the task of moral culture has historically been "world creation," and that to make a world has always been to "translate otherwise sacred orders into their visible modalities—social orders" (Rieff 2006b). Morality makes meaning out of chaos by teaching that some things are intrinsically more important and better than others.

The essence of decadence is loss of certainty in such world-making claims, a spreading sense that things, acts, and people are all, in truth, equally important, equally valuable, equally meaningful (Joad 1948). Claims to the contrary are seen, in the manner of Thrasymachus, as cynical ploys to retain or obtain some personal or class advantage. Thus a book like *S/Z* by Roland Barthes is deeply decadent, not because it advocates libertinage, but because it argues more subversively that the purported denotative meaning of a word is nothing more than a privileged connotation (Barthes 1970). For Barth, as for most teachers in our decadent culture, "truth" always appears in brackets as a partial truth or a provisional fiction. "All of the putative guiding cadres in our culture," Rieff states, "are dominated by the quotation marks around their transgressive sense of this or that action." This "transgressive sense" is not a world-making re-description of the action, but a "denial that an action must mean just this, not that" (Rieff 2007b). Quotation marks and the transgressive sense are, in other words, testaments to nihilism.

Every moral system, and therefore every world, is prone to decay by nature. This is because, like a seawall, it opposes powerful natural forces and is, in turn, opposed by those forces. The moral system under which I live, for instance, consists of interdicts to perform deeds I would rather neglect and repress impulses I would rather indulge. Because it is at war with a certain part of me, a certain part of me is at war with it. This is also true of you, and has been obvious to nearly every traditional moral philosopher. "Man," they would say, "is inclined to all evil." They do not mean that every one of us is doomed to a life of wickedness, only that "the inclination to evil that dwells within us is more normal and natural than the desire to do the good" (Kinneking 2009).

This inclination to evil is important because it means that men, even when they obey the interdicts, nevertheless regret and resent at least some of those interdicts. They may be convinced that the moral system is a necessity, but cannot help to rue it as a tragic necessity or occasionally to escape its grip in fantasy transgressions. A fantasy transgression is a dangerous desire enacted in the safety of imagination. Such desires are, for most of us, confined to fantasy so long as the perceived danger outweighs the desire. We can see this if we consider the art of seduction, which is largely a matter of releasing a transgression from the confines of fantasy by reversing this ratio. To seduce is, in essence, to aggravate the desire while repressing or removing the danger (Minogue 2006). The art of sustaining moral interdicts is, on the other hand, largely a matter of preserving an intimidating ratio of perceived danger to felt desire.

Historically, one means to aggravate the danger of a transgressive desire has been to teach that the interdict opposing it is a natural or cosmic law. It is not a rule that men have instituted for convenience and might change; it is, rather, a discovery they have made or a revelation they have received. It is grounded in a transcendental realm, inaccessible to men, so men cannot alter it, and it is enforced by an unsleeping power so men cannot escape it (Voegelin 2000). Whether this power is understood through symbols of fate or final judgment, the dangerous desires it interdicts will appear very dangerous indeed.

The data are not unequivocal, but a good deal of evidence supports the proposition that, *ceteris paribus*, moral compliance declines as secularism undermines faith in the absolute authority of moral interdicts (Davis 2004). This is not to say that atheists, naturalists, and humanists cannot be moral, for many of them obviously are. But it is to say that moral interdicts appear much less august and fearsome on the assumptions of these secular creeds. Indeed they appear much more like arbitrary rules that one group of humans has invented to give it an advantage over other groups. It follows from this that members of these disadvantaged groups will believe themselves free to disregard these invidious rules whenever their earthly wardens happen to be napping.

Each of us is in some stage of insurrection against the moral interdicts and meanings that give shape to our world. We rage against reality, if only in the safe privacy of our transgressive fantasies. Christianity teaches that we rage because we are fallen, because there is something radically wrong with us. Gnosticism teaches that we rage because there is something radically wrong with the world (Franz 1992). Indeed the whole thrust of Gnosticism, ancient and modern, is to set quotation marks around “reality,” represent the “world” as an evil fiction, and deny that it is in any sense what Rieff called a transliteration of sacred order. Secularism is a modern Gnostic doctrine that was *designed* to subvert the authority of the traditional world by separating it from its transcendental ground. As Voegelin famously described it: “All Gnostic movements are involved in the project of abolishing the constitution of being, with its origin in divine, transcendent being, and replacing it with a world immanent order of being.” Or, as he puts it in another place: “in order . . . that the attempt to create a new world may make sense, the givenness of the order of being must be obliterated,” and this “taking control of being requires,” above all else, “that the transcendent origin of being be obliterated” (Voegelin 1968).

The metaphysical assault of secularism on traditional morality has been in recent decades augmented by the social policy of multiculturalism or the promiscuous mingling of peoples who acknowledge different “truths” and inhabit different “worlds.” The result, and arguably the purpose, of this mingling (as many of its proponents admit) is to challenge assumptions, undermine certainties, and place quotation marks around “reality.” As Rieff puts it, “multiculture is an anticulture” because this creed of creedlessness “no longer mediates between sacred order and social order.” It is, rather, another Gnostic “abolitionist movement directed against all sacred orders in any of their historic or theoretical manifestations” (Rieff 2006b).

Rieff’s theoretical assertion appears to be born out by discouraging assessments of moral education programs in a multicultural society. It is very difficult to persuade young people of a moral truth if they live in a pluralistic community in which

that “truth” is routinely challenged or flouted. As James Davidson Hunter puts it, “there is a body of evidence that shows that moral education has its most enduring effects on young people when they inhabit a social world that coherently incarnates a moral culture.” Hunter goes on to say that successful transmission of a moral system requires:

a milieu where the school, youth organizations, and the larger community share a moral culture that is integrated and mutually reinforcing; where the social networks of adult authority are strong, unified, and consistent in articulating moral ideals and their attending virtues . . . where intellectual and moral virtues are not only naturally interwoven in a distinctive moral ethos but imbedded in the structure of communities.

Hunter concedes that such communities are “scarce in America today,” and that in most places social life is “intensely fragmented” (Hunter 2000).

15.2 Hollow Men

The phrase “hollow men” alludes, of course, to T.S. Eliot’s 1925 poem, in which a band of aimless wraiths haunts a twilight wood of inanition and futility. This poem is difficult to interpret, but begins to yield a meaning once one notices how frequently eyes are mentioned in it. The hollow men are themselves sightless, unlike other men who have departed for “death’s other kingdom,” but they are content with this condition, and eager to linger in “death’s dream kingdom,” because they say this dream kingdom is a “dead land” in which “there are no eyes.”

What dreadful eyes do the hollow men shun? They are, Eliot tells us, eyes they “dare not meet in dreams,” much less at a “final meeting.” They are reproachful eyes, censorious eyes, eyes of judgment. In short, they are the eyes of God (Kirk 1971).

The blindness of Eliot’s hollow men apparently is their secularism, and their hollowness results from the consequent absence of what an earlier generation called the “fear of God.” Because they lack this fear, hollow men lack the inner life of wariness, repression, guilt, and repentance that had been embosomed by nearly everyone in the West until not long before Eliot wrote his poem. Anything but hollow, the god-fearing men of earlier times were fairly bursting with inner life because they were intensely conscious of living under judgment, under what the Puritans of New England were wont to represent as the “All-seeing Eye of God.” Cotton Mather put the matter very plainly when he wrote: “The fear of God will place a man as under the eye of God.” It will, moreover, cause him “often in a day to recollect that the Eye of the Holy God is now upon me” and consequently to strive that his “conduct all the day long should be agreeable” (Mather 1701).

Eliot’s contemporary Irving Babbitt developed an argument similar to this one in *Democracy and Leadership*, a book published one year before “The Hollow Men.” Babbitt wrote this book to denounce humanitarianism, a doctrine that he claimed had destroyed the “inner life” (Babbitt 1979). Humanitarianism compounds moral permissiveness and technological prowess (Rousseau and Bacon rolled into one),

and aims to unify men, not by leadership, but by affirming and satisfying their ordinary desires. Babbitt rejected the doctrine as politically naïve and morally debased, maintaining instead that, “men can really come together only in humble obeisance to something set above their ordinary selves” (Babbitt 1979).

Babbitt described this “something set above” as “standards” or the “higher will,” both terms evidently secular substitutes for the Puritan’s Eye of God. Functionally it makes little difference whether a man imagines himself to be living under the Eye of God, objective standards, or the higher will. He will, in any case, be filled with *striving* to rise to an honorable level, with *fear* of falling short, with *guilt* for having fallen short, and with *gratitude* for not having fallen so far short, so frequently, or with such disastrous consequences as he might have. This complex of striving, fear, guilt, and gratitude was what Babbitt meant by the “inner life.” Why he lamented its loss will be apparent presently.

Babbitt, himself no Christian, nevertheless conceived the higher will in transparently Christian terms. It is, he wrote, “a force in man that moves in an opposite direction from the outer impressions and expansive desires that together make up his ordinary temperamental self.” Likewise, Babbitt described the inner life in terms that would be approved by St. Paul. Whereas Paul wrote that, “the flesh lusteth against the Spirit, and the Spirit against the flesh,” Babbitt wrote that, “a higher will . . . is felt in relation to man’s ordinary will or expansive desires as a power of vital control” (Babbitt 1979).

Like Edmund Burke, whom he praised and followed, Babbitt maintained that men apprehend the higher will, not by way of reason, but by way of imagination. A man encounters what he spontaneously recognizes as a good example, be it in a story, a picture, or the actions of a living man, and this example captures his imagination. He sees the example as the incarnation or personification of “some higher will” and feels at once “awe and humility” (Babbitt 1979). He recognizes that this exemplary man possesses and exercises the power of true *leadership* because, as Maurice Cowling put it in his discussion of Burke, every man has need for “sublime objects to which to offer honor and respect” (Cowling 2001). It must be noted that, in any discussion of Burke, we should assume that “the sublime is built on terror” (Burke 1885).

In a remarkably similar yet more recent argument, Philip Rieff describes a sublime object that captures the imagination as an instance of charisma. Rieff’s definition of charisma is complex, and perfectly opposite that given by Max Weber, but it may be stated most simply as an encounter with someone “we do not enough resemble,” a recognition that this person is the image of “of one’s ideal self,” a feeling of “indebtedness” to this person “for his existence,” and a feelings of “guilt” and “holy terror” over past and potential transgressions against this exemplary model (Rieff 2007b).

The most important point, in both Babbitt and Rieff, is that the ideal self that one encounters in a charismatic image is not a liberated self, but a mastered self. Charisma (leadership) does not break down barriers or open doors that are presently closed; it enjoins the man who feels it to repair barriers that have been beaten down

and close up doorways that are presently open. As Rieff describes it: the charismatic vision is “communicated by mobilizing fresh renunciations and extending those renunciations to larger numbers of people” (Rieff 2007b). Likewise, Babbitt describes leadership (charisma) as communication of a “will to refrain” and describes the leader (charismatic) as “the man who is so loyal to sound standards that he inspires right conduct in others” (Babbitt 1979). An encounter with charisma (leadership) is, in other words, the source of Babbitt’s inner life, and this is the experience of which Eliot’s hollow men, being “blind,” are incapable.

If Babbitt’s “leadership” is equivalent to Rieff’s “charisma,” Babbitt’s “humanitarian” is equivalent to Rieff’s “therapeutic.” Humanitarianism was, as we have seen, Babbitt’s title for the doctrine that every man should be allowed “to expand freely along the lines of his dominant desire,” that it was the purpose of a humane society to furnish such freedom, and that to succeed in this purpose, a society must be morally permissive and technologically innovative (Babbitt 1979). Rieff likewise describes the therapeutic as the doctrine that “everything is possible.” Because it is “a releaser from interdicts,” because its apostles are “virtuosi of guiltlessness,” and because it aims to institute “a society in which there is no normative order,” the therapeutic is at heart an “attack on faith and guilt” that teaches, as “the highest knowledge, that there is no God,” and thus no cause for “holy terror” (Rieff 2007b).

What all of this means, of course, is that this doctrine that Babbitt calls humanitarianism and Rieff calls the therapeutic has *as its purpose* the dismantling of the traditional moral system and the construction of “death’s dream kingdom,” in which there are no eyes. It has as one of its consequences the production of hollow men, for as Rieff puts it, “faith is the general term of obedience to particular interdictory contents” and “only under this obedience are souls made” (Rieff 2007b).

The therapeutic critique of the old ascetic morality of self-control and personal guilt is that it entails unnecessary psychic violence. When a man represses a “low” impulse in favor of what he mistakenly imagines to be his higher will, he disowns or alienates a part of his self. Therapy therefore aims to reeducate men, to release them from “an authoritative, set hierarchical order of conduct” and thereby make them “kinder to the self as a whole.” It does this, as we have seen, with a permissive morality (it wasn’t wrong in the first place) and an exculpatory psychology (you cannot stop yourself from doing it). Where it succeeds, it produces hollow men who “suffer no gratuitous failures in a futile search for ethical heights that no longer exist” (Rieff 2006a).

That last line is not quite right, though, for as we shall see, hollow men do search for ethical heights, just not among the summits mapped by traditional morality.

15.3 Strange Gods, Strange Guilt

In a series of lecture delivered nearly a decade after the publication of “The Hollow Men,” T.S. Eliot described a perilous temptation to which the greatest authors of his age were exposed because they were members of a society “worm-eaten with

Liberalism,” and so lived without benefit of tradition and orthodoxy (Eliot 1934). Eliot used the terms tradition and orthodoxy to denote time-tested modes of local conduct and ecclesiastical dogma—established ways of living, judging, and thinking that had been organically developed by a particular people living in a particular place, with the moral and metaphysical elements ordered and refined by an established Church.

The perilous temptation that the great authors were exposed to was to join the “tribe” of “serious and eccentric moralists” who, divorced from tradition and orthodoxy, espouse a “personal view of life.” Rather than participate in the development of a living moral and literary tradition, these writers assumed the cloak of a “modern messiah” and preached eccentric ideas “of their own making” (Eliot 1934). As Eliot wrote:

When morals cease to be a matter of tradition and orthodoxy—that is, of the habits of the community formulated, corrected, and elevated by the continuous thought and direction of the Church—and when each man is to elaborate his own, then *personality* becomes a thing of alarming importance. (Eliot 1934).

The reason Eliot found the emphasis on personality alarming was that the pronouncements of a modern messiah were not always, in his estimation, the modern messiah’s own pronouncements. When tradition and orthodoxy are absent, these men were thrown back on their “inner light” of inspiration. The peril of reliance on an inner light, especially when inspiration cannot be tested against tradition and orthodoxy, is that “no one . . . can be the sole judge of whence his inspiration comes” and a “spiritual” man without religion was equally open to “forces of good and forces of evil.” He was, in other words, easily made into an energumen, “an instrument of daemonic powers” (Eliot 1934).

Eliot clearly had something similar to this in mind when he wrote “The Hollow Men,” for at the head of that poem he placed an epigraph from Conrad’s *Heart of Darkness*, presumably to indicate Kurtz as a specimen of the type. Of Kurtz it was said, “there was something wanting under his magnificent eloquence,” that he was, indeed, “hollow at the core,” and that because of this void he “lacked restraint in the gratification of his various lusts.” Kurtz acknowledged no moral authority and lived as a hollow man in a world where there were no eyes. However, this was not the end of the matter. Kurtz carried this cavity about within himself, but “the wilderness . . . found him out” and sent something to supply his “deficiency,” and the spirit that took possession of his dark heart “whispered to him things about himself which he did not know” (Conrad 1974).

I will not pursue Eliot’s demonological hypothesis, interesting as it is, but will follow his general thesis that a hollow man does not remain hollow for very long.

As traditional morality collapses, a new *ethical* system is growing up around us as a substitute. I will focus here on one feature of this new ethical system, its novel representation of the cause and cure of guilt. Under the old moral system, a guilty conscience was understood as the psychological penalty for personal failings. This interpretation has been nearly eradicated by therapeutic doctrines that are permissive and/or exculpatory. The interpretation has been nearly eradicated, but the sense of

guilt remains because, as Rieff puts it, “one simply cannot live without becoming guilty” (Rieff 2007a). The new ethical system innovates by interpreting this guilt as the psychological penalty exacted on privileged persons in an unjust social system, and proposes social reform, not personal repentance, as the cure for this strange guilt.

Kenneth Minogue explains that this new ethical system and *social* guilt, has arisen as a result of the erosion of traditional moral life by democratic egalitarianism. Minogue argues that the doctrine of equality is incompatible with traditional morality because, as we have seen, traditional morality asserts that some things (men, acts, “lifestyles”) are more important and better than others.

According to Minogue, the object of traditional moral life was to “sustain a character” by behaving in a way that was orderly, predictable, and honorable. It was to display what is sometimes called integrity. A man of character, or integrity, honors the same commitments and respects the same values, day after day, year after year. To do this he controls his impulses, disciplines his passions, and brings order to his soul (Minogue 2010).

He brings order to his soul by the cultivation of virtues, “good habits that have become second nature,” settled dispositions, and desires “acquired by practice” (Kinneking 2009). He exhibits qualities such as courage, honesty, temperance, and chastity, and he cultivates such virtues for two reasons. The first is that an impulse that might give short-term or occasional pleasure or advantage may, if indulged, in the long run or on most occasions bring the impulsive man to grief. Thus, when we recite the maxim that “honesty is the best policy,” we mean that a man with the virtuous habit of truthfulness will, as a rule, enjoy a more satisfactory life than will a man without it. Stated more generally, a virtuous life of self-control will be, in most cases and ultimately, the most satisfactory.

Democracy disapproves of virtue as the means to a satisfactory life because the willingness or ability of individuals to develop virtues is unequal, and men unequal in virtue will lead lives unequal in satisfaction. To correct this perceived injustice, democratic societies work hard to mitigate the consequences of lives lived without virtue. The costs of profligacy, intemperance, and promiscuity are, for instance, to some degree removed from the spendthrift, drunkard, and harlot, and every effort is made to shield the children of such from the consequences of their parents’ actions. This is the first blow that democracy strikes against traditional morality.

The second reason to cultivate virtues is that an impulse that might give short-term or occasional pleasure or advantage may, if indulged, compromise a person’s status. The aim is to fortify resistance against temptations to degrading behavior, and thereby to “sustain one’s identity” as a respectable person. Respectable persons are not, under traditional morality, simply members of the most respected social classes, but they are rather persons who display the virtues appropriate to their social station. A worker is, for instance, a respectable worker if he is a *hard* worker; a housewife is a respectable housewife if she is a *tidy* and *frugal* housewife (Minogue 2010).

Needless to say, democracy also disapproves of all of these invidious distinctions between more and less respectable classes and more and less respectable members of a given class. It is most effective at breaking down the moral distinctions within classes—the distinction, for instance, between diligent and lazy students. To see this

at work, one has only to consider the way that democracy has all but erased the moral distinctions within the social class of single mothers, and today happily lumps together war widows and wanton women. This is the second blow that democracy strikes against traditional morality.

More might be said about democracy's deleterious effect on traditional morality, but enough has been said for us to move ahead to the all-important question of the nature and remedy of guilt under the old morality and the new ethics.

Under the old morality, one felt guilt because of a failure of personal conduct. One had failed to cultivate or exhibit a virtue, such as temperance; one had failed to honor a commitment, such as to honor one's parents; one had failed to preserve one's respectability. This was personal guilt for personal misconduct. The cure for personal guilt was normally confession, restitution to injured parties, and personal recommitment to the transgressed standard of conduct. I'm sorry! Let me make it up to you! I'll try not to do it again!

Under the new ethics, guilt is very different than this. Here guilt arises, not from an awareness of personal wrongdoing, but from the belief that one is enjoying an unmerited benefit because one is a member of an arbitrarily privileged social class. Because some degree of privilege is necessary for this interpretation to be credible, this sort of guilt especially troubles the conscience of individuals who enjoy some degree of privilege, but the fact of privilege is not alone sufficient. There must also be a conviction that the privilege is both unmerited and the cause of suffering and deprivation for some other party. In short, privilege must be experienced as a *stolen privilege*. To experience this sort of guilt, a privileged individual must believe that the comforts and conveniences that ameliorate his life are the fruit of crimes committed by "the system," either against "underprivileged" classes of humanity who lack these comforts and conveniences, or against "the environment."

The sources of this postmodern guilt are not easy to state with confidence or precision. Some of this guilt may be transposed contrition for failures of personal conduct. Much would seem to originate in a primal fear of hubris, which is no doubt common enough in a technologically advanced society with cheap energy, in which many people lead lives that are very comfortable by historical and global standards. But the most important source of this guilt is promulgation of the teaching that this apparent good fortune has come at someone else's expense, that one man's privilege requires another man's deprivation.

The guilt of stolen privilege cannot be expiated by personal repentance since the man feeling it is not *personally* tearing crusts from the lips of hungry children or disgorging oil into pristine seas. He enjoys his stolen privileges, not because *he* has stolen them, but because of his place *in an iniquitous system*. He may of course find some relief from the resulting social guilt in performance of such personal rituals of atonement as purchasing fair trade coffee or recycling empty wine bottles, but his only hope for absolution of the guilt of stolen privilege is to repudiate the exploitative system and dedicate himself to "grand moral projects" that are of necessity "grand political projects" (Minogue 2010).

What we have here is clearly an example of what Voegelin called "Gnostic man," who perceives the world as "a prison from which he wants to escape" and whose

“aim is always destruction of the old world and passage into the new” (Voegelin 1968). To effect this destruction and accomplish this passage, the Gnostic hollow man enters into what Minogue calls the politico-moral world, where the collective guilt of the beneficiaries of an exploitative systemic is expiated by their collective action to destroy that system and erect on its ruins a new and “ethical” world.

I am not an atmospheric scientist, so I have no definite personal opinion as to the likelihood, probable scope, causes, or consequences of anthropogenic global warming. If I did, it would be of no importance. This is a scientific question and, like most scientific questions, this one bores me. (I say this as a confession, not a boast.) What does interest me, and is relevant to this chapter, is the way in which this scientific question has become a touchstone in the politico-moral world. There are three signs that a scientific question has been moralized: data is distorted, neutrality is disallowed, and opponents are vilified. All three signs are present in debates surrounding anthropogenic global warming, whether between climate scientists or members of the general public. This does not mean that advocates of anthropogenic global warming are wrong, only that many of them appear to feel an inordinate need to be right.

They feel this need, I propose, because they are Gnostics trying to expiate the guilt of stolen privilege, and because they believe that permanent relief from this guilt will come only after the iniquitous system has been destroyed in an environmental apocalypse.

An apocalypse is, properly speaking, a vision of the end of the world as we know it. The Christian apocalypse includes both a time of acute tribulation and a final restoration of cosmic justice. Critics of Christianity complain that eagerness for cosmic justice may cause some Christians to welcome, even invite, the preliminary tribulation (Dittmer and Sturm 2010). Post-Christian belief systems have their own apocalypses. They follow this same pattern of ultimate crisis and final redemption, and appear also to welcome, even invite, a time of tribulation. The best-known post-Christian apocalypse is found in Marxism, which teaches that immiserization will worsen to a point where the working class takes its revenge, revolution erupts, and a new age of social justice is brought into being. In this case, it is not Satan, but Capitalism, that is cast into the Bottomless Pit. Because ideological environmentalism is, arguably, Marxism for the postmodern middle class, its apocalypse is very similar to the Marxist apocalypse. In this vision of the end time, environmental degradation worsens to a point where the environment takes its revenge; floods, famines, and droughts scourge mankind; the sinful system of anthropocentric environmental exploitation is cast into the Bottomless Pit; and a new age of environmental stewardship and justice is brought into being.

The zeal of some proponents of the theory of anthropogenic global warming may arise from their need to believe that the events described in this apocalypse have begun to unfold, and the day of their final absolution is at hand. If this is so, the hungry dread with which some among us apprehend catastrophic climate change is, at least in part, a symptom of our nihilism.

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Chapter 16

Colliding with Reality: Liquid Modernity and the Environment

Arran Gare

Abstract The defining feature of (post)modern environmentalism is its focus on damage to ecosystems, including the global ecosystem or Gaia. Its proponents argue that this damage now threatens the future of life itself. They have not succeeded in overturning the current priorities of governments, however, particularly on the crucial measures required to combat climate destabilization. This failure has crystallized a much stronger ideological challenge by radical environmentalists who have rediscovered the Radical Enlightenment and are defining its realization as the creation of an ecological civilization. This challenge, in turn, has exposed more clearly the obstacles in the way of creating such a civilization, notably the advance of “inverted totalitarianism” whereby a new global ruling class, the “corporatocracy,” has aligned itself with and utilized morally and intellectually stunted “post-humans” to subvert the institutions of democracy. The nature of this inverted totalitarianism and those who are serving it are examined. Despite the apparent success of this form of totalitarianism, it is shown that environmentalists have grounds for hope. They still could prevail in the long run, although success will require a long struggle.

16.1 Introduction: The Global Ecological Crisis

It is impossible to understand the present state of culture except in relation to the environmental movement. In its (post)modern form, this movement is sometimes dated from the publication of Rachel Carson’s *Silent Spring* in 1962. While there were environmentalists before this concern to save resources and preserve wilderness areas, Carson had identified a more sinister form of environmental destruction, the slow poisoning of our ecosystems by industrial pollutants, an effect that might not be immediately obvious but could suddenly reveal itself in the loss of whole forms of life. Carson made the threat to bird life the symbol of this destruction. Their elimination would signify the diseased state of the ecosystems of which we are part.

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For (post)modern environmentalists, the signs are now all around us. There are less species of birds, animals, fish, and plants, and even insects are under threat. Western honey bees are dying off in horrifying numbers (MacKenzie 2009; Benjamin 2010). That bees are required to pollinate most flowers highlights the co-evolved nature of species. Without the pollination of flowers, fruit trees will not survive nor the animals dependent on fruit. It is estimated that a third of everything we eat depends upon honeybee pollination. As Christopher Mullin pointed out: “Their extinction would mean not only a colourless, meatless diet of cereals and rice, and cottonless clothes, but a landscape without orchards, allotments and meadows of wildflowers—and the collapse of the food chain that sustains wild birds and animals” (Mullin et al. 2010; Girling 2009). Nobody is quite sure why bee populations are collapsing, but given that US scientists have found 121 different pesticides in samples of bees, wax, and pollen, it is reasonable to suppose that ultimately modern industry is responsible. Wild birds and animals are also faring badly. According to a UNEP report, wild vertebrate species fell by 31 % between 1970 and 2006, with a 59 % decline in the tropics (Secretariat of the Convention on Biological Diversity 2010). Between 2000 and 2010, the extent of primary forest (that is, substantially undisturbed forest) declined by 400,000 km², mostly in areas with the greatest biodiversity, and in 2010, billions of trees in the Amazon died due to an unprecedented drought (Secretariat of the Convention on Biological Diversity 2005; Food and Agricultural Organization of the United Nations 2005; Carrington 2011). With some 40 % of the world’s agricultural land seriously degraded, maintaining food production will place further pressures on the global ecosystem (Sample 2007). Rivers, the largest renewable water resource for humans and a crucible for aquatic biodiversity, are in a state of crisis due to environmental stressors, which include pollutants (Vörösmarty et al. 2010). There are growing dead zones in the oceans along coastlands, graveyards for fish and plants that are caused mainly by chemical fertilizers (NASA Science Focus 2010). The fragility of the ocean ecosystems has been brought home by the collapse of the Newfoundland cod fishing industry. Marine ecosystems are experiencing an accelerating loss of populations and species resulting in exponentially decreasing recovery potential, stability, and water quality, and it is predicted that all ocean fish could be eliminated by mid-century (Worm et al. 2006; CBS News 2006). In such a world, it is hardly surprising that the proportion of people of all ages suffering from cancer is increasing (Epstein 1998).

All this pales before the threat of global climate destabilization. James Lovelock suggested that only 200 million people, living close to the North Pole, will be alive at the end of the century (Powell 2006), and James Hansen, the world’s leading climate scientist, warned that “[t]he startling conclusion is that continued exploitation of fossil fuels on Earth threatens not only the other millions of species on the planet but also the survival of humanity itself—and the timetable is shorter than we thought” (Hansen 2009). While Hansen takes rising sea levels due to melting glaciers as the more immediate problem,¹ he believes there is a very real possibility that all life on

¹ A 1-meter (3.28-ft) rise in sea levels would flood almost a third of the world’s crop-growing land, and if global warming continues, there will eventually be a 70-m (226.66-ft) rise.

Earth will be destroyed unless there is dramatic action to deal with the problem of greenhouse gas emissions.

Environmentalists confronting this situation believe that the global ecological crisis is the greatest crisis any civilization has ever had to confront. The future of the world now hangs on the outcome of the struggle between them and their opponents. Global ecological destruction is such a massive phenomenon that it provides a reference point to put in perspective, understand, and evaluate the present state of culture in all its dimensions. This includes the culture embodied in and constituting institutions, including economic organizations and institutions of government; the cultures of different countries, generations, and political movements; and the culture of the environmental movement itself. To understand culture, it is necessary to understand not only the attitudes people express but the beliefs that actually determine how they live and behave, and their attitudes to the attitudes and beliefs of others; that is, those whose beliefs they respect and accept as authoritative and whose beliefs they dismiss as unimportant. It is the ecologists and climate scientists who have identified a global ecological crisis and the eco-philosophers who have called for a fundamental rethinking of our beliefs, values, and the organization of our institutions. It is in relationship to these and the attitudes and responses of people to them that provides a starting point for interrogating the state of culture and working out what kind of future we can create.

However, this is not as simple as it seems. While there are outright opponents of environmentalism, such as Rupert Murdoch, most people claim to be concerned about the environment or claim to be environmentalists. Yet in examining global trends, it is clear that the required action is not being taken. It is this expressed concern with the failure of this to translate into action that has forced environmentalists to reflect more deeply on their culture and themselves. Their engagement with this is beginning to crystallize into a hard-headed effort to understand not only the economic and political trends that have to be overcome, but tendencies within culture that infect a good proportion of those who believe they are environmentalists. The split that is emerging is not simply a split between different groups of people but a split among environmentalists and even a split within individuals.

16.2 The Crisis in the Environmental Movement

There has always been a spectrum of environmentalists. They range from environmental economists who believe that all that is required is to tweak the market to ensure that the cost of “externalities” are borne by those who produce them, thus improving the efficiency of the market, to those who call for a fundamental transformation of the economy, society, and the culture on which they are based. These are the radical environmentalists, and it is these few who will be focused upon here. These radicals are centrally concerned with the threat of a global ecological catastrophe and see all other environmental problems in relation to this.

Radical environmentalists are a product of the culture of modernity while seeing their relation to this culture as problematic. The failure to achieve more than marginal gains has left them with an acute sense of their powerlessness. This is the case even with those who have the greatest influence. Al Gore, as a former Vice President of the US, in response to his own failures, wrote of how democracies are being undermined through an “assault on reason” by lobbyists, public relations firms and advertisers, controlled by large corporations with no concern for the common good and hostile to genuine democracy. The “consent of the governed” has become “a commodity to be purchased by the highest bidder” (Gore 2007) complained Gore.

Hansen concurs with this, but reveals another dimension. “I believe the biggest obstacle to solving global warming is the role of money in politics, and undue sway of special interests” he wrote (Hansen 2009). He also complained: “I have never seen anything approaching the degree to which information flow from scientists to the public has been screened and controlled as it is now” (Hansen 2009). Despite the principle of serving the public on which NASA was founded, NASA scientists are now prevented from playing this role and countering the misinformation of lobbyists and the public relations industry. Through advertising and public relations industries, commodification has now been extended to mind control, and any checks on this have been neutralized by silencing the foremost institutions concerned to pursue the truth and inform the general public. This is also the case with universities, which are being transformed into transnational business corporations and reorganized on managerialist lines to ensure their employees do not do anything that would stand in the way of maximizing profits (Readings 1996). Science has almost entirely been transformed into techno-science, and the humanities have been transformed into services for the entertainment industry (Dickson 1993; Frank 2000). The most basic condition for democracy, a citizenry with economic security, educated and able to understand arguments and judge the true state of affairs and make responsible decisions accordingly, no longer exists. With democracy crippled, there is very little constraint on ecological destruction.

There is also a growing disillusion by radical environmentalists with the established environmental movement itself. Increasingly this is seen as getting in the way of effective action. Ted Nordhaus and Michael Schellenberger circulated an essay in 2004, “The Death of Environmentalism,” followed by a book in 2007, *Break Through: From the Death of Environmentalism to the Politics of Possibility*. They attacked environmentalists for trivializing the movement into nothing more than one pressure group among others, with its leaders attempting to monopolize the right to speak on the environment. They also criticized the failure of environmentalists to put forward a positive vision to inspire people. In 2008, Christine MacDonald published *Green, Inc.: An Environmental Insider Reveals How a Good Cause Has Gone Bad*, detailing the collusion of leading environmentalist organizations in the US with corporations, the high salaries of the managers of these organizations, and their ineffectiveness.

The findings of ecologists and climate scientists, the failure of societies to respond to the situation, and the failure of the established environmental movement to influence governments are seen to vindicate radical environmentalism. Sir Nicholas Stern, the establishment figure who led the British government inquiry into climate

change, published as *The Economics of Climate Change: The Stern Review* in 2006, acknowledged then that “[c]limate change is the biggest market failure the world has ever seen.” He saw it as a failure that could be overcome, but has become increasingly alarmed by the possible effects of global warming and the failure to act (Stern 2007). In 2009, he published *A Blueprint for a Safer Planet*, calling for much more drastic action (Stern 2009). While the established environmental movement has been domesticated, moderate environmentalists are being radicalized.

Radical environmentalism has also undergone a crisis, however. In the early days of the environmental movement, radicals questioned the culture and social structures of Western civilization and tried to identify what was driving its destructive tendencies. Often this involved blanket condemnations of the culture of modernity in all its dimensions and the Christian culture that had given birth to it. This condemnation was accentuated by contrasting modernity with cultures of the past or primitive cultures or contrasting mainstream Christianity with other religions or minor branches of Christianity. Modernity was condemned for its separation of mind from the material world, reason from emotion, and facts from values. It allowed reductionist science with its atomism, mechanism, and blindness to as well as lack of appreciation of diversity and complex relations, to define reality. It identified rationality with instrumental rationality and reduced nature and people to instruments. Finally it subordinated society to the dynamics of the market, blinding people to any value other than monetary value.²

Radical environmentalists believed that it is not enough to be critical; it is necessary to replace prevailing modes of thinking, radically transform institutions, and change the way people live. Often this would involve defending, reviving, or recreating supposedly superseded institutions, ways of living, and thinking. Philosophers and anti-reductionist scientists, particularly ecologists who had questioned and tried to replace reductionist thinking, were invoked, and a number of new sub-disciplines emerged, including environmental ethics, environmental history, ecological economics, eco-politics, environmental law, and environmental education. However, they found that their severely oppositional orientation marginalized and disempowered them. The sensed urgency of the situation has led to a more affirmative orientation. Radical environmentalists now have a less romanticized interpretation and evaluation of non-Western cultures, which are now seen to have been much more environmentally destructive than previously thought (Chew 2007; Diamond 2005; McIntosh et al. 2000; Tainter 1990),³ and have a much more positive view of Western civilization that has, after all, given birth to environmentalism. They also have gained a better understanding of the opposition to efforts to address environmental problems. Radical environmentalists believe that it is now possible to identify the main fissures in Western civilization and the nature of the opposition between different traditions, thereby identifying their genuine allies and the real “enemies of nature” (Kovel 2002).

² For a study of these radicals and their relationship to postmodernism, see Michael E. Zimmerman, *Contesting Earth's Future: Radical Ecology and Postmodernity*.

³ For the ecological destructiveness of “primitive” societies, see Tim Flannery, *The Future Eaters*.

16.3 Radical Environmentalism: From the Radical Enlightenment to Ecological Civilization

The roots of the traditions that have expressed themselves in radical environmentalism are found in the Renaissance quest for liberty and democracy, understood as membership in self-governing communities. Renaissance culture supported a conception of humans as capable of being educated to govern themselves (although prone to decadence) and saw nature as creative and dynamic within which humans are creative participants. The two key intellectual movements associated with this were Civic Humanism and Nature Enthusiasm. Opposition to environmentalism has its roots in the “Counter-Renaissance,” the effort to subvert the influence of Nature Enthusiasm and Civic Humanism by showing that nature is merely brute matter in motion moving according to inexorable laws, and that humans are incapable of the virtues required for genuine democracy.⁴ The Counter-Renaissance was united by the mechanistic view of nature⁵ that justified dominance by instrumental reason, rule by oligarchy, and the subordination of societies to the laws of the market and/or managers of hierarchically structured bureaucracies, with all else being a matter for private consumption. The Radical Enlightenment developed in reaction to this to revive the Renaissance quest for liberty, advance democracy and the conditions for achieving it, and defend a notion of nature as creative becoming.

While the development of the dominant thought of modernity can easily be traced from Descartes and Hobbes to Newton and Locke, Adam Smith and Charles Darwin, Milton Friedman and Richard Dawkins, the history of the Radical Enlightenment has been obscured by its subordinate position. The coherence of its evolution, from Giordano Bruno to Spinoza, Leibniz,⁶ Johann Herder, Wolfgang Goethe and Friedrich Schelling, Georg Hegel, Karl Marx and Friedrich Engels, the British Idealists and the process metaphysicians, C.S. Peirce, Aleksandr Bogdanov, Henri Bergson, John Dewey, and A.N. Whitehead, is little appreciated, and its proponents often misunderstood. The work of the radical environmentalists has gradually revealed this coherence and the strength and influence of this submerged tradition (Jacob 2003; Gare 2008). It has become evident that the Counter-Renaissance has been parasitic upon it from the beginning, taking up ideas from it and then attempting to neutralize their radical import. Newton’s physics, for instance, borrowed heavily from the work of Bruno, the leading Nature Enthusiast of the sixteenth century, but in a way that neutralized Bruno’s radical politics. The mainstream or “moderate” Enlightenment was really a fake Enlightenment, utilizing ideas from the Renaissance and Radical Enlightenment thinkers, such as Diderot and Rousseau, while countering their quest for democracy. The classical economics of Adam Smith and David Ricardo, promising prosperity through free trade, has always been a trap for those who followed this

⁴ The term “Counter-Renaissance” comes from Stephen Toulmin, *Cosmopolis: The Hidden Agenda of Modernity*.

⁵ The “ontology of death” as Paul Tillich called it (Tillich 1963).

⁶ Who absorbed ideas from the neo-Confucian philosopher Zhu Xi.

advice. Prosperity has followed from the policies argued for by Renaissance economic thinkers who called for the fostering of the “arts”—highly skilled productive activities, and developing a national economy with a strong, educated middle class by protecting and fostering local industry over “extraction” (Reinert 2007).

The Radical Enlightenment is also behind the major advances of culture, without this being properly acknowledged. The arts, the humanities, and the humanistic human sciences also have their roots in the Renaissance, and their development has been inspired by the Radical Enlightenment. For the Radical Enlightenment, the arts are needed to comprehend the world, particularly its holistic aspects, to develop character and cultivate the virtues. The products of artists inspired by this belief have been appropriated by mainstream culture as entertainment, amusement, decoration, and investments important for the tourism industry. The humanities, originating in the Renaissance, is directed at producing people who have the ability and virtues required to govern themselves. The humanistic human sciences, aligned with the humanities, have their roots in the Renaissance historical school of law, with the core concepts of community and culture having been further developed by Johann Herder in the late eighteenth century (Haddock 1980). Herder, a major exponent of democracy, was the first person to use the word “culture” in the plural, implying a whole way of life. This notion was used by him not only to develop and further justify the humanities, arts, and literature, but to promote respect for people of different cultures, defend democracy, and oppose imperialism. The defense of democracy has always been a core project of the Radical Enlightenment, not the moderate Enlightenment or the proponents of free markets who have benefited from, then exploited and subverted the institutions created by the Radical Enlightenment. In opposition to utilitarianism, Herder argued that the goal of life is self-realization. These ideas then influenced the Humboldtian model of the university that gave a central place to the humanities, assuming that as it advanced, science would support the humanities. Mainstream culture embraced the humanities, but only as a form of connoisseurship, of no cognitive value, for those wealthy enough not to have to work, and then as important for the entertainment industry.

Advances in the arts and the humanities have been accompanied by advances in the natural sciences. Herder was also a major influence on Friedrich Schelling, who strove to replace the Newtonian mechanistic cosmology with a view of nature as creative process, reviving and developing the ideas of the Nature Enthusiasts. Mainstream culture has appropriated post-mechanistic advances in the physical sciences, but neutralized their radical implications by separating science from natural philosophy, denying the contributions of natural philosophers to science, and interpreting theories as only means for making predictions and effecting control over nature. It was proponents of the Radical Enlightenment who revived evolutionary theory and used it to defend radical political programs. The “Darwinian revolution” was really an attempt to appropriate the theory, reformulate it to accord with mechanistic science, and thereby use it to defend the exploitation and impoverishment of the poor, imperialism, and the destruction of “primitive” races (Richards 2002; Young 1985).

What is called “postmodern” science is really the triumph of the natural philosophy of the Renaissance and Radical Enlightenment, specifically, the science of the Naturphilosophen inspired by Schelling, with further advances in science, for instance, the work of David Bohm, Ilya Prigogine and Jesper Hoffmeyer, having been

inspired by such Schellingian philosophers Henri Bergson, Alfred North Whitehead, and C.S. Peirce. Prigogine argued that this post-mechanistic science, by giving a central place to time and becoming, is now aligned with the humanities, vindicating the Humboldtian model of the university and the central place it gave to the humanities. The incoherence of the mechanistic version of evolutionary theory based on the notion of the survival of the fittest machine has been demonstrated over and over again (Fodor and Piatelli-Palmarini 2010). Theoretical biologists influenced by Whitehead, such as Joseph Needham and C.H. Waddington, overcame this incoherence by granting a place to agency, epigenesis,⁷ and the effects of organisms on their environments, thereby demonstrating the importance of symbiosis and eco-dynamics in evolution (Waddington 1969). Recent developments in evolutionary theory, now incorporating semiotics and hermeneutics, are much closer to the evolutionary theory of Schelling and the Naturphilosophen than to orthodox Darwinian theory (Schelling 2004; Turner 2007; Barbieri 2008). This new evolutionary theory requires us to recognize that the Earth itself is a living being, as James Lovelock argued, a view that had been defended by Leonardo da Vinci as well as Bruno, and then later by James Hutton, Jean-Baptiste Lamarck, Schelling, and Alexander von Humboldt (Capra 2007; Grinevald 1996). From this perspective, it has been possible to reconstruct the history of humanity as participation in the becoming of nature, revealing much more clearly the destructive effects of exploitation and the possibilities open to humanity (Hornborg et al. 2007). Radical environmentalism is a revival of the whole project of the Radical Enlightenment.

Perhaps most importantly, the Radical Enlightenment is concerned to oppose the atomization, fragmentation, and nihilism of the Counter-Renaissance and augment the meaning of life. It can be seen as a religious movement attempting to “reconnect” (from *re* (again) + *ligio* (connection)) individuals, communities, and humanity with nature and the cosmos, whether this be conceived theistically or non-theistically. “Spirituality” is inspiration gained from such reconnection and the associated feeling of being part of a meaningful whole. Lovelock, along with other radical environmentalists, has concluded that it is unlikely humanity will save itself without such inspiration (Lovelock 2009; Griffin 1988; Kovel 1991). While for a long time ecologists were wary of the embrace by environmentalists and Lovelock’s notion of Gaia, community ecology has won out against rival reductionist approaches,⁸ (O’Neill et al. 1986) and ecologists are now happy to fuse their science with religion in this sense (Ulanowicz 2009). The complexity theorist, Stuart Kauffman, argues for “a worldview beyond reductionism, in which we are members of a universe of ceaseless creativity in which life, agency, meaning, value, consciousness, and the full richness of human action have emerged” (Kauffman 2008). This accords with Schelling’s call for a new philosophical religion (Schelling 2007), and before that with Bruno’s Nature Enthusiasm.

The shock of recognition by radical environmentalists of the source of their ideas and ways of thinking has reoriented them and vastly strengthened their challenge

⁷ The differentiation of cells and generation of form.

⁸ See also the work of members of the Resilience Alliance building on the work of C.S. Holling.

to the dominant traditions of thought. Radical environmentalists no longer think of themselves as marginal figures, aligning themselves with primitives and pitting themselves against Western civilization, but as realizing its highest potential. They now also see themselves as realizing the highest potential of all civilizations in opposition to mechanistic thought, instrumental reason, and consumerism. In fact, it is Chinese environmentalists who are now taking the lead in this, having the vantage point of being in a country where they cannot escape the effects of environmental destruction, where they have been forced to embrace much of Western civilization, but have a culture that has a long history of appreciating the creative dynamics and intrinsic significance of nature, for instance, in the Neo-Confucianism of Zhu Xi. These environmentalists have embraced and promoted the idea of creating an ecological civilization. This was characterized by Pan Yue, the deputy director of China's State Environmental Protection Administration (SEPA) as "a comprehensive and sustainable change of politics, economics, society, culture, and theory—a transformation of civilization" (Yue and Jagang 2006; Tianyu 2008; Huan 2008). There is now a growing global movement that defines its goal as the creation of an ecological civilization, a civilization committed to augmenting the life of Gaia, unifying humanity while celebrating diversity, and recovering the wisdom of past societies and civilizations.

What would this entail? Brian Goodwin, one of the world's leading theoretical biologists until his death in 2009, summed this up in his last book, *Nature's Due*:

The Great Work, the Magnum Opus in which we are now inexorably engaged, is a cultural transformation that will either carry us into a new age on earth or will result in our disappearance from the planet. The choice is in our hands. I am optimistic that we can go through the transition as an expression of the continually creative emergence of organic form that is the essence of the living process in which we participate. . . . This Gaian Renaissance will lead to what Thomas Berry calls the Ecozoic Age, in which all inhabitants of the planet are governed by the principles of Earth Jurisprudence in an Earth Democracy (Goodwin 2007)

The principles on which such a civilization should be based can be summed up in a small number of principles: maintain heterogeneity, sustain modularity, preserve redundancy, tighten feedback loops, minimize entropy production, produce nothing that cannot be recycled and recycle everything, build trust, and do unto others as you would have them do unto you (Levin 1999).

Humanity will be organized into communities of communities, with a global organization decentralizing power, united while celebrating diversity, reviving strong democracy, and liberating people to augment the vitality and resilience of their social and natural communities (Prugh et al. 2000). The goal of politics will shift to augmenting the quality of life and maintaining and developing the conditions for people to pursue this end rather than increasing the production of commodities. That is, the liberty of people, the self-realization of individuals, the resilience of life, and the development of culture will be the measure of progress rather than GDP (Schafer 2008). The market will be subordinated to the complex of communities of communities, with the economies of local communities protected from destructive

competition (Gare 2010).⁹ As Richard Norgaard wrote of the future: “If our vision shifts to a patchwork quilt of coevolving economies rather than one modern global economy, interconnectedness would have to be reduced, self-sufficiency would have to be increased, and different technologies and forms of social organization would have to be tried” (Norgaard 1994). Ecological economists have worked out in some detail the policies that need to be implemented and the institutions that need to be maintained, developed, or created to achieve this transformation (Daly and Cobb Jr. 1994; Norgaard 1994; Söderbaum 2001; Vatn 2005; International Forum on Globalization 2002).¹⁰ And it has been shown that the technologies required for this new order are available and viable (Brown 2009).¹¹

16.4 Opposition to Ecological Civilization

In identifying the Radical Enlightenment and calling for the creation of an ecological civilization, radical environmentalists are up against the whole tradition of the Counter-Renaissance, a tradition that would appear to be stronger than ever. The Radical Enlightenment slowly gained ground during the nineteenth century despite strong opposition. With the advance of the Radical Enlightenment, opposition to it became more complex. Increasingly, opponents advanced their agenda by adopting the mantle of the Radical Enlightenment rather than opposing it. Both Stalin and Hitler gained power under the guise of doctrines from the Radical Enlightenment, but then subverted these doctrines. The defeat of Naziism and then opposition to Communism after the Second World War were carried out in the name of freedom and democracy, but democracy was subverted by neo-colonialists whereby, supposedly in defense of the “free world,” comprador elites were imposed on Third World countries, usually in the form of dictatorships, by First World countries in order to extract their resources. Then, beginning in the 1970s, there was a major campaign to subordinate all nations to one global market dominated by transnational corporations, subverting the advances made in democracy in the First World, intimidating and disorienting people, and then massively expanding institutions of coercion; but this whole project was undertaken in the name of freedom and democracy (Klein 2007). The proponents of this new order, a new managerial class based in transnational corporations and their apologists, the neo-classical economists, have largely succeeded in capturing control of people’s minds and transforming public institutions into their instruments (Korten 2001; Robinson 2004; Beder 2006). This new

⁹ For such a vision of the future, see Arran Gare, “Towards and Ecological Civilization: The Science, Ethics and Politics of Ecopoiesis” in *Process Studies*.

¹⁰ On the required institutions and their relation to action, see Arild Vatn, *Institutions and the Environment* and *International Forum on Globalization Alternatives to Economic Globalization: A Better World Is Possible*.

¹¹ For a more skeptical assessment, see George Monbiot, *Heat: How to Stop the Planet Burning*. See also William McDonough and Michael Braungart, *Cradle to Cradle: Remaking the Way We Make Things*.

class has been characterized as someone who was involved in creating this new order, John Perkins, as he “corporatocracy” (Perkins 2006, 2009).

Very early on, this new class identified the main threat to their agenda in the emerging global environmental movement. As far back as 1972, the International Chamber of Commerce set out to take over the environmentalist agenda, embracing the idea of “sustainable development” and equating this with “sustainable growth.” As Leslie Sklair summed up what happened: “Big business mobilized a sustainable development historical bloc against what it saw as a threatening counterculture organized around the powerful idea of the singular ecological crisis, the ‘deep green’ or ecological movement” (Sklair 200). Big business was immediately supported by economists. In 1974, the Nobel laureate Robert Solow developed a theory of exhaustible resources, arguing that through substitution of produced capital for a dwindling stock of natural capital, the market could generate permanent sustainability at a constant level of consumption. “If it is very easy to substitute other factors for natural resources” he argued, “then there is, in principle, no ‘problem.’ The world can, in effect, get along without natural resources, so exhaustion is just an event, not a catastrophe” (Solow 1974). Later, media moguls, such as Rupert Murdoch of News Corp, used their media to convince the general population that climate destabilization is not a problem while the mining companies, particularly ExxonMobil, engaged in a massive public relations campaign to cripple the public’s ability to comprehend what was happening and the significance of climate destabilization (Beder 2007; Gare 2007). These developments were associated with an ideological offensive that began in the 1970s promoting neo-classical economists, most importantly Milton Friedman, who identified freedom with free markets (Friedman 1982), and sociobiologists, notably Richard Dawkins, and psychologists, such as Hans Eysenck, who were reviving Social Darwinism. The liberation of market forces, it was promised, would solve all problems, including environmental problems.

What they have created is not merely “predator states” as James Galbraith characterized them, but, as Sheldon Wolin called them, “managed democracies” (Wolin 2010). Intellectual arguments are inefficient means to control people as ideas are vulnerable to criticism. More efficient means were soon deployed. Political processes were controlled through consolidating their control of the media and financing career politicians and political parties prepared to work for the transference of power and wealth to corporations. Civil services were undermined by implementing the “new public management philosophy,” outsourcing wherever possible and eliminating job security for civil servants, thereby crippling the capacity of elected governments to function properly (Harriss-White and Harriss 2006).¹² Established institutions, distinctive features of political traditions that were assumed to be part of the people’s heritage, disappeared before they could be put on the endangered list. Niches where troublesome intellectuals, such as James Hansen, might criticize public policies were

¹² Barbara Harriss-White and Elinor Harriss showed how in Britain all efforts to develop alternative forms of energy were undermined by its civil service. See “Unsustainable capitalism: the politics of renewable energy in the UK” in *Coming to Terms with Nature*.

largely eliminated by transforming research institutions and universities into transnational business corporations with their goals redefined as knowledge production and profit maximization, with the freedom of expression of employees severely restricted (Readings 1996). Consequently, as Carl Boggs noted, “the traditional intellectual. . . has been replaced by the technocratic intellectual whose work is organically connected to the knowledge industry, to the economy, state, and military” (Boggs 1993). Science has been almost entirely transformed into techno-science, neutralizing the force of post-mechanistic science (Dickson 1993), while the humanities have either self-destructed or been taken over by “vampire disciplines” serving the entertainment industries in place of educating people to be citizens capable of governing themselves (Kagan 2009).

The corporatocracy has not been driven by greed alone, however. They have their own perspective on events, including a vision of the future, which they believe everyone should share and would share if they were intelligent enough. They have inherited the tradition of thought of the Counter-Renaissance and believe that it is this that has made the world a better place. Free markets and a mechanistic view of the world have enabled humanity to control nature for its own benefit. This is the progress that has mattered. While some people have suffered, for instance, the working classes in the early stages of industrialization and people from more primitive societies and backward civilizations, this is “creative destruction,” as the Austrian economist Joseph Schumpeter termed it. Overall, people are far better off. This is demonstrably evident in the number of people the world can now support, their increasing life expectancy, and levels of affluence, levels that people could only dream of a few hundred years ago. The costs to individuals in the present, the destruction of inefficient enterprises previously protected by trade barriers, the elimination of small farmers, the impoverishment of people in the First World who had been propped up by nanny states, all this is justified as “creative destruction,” paving the way for more economic growth in which countries will specialize in that which they have a comparative advantage. This vision was very clearly articulated more than a decade ago by P. Schwartz and P. Leyden:

We are watching the beginnings of a global economic boom on a scale never experienced before. We have entered a period of sustained growth that could eventually double the world's economy every dozen years and bring increasing prosperity for—quite literally—billions of people on the planet. . . . In the developed countries of the West, new technology will lead to big productivity increases that will cause high economic growth. . . . And then the relentless process of globalization . . . will drive growth through much of the rest of the world. . . . Five great waves of technology—personal computers, telecommunications, biotechnology, nanotechnology, and alternative energy—. . . could rapidly grow the economy without destroying the environment (Prugh et al. 1997)

The way to this future was portrayed as a moral project projecting values based on the patriarchal family, which was taken as the model for the whole of society (Lakoff 1996). Those opposing this development, notably the environmentalists, were portrayed as standing in the way of the progress of humanity and evolutionary progress. The “skeptical environmentalist,” Bjørn Lomborg (who now acknowledges he was

wrong) was supported and promoted to explain to people that the environmental destruction taking place is necessary for the far greater benefits of economic progress (Lomborg 2001).¹³ Of course, it was necessary to mislead people and disguise the fact that they were losing their liberty and becoming poorer in order to get their support for this project. Elites have a responsibility to manufacture consent in this way, as Walter Lippman argued in the 1920s (Lippman 1960), and when they fail to do so and the general population attempts to exercise its democratic rights as they did in the 1960s, they threaten social order and economic progress.

16.5 The Struggle for Cultural Hegemony

So what we see are two major conflicting movements, each of which has its own perspective on the world and each defining the other as an enemy of the progress that needs to be made. Other political, cultural, and social movements, such as Islamic fundamentalism and orthodox Marxism, are of relatively minor significance. The environmental movement is now crystallizing its vision of an ecological civilization by realizing the highest potential of all civilizations, based on the most advanced developments in the sciences, the arts, and the humanities and integrating the wisdom of all nations and civilizations, struggling to address the failure of humanity to deal with the greatest problem it has ever confronted. They are struggling to revive strong democracy, defend traditional institutions such as universities in their Humboldtian form, and revitalize local communities to mobilize humanity's highest potential. On the other side, there is the corporatocracy, globalizing the economy, replacing democracy with government by corporations, or euphemistically, "managed democracy," and amassing vast wealth and power at the expense of nations, but justifying this by promising unheard of wealth for all through the liberation of capital from bureaucratic constraints. Claiming to be reviving traditional morality based on traditional patriarchal family values, they assume a mechanistic world-view and the validity of Social Darwinism.

In the struggle to defend their view of the real situation, the radical environmentalists believe they have won. Scientists who believed that there is a global ecological crisis have won the scientific debate. This has been acknowledged by their opponents who have developed a strategy of confusing the public rather than invoking the findings of science in order to maintain their cultural hegemony (Luntz 2008). Environmentalists believe that not only have they shown there is a crisis, they have succeeded in defending holistic scientific theories against theories based on reductionist materialism. Also, they believe that those economists who opposed mainstream economics and argued that unfettered markets would damage people's welfare as well as undermine the stability of the economy and damage nature have been vindicated. Most people have suffered under neoliberalism and will not reap a

¹³ In 2010, Lomborg changed his stance and called for \$ 100 billion a year to be spent countering climate change. See *Smart Solutions to Climate Change: Comparing Costs and Benefits*.

bonanza from economic growth. Although this has not been conceded, even with the global financial crisis, this invalidates neo-classical economics with its reductionist assumptions and validates the traditions opposed to it, particularly institutionalist ecological economics. It is now clear that most people will be utterly impoverished and lucky to survive if the climate is destabilized. Whatever initial plausibility the champions of the global market had in promising greater affluence in the long run, surely their promises have lost all credibility. They have failed to address the ecological problems of civilization that are clearly far more serious than they claimed.

How have most people responded to this ideological struggle? While there are significant numbers of intransigent anti-environmentalists, exemplified by Sarah Palin and her admirers, most people show some concern for the environment and believe that governments should be doing more to address environmental problems. Jim Norwine found that large majorities of students believe that environmentalism is good for people. This does not mean that people support the radical environmentalists, however. Norwine also found that in the US only a minority of students agreed that saving the environment is more important than personal freedom, with the superficially more environmentally concerned public institution students being less willing than parochial (church-college) students to put the environment before personal freedom (19% vs. 26%) (Norwine 2008). Even in the more environmentally concerned countries of Northern Europe, radical environmentalism is still a marginal movement. If it were otherwise, governments would be taking more drastic action to deal with ecological destruction. It would appear that people still believe in the promises, values, and weak environmentalism of the corporatocracy, or are confused and too bogged down in deconstructive postmodern relativism and too narcissistic to work their way out of their confusion.

The intellectual victories of the radical environmentalists are largely irrelevant to such people. They accept mainstream economists as a priesthood with special knowledge not accessible to normal people and do not take seriously critics, even if they are Nobel laureates, who have exposed their theories, policies and technocratic jargon as pseudo-science. There has been a class war that the transnational capitalist class and their allies have won. As the second richest man in the world, Warren Buffett wrote while commenting on tax breaks for corporations, "If class warfare is being waged in America, my class is clearly winning" (Perelman 2006). The winners have waged a successful struggle for moral/cultural hegemony, putting forward patriarchal family values and a vision for the future, supporting neo-classical economists, skeptical environmentalists, and moralists who promote this vision, co-opting potential opposition and eliminating the institutional bases of critics of this vision. While the central actors in this cultural struggle might not admit this in public, it is almost certain that many of them accept that climate destabilization will be devastating, but can live with this because they see it as a further instance of "creative destruction." The world's population has to be culled at some time, after all. The losers have been duped, and they remain duped.

This is most clearly true in countries such as the US, Canada, and Australia where despite the displacement of farmers by agribusiness, economic collapse of major regions and the decline of real incomes of non-managerial employees, people still

believe that society is progressing. In fact, in the US, 80 % of the population had lower real return for their work in 2002 than in 1970 (Perelman 2006, 2007), and the proportion has increased with the financial collapse of 2008. Of these, many are much worse off, working much longer hours with far less security of employment. The deteriorating conditions of most Americans have not been associated with alleviating poverty in developing countries. While capital and jobs have been exported mostly to China, the great mass of Chinese people, peasants, and uneducated workers, can hardly be regarded as beneficiaries. They have suffered from massive environmental degradation due to this industrialization (Economy 2004; Wen and Li 2006; Li 2008), while most of the income generated by this growth has gone to wealthy elites. Between 1990 and 2005, total labor income fell from 50 % of GDP to 33 % of GDP (Li 2008). Many factory workers, escaping growing rural poverty caused by rising charges for services, such as health and education, work 12 hour days or more, seven days a week, and then are only able to afford to live in dormitories (Becker 2007; Lee 2007). The benefits of economic growth world-wide have almost all been captured by the super-wealthy, although these are now spread out around the world more than they were (Douthwaite 1999). In 1970, the top ten corporate CEOs in the US earned approximately 49 times as much as the average wage earner. By 2000, the ratio had reached 2,173 to 1. In 1952, corporations in USA paid 32 % of all tax receipts; in 2003 7.4 % (Perelman 2006). The rest of the population has compensated for their loss of income by increased borrowing, either anticipating that the huge incomes of managers will eventually trickle down to them, or struggling to provide the conditions for their children to get a reasonable start in life (Frank and Cook 1995). Household debt in the US approached 100 % of GDP in 2007 (*The Economist* 2010).

How is it possible to account for this success of the corporatocracy? Many members of this class, notably Buffett and George Soros (Soros 1998), have criticized the transformations that have taken place, and some genuine environmentalists have gained high office, notably Al Gore. At the same time, as I have already suggested, despite difficult and often hostile environments, there has been some outstanding work by academics and other researchers exposing the illusions of the dominant culture and offering an alternative vision of the future, much of it available on the Internet. People who question the dominant culture are not being jailed, although they might lose their jobs. The question, or puzzle, that needs to be answered is why the environmentalists' vision of the future has not prevailed and effective action taken.

16.6 Inverted Totalitarianism

The answer to this puzzle lies in the development of what Sheldon Wolin diagnosed as the core of managed democracy, "inverted totalitarianism." Inverted totalitarianism, unlike the totalitarianism of Nazi Germany, Fascist Italy, or Stalinist Russia in which

power was concentrated in the state and used by their rulers to reconstitute society, “projects power inwards” working from the bottom up. As Wolin wrote:

Inverted totalitarianism . . . while exploiting the authority and resources of the state, gains its dynamic by combining with other forms of power, such as evangelical religions, and most notably by encouraging symbiotic relationship between traditional government and the system of “private” governance represented by the modern business corporation. The result is not a system of codetermination by equal partners who retain their distinctive identities but rather a system that represents the political coming-of-age of corporate power . . . The result is an unprecedented combination of powers distinguished by their totalizing tendencies, powers that not only challenge established boundaries—political, moral, intellectual, and economic—but whose very nature it is to challenge those boundaries continually, even to challenge the limits of the earth itself. Those powers are also the means of inventing and disseminating a culture that taught consumers to welcome change and private pleasures while accepting political passivity (Wolin 2008).

Unlike the old totalitarianisms, “inverted totalitarianism thrives on a politically demobilized society, that is, a society in which the citizens, far from being whipped up into a continuous frenzy by the regimes operatives, are politically lethargic” (Wolin 2008). This lethargic population allows rollbacks of previous social gains, thereby teaching political futility to the many. An “economy of fear” is generated through downsizing, outdated skills, creating speculative bubbles that burst, and exporting jobs, creating “a system of control whose power feeds on uncertainty” (Wolin 2008). While there are major parallels with the older totalitarian systems, there are also unique features, notably the extent to which the agents of this are people operating at very low levels in the hierarchies of power.

A key to this has been supplied by James Galbraith, who identified the corruption of one word that has effectively subverted democracy. The word is “freedom.” Friedman, the main ideologist of market fundamentalism, redefined freedom as “freedom to choose,” meaning by this “freedom to spend” (Galbraith 2008; Friedman 1982). As Galbraith pointed out, this really meant “freedom to shop.” While one tends to look past this idea because it appears palpably absurd and a monstrous perversion of language, it appears that this is indeed how people now think of freedom. China is seen as free because it has great shopping, whereas the Soviet Union was not free because it did not. Once freedom is defined as freedom to shop it becomes a political right, the right to consume pornography, the right to cheap goods produced by sweated labor in countries like China, and the right to buy big cars and the gas to run them. It also entails freedom for others, for corporations to buy other companies and asset strip them, to buy control of what people think through advertising, public relations, lobbying, and control of the media, then buy politicians, political parties, and effectively governments, and to use these to free public assets, including natural resources, for acquisition by corporations. There is also the right not to buy, including the right not to employ people or to retrench employees from companies that have been asset stripped. Conversely, it becomes wrong to stand in the way of such freedom.

Freedom is consumed. The new order operates through a micro-politics of insecurity and little fears, amplifying inequalities of status, incomes, education, etc., and modulating divisions and differences between people to weaken individuals by

individuating them, undermining the possibility of solidarity, and rendering people politically passive. With neo-liberalism, competitive relations are imposed throughout organizations, not to improve productivity, but, as Michel Foucault revealed, as an instrument of governance (Foucault 2008). With the elimination of job security, individuals are forced to live their lives as entrepreneurs, selling their services, often underemployed and forced to continually relocate, poised over an abyss of unemployment (Boltanski and Chiapello 2007). As John Quiggin characterized the new managerialism:

The main features of managerialist policy are incessant organizational restructuring, sharpening of incentives, and expansion in the number, power, and remuneration of senior managers, with a corresponding downgrading of the role of skilled workers and particularly of professionals (Gare 2006).

The people who flourish and become managers in this environment are the sociopaths, people who are good at ingratiating themselves to superiors and enjoy humiliating or retrenching their subordinates (Pech and Slade 2007; Babiak and Hare 2007). Work insecurity has produced a “precarisation of existence” in which people cannot perform their work properly, have to continually work around the mistakes of managers without these mistakes ever being acknowledged, and are denied recognition for what they achieve¹⁴ (Deranty 2008).

The undermining of work has been accompanied by massive increases in spending on advertising. Almost all the power of the arts has been co-opted by the advertising industry and devoted to promoting not merely consumption, but a whole way of life centered on consumption, leaving virtually no place for citizenship (Klein 1990). As people are less able to define themselves through their careers, or find work that is in any way meaningful and fulfilling, they define themselves instead through their consumption, and the consumption that bestows identity is largely determined by advertisers. It is the countries where expenditures on advertising are highest, such as Australia and the US,¹⁵ that are the most ecologically destructive (TNS Media Intelligence 2007).

The defense of freedom as the freedom to shop is also the defense of people’s right not only to make their own choices, but to have their own preferences without having to justify them. This explains the finding made by Jim Norwine that “fully 50 % of public university undergraduates agreed that ‘teaching any particular value is better than another is wrong,’ and only 27 % disagreed” (Norwine 2008). But it is not only values that cannot be questioned; it is now seen by many as unethical to question people’s opinions, especially if this makes people feel ignorant. 68 % of students at public universities in US believe that everybody’s point of view is equally valid¹⁶ (Norwine 2008). As a bewildered Australian academic lamented:

¹⁴ This process has been studied by the French psychiatrist, Christophe Dejours.

¹⁵ Where in 2007, \$ 153.7 billion was spent on advertising.

¹⁶ Norwine found “69 % (secular) versus 39 % (parochial) (college students) agreed . . . that ‘every point of view is equally valid.’”

... there seem to be many individuals who feel ‘relaxed and comfortable’ in talking about that which they haven’t bothered to read a single researched article, let alone a book. Apparently, ‘life taught them.’ In fact, such people are so ‘relaxed and comfortable’ that they believe that the more someone works at trying to learn about an issue, the more they become part of an ignorant and arrogant lot: the intellectual elite. The role of this elite is apparently simply to put down naturally intelligent people and find ways to stop them from expressing the truth they capture so effortlessly by merely living (Hage 1998).

Such “elites” have committed the heinous crime of claiming to have knowledge or values superior to the ordinary person. What makes this crime particularly odious is that challenging prevailing opinions often makes people, and intends to make people, uncomfortable with not only their beliefs but with the present state of things. It is an affront to their positive feelings about themselves.

The widespread acceptance of such views cripples people attempting to carry out their duties within the public sphere as citizens of a democracy, which requires of them that they discuss and question each others’ beliefs in the service of promoting the common good and the virtues required to sustain it. This was understood in Ancient Greece where people who failed to participate in such questioning were regarded as *idiōtēs* (a word deriving from *idios*, meaning “one’s own”), private people having no interest in public affairs. These *idiōtēs* were looked down upon. Now, idiots claim the moral high ground, freeing the power elites to define reality without being questioned. In George Orwell’s *Nineteen Eighty-Four*, the novel based on a Stalinist Soviet Union, the central character, Winston, working in the “Ministry of Truth,” could wonder how people could be deluded through the Ministry’s control of all records into believing that their chocolate ration was being increased when really it was being reduced. “Was it possible that they could swallow that, after only 24 h. Yes, they swallowed it” (Orwell 1949). With inverted totalitarianism, it is the victims of such delusions, notably the delusion that the growth of GDP has improved their welfare, who police the official view and censure those dreary individuals who attempt to use available records to question these delusions.

16.7 The New Decadence: The Rise of the Post-Humans

Inverted totalitarianism has been associated with the kind of decadence that Plato railed against in *The Republic* and Giambattista Vico analyzed in his *New Science*. In his discussion of imperfect societies, Plato described the corrosive effects of the pursuit of wealth, noting that

the higher the prestige of wealth and the wealthy, the lower that of goodness and good men will be. . . . [H]onour and admiration and office are reserved for the rich, and the poor are despised. . . . [R]eason [is] forbidden to admire or value anything but wealth and the wealthy, or to compete for anything but the acquisition of wealth and whatever leads to it (Plato 1974).

Such people constrain themselves for fear of losing respectability, but have no moral conviction. Their acquisitiveness in turn paves the way for wastefulness as people indulge the pleasures of the moment. With this more advanced form of decadence,

people claim “all pleasures are equal and should have equal rights.” No objections are made to this. “The teacher fears and panders to his pupils, who in turn despise their teachers and attendants. . .” People become ever more self-indulgent.

[T]he minds of the citizens become so sensitive that the least vestige of restraint is resented as intolerable. . . Those. . . who have no experience of wisdom and goodness. . . bend over their tables, like sheep with heads bent over their pasture and eyes on the ground, they stuff themselves and copulate, and in their greed for more they kick and butt each other (Plato 1974).

Similarly, Vico noted:

[P]eoples, like so many beasts, have fallen into the custom of each man thinking only of his own private interests and have reached the extreme of delicacy, or better of pride, in which like wild animals they bristle and lash out at the slightest displeasure. Thus no matter how great the throng and press of their bodies, they live like wild beasts in a deep solitude of spirit and will, scarcely any two being able to agree since each follows his own pleasure and caprice (Vico 1984).

This state is associated with a base savagery of premeditated malice in which, “under soft words, people plot against the life and fortune of friends and intimates” (Vico 1984).

With inverted totalitarianism, decadence is not simply the result of decay; it is imposed. It is promoted as a way of crippling the intellectual development of the lower orders in order to render them politically impotent. Orwell portrayed this in *Nineteen Eighty-Four*. Entrusted with control of the media, there was a whole section of the Ministry of Truth serving the proletariat:

There was a whole chain of separate departments dealing with proletarian literature, music, drama and entertainment generally. Here were produced rubbishy newspapers containing almost nothing except sport, crime and astrology, sensational five-cent novelettes, films oozing with sex, and sentimental songs which were composed entirely by mechanical means on a special kind of kaleidoscope known as a versificator. There was even a whole subsection—Pornosec, it was called in Newspeak, engaged in producing the lowest kind of pornography (Orwell 2000).

At the same time, language was being simplified to eliminate the capacity for reflective or critical thought. A recent book by Chris Hedges, *Empire of Illusion: The End of Literacy and the Triumph of Spectacle* provides a study of actually existing decadence showing how a debased news media, pornography, and other spectacles, complemented by positive psychologists offering “Transformational Positivity” by cultivating positive attitudes whatever the external reality, serve to pacify the population (Hedges 2009).

There is a difference between the decadence prophesized by Orwell and present reality, however. What makes the present an inverted totalitarianism is that there is no Big Brother imposing this decadence; the imposition comes from below. It does so in a way that disguises what is happening by severing the relation between appearance and reality. Inverted totalitarianism works by extending the process of commodification so completely that there are no outside reference points left, and oppositional stances themselves are incorporated into this world. A social world is produced in which people become complicit in the subjugation of each other and

themselves through seeing everything through the prism of the market. In this way, all social forms and relationships through which people might gain some secure vantage point outside this system of control are eliminated. Participants in this illusory world become fakes who appear to be unaware that they are fakes and judge and evaluate everyone on the assumption that others have the same fake standards. They participate in transforming society into a society of consumers, and, as Zygmunt Bauman argued, in such a society

No one can become a subject without first turning into a commodity, and no one can keep his or her subjectness secure without perpetually resuscitating, resurrecting and replenishing the capacities expected and required of a sellable commodity (2007).

As people become commodities, they dissolve into the sea of commodities in which, as Georg Simmel put it, all things “float with equal specific gravity in the constantly moving stream of money” (Bauman 2007). Life then becomes an incessant activity of consumption as people strive to lift themselves “out of that grey and flat invisibility” (Bauman 2007). The subjectivity of consumers is made out of shopping choices, including choices of causes to identify with. These consumers then form swarms rather than groups; they assemble, disperse, and gather again, from one occasion to another, each time guided by different, invariably shifting relevancies, and attracted by changing and moving targets (Bauman 2007). Living in a continuous state of emergency in which time is dissipated into a series of disparate new beginnings, life must become a life of rapid learning, but also of swift forgetting. In this swarm, causes such as environmentalism or philosophers might be taken up and attract attention, only to almost immediately fall back into insignificance without ever being properly understood as the swarm changes direction.¹⁷

This dissolution of people into the market has produced a new kind of person with an overall trend towards pacification. Marcel Gauchet defined this new person by contrasting them with two previous types, or “ages of personality” (Gauchet 2000). The traditional personality was ordered through the incorporation of collective norms, centrally concerned with honor and the avoidance of shame. Such personalities were characterized by strong identification with the social whole and a very strong capacity for self-determination within the received framework of norms. By contrast, the modern personality acknowledged the factual precedence of the collective, but with freedom of choice. It led to an individual appropriation of the collective dimension and an interiorization of the norm. The dominance of this personality from 1700 to 1900 was the golden age of conscience, responsibility, and concern with duty, failure leading to the experience of guilt. The high point of this reflexive appropriation of the collective was the exercise of citizenship with a strong capacity for independence. The new personality that has since emerged is characterized by the effacement of the structuring of the person through belonging. Such people are unaware that the basis of their being is in the social, and hence have no feeling of obligation or sense

¹⁷ By the time it had been pointed out that deconstructive postmodernists had got Derrida totally wrong (see Vladimir Tasić, *Mathematics and the Roots of Postmodern Thought*), the people who had appropriated jargon from his philosophy had moved on to something else. Much the same thing happened with Foucault.

of debt to their societies, let alone to the thousands of years of development that has produced modern civilization or to future generations of humanity. As Johan Galtung noted:

Post-modern society is basically individualistic and egocentric, low on compelling norms (anomie) and low on social fabric, tissue (atomie), high on egoism and egocentrism, low even on solidarity with people of the same gender, generation, race, class, nation and state, yet being cut through by sexism, ageism, racism, classism, etc (2009).

These people are postmodern, not in the sense that they have rejected the technicist mind-set of modernity and sought to revive and develop suppressed traditions of thought to create a better future, but in the sense that they are disconnected symbolically and cognitively and no longer attempt to situate themselves according to the viewpoint of the whole. What matters is to know “how to flow, no matter how, in the universe of networks. Hence the decline of the goal of elucidation and in the value of truth . . . observed in the changing nature of psychotherapies” in which we see “the reorientation towards managing symptoms and behavioral efficacy” (Gauchet 2000). Unable to identify with others and internalize their values, these people lack moral backbone. There is scarcely any place in this contemporary personality for shame or guilt. As Gauchet noted, “We have striking testimony of this from those working with criminals today. Many of them stress this absence of remorse or of guilt among their patients”¹⁸ (2000). There is also a decay of imagination so that people are no longer able “to imagine or reflect upon the implications and consequences of [their] actions” (Code 2007). Such personalities find it difficult to even conceive a public dimension that interests or should interest everyone, and so the very notion of exercise of citizenship becomes problematic. They are post-human.

16.8 The Corruption of the Public Sphere and Public Institutions

Such people have subverted the public sphere and public institutions. The public sphere is the site of dialogue through which public issues are considered by the public. It is the sphere in which people should develop and test their ideas about the world they are living in, and sources of information should be questioned. The World Wide Web should have strengthened the public sphere. However, people have not only abandoned their civic responsibilities but undermined the very basis for its functioning.

The undermining of the public sphere undermines public institutions, which in turn further undermines the public sphere. This effect is evident in all public institutions, including the institutions of representative government, political parties, the civil service, and legal institutions. Its effect on supposedly radical organizations supposedly representing causes, such as the environment, is particularly pernicious

¹⁸ When such people were a rarity they were known as psychopaths.

since the corruption of these paralyzes opposition to the dominant powers. It is most clearly and fully manifest in educational institutions, and particularly universities. The public sphere does not exist side-by-side with institutions; it is the condition for and permeates such institutions, while institutions, such as universities and more particularly again the arts and science faculties, can and should augment the life of the public sphere.¹⁹ Education as the process by which the culture of a people through which they define reality, themselves, and their place in the world is passed on, developed from one generation to the next, and should be a central concern of the public sphere. In a democracy, where the people themselves are meant to be the governors, they should be educated to be governors. This is the notion of education as *paideia* developed in Ancient Athens, revived as the humanities in the Florentine Renaissance, and inspired the development of the humanities in the nineteenth century. The most important components of such education should be “trans-disciplines,” such as history, geography, human ecology, and philosophy, which can put in perspective all the other disciplines. The undermining of the public sphere makes it impossible to defend and maintain this function of the institutions of education, which come to be looked upon as nothing more than means for personal advancement.

This has made it easier for power elites to transform universities into transnational business corporations and redefine students as customers. As customers, students have swelled the ranks of the business faculties that promise the greatest return on their investments. Along with the new university managers, they have assaulted inquiry that is not brutally utilitarian and technocratic. They have rejected Alfred North Whitehead’s view that “The task of a university is the creation of the future, so far as rational thought, and civilized modes of appreciation, can affect the issue” (Whitehead 1968). Supporting the right of people to have their own values and opinions, they have effectively crippled academics who believed that a major role of the intellectual is, as Edward Said put it, “speaking truth to power” (Said 1994), and freed those with power from moral accountability for their actions.

Some non-utilitarian areas have survived. These provide universities with a veneer of respectability as research institutions supporting the quest for truth, and provide intellectual exercises for elite students; but the areas supported are ultra-specialized with researchers writing only for other specialists in their own fields. These are the scholars who in their own way are as hostile to intellectuals as university managers. They produce a mass of publications that only serve to intimidate the general population and discourage them from making any effort to develop their own understanding of the world.

It is in this environment that the new personality type described by Gauchet has flourished. Without the encumbrance of shame, guilt, or integrity or any sense of belonging or knowledge of history, they embark on courses of education and then careers without any sense of the responsibilities entailed by the positions they occupy. They have followed the path identified by Michel de Montaigne in “On Voluntary Servitude” (published in the 1570s) of abandoning liberty and accepting

¹⁹ The notion of the public sphere was put forward and developed by Jürgen Habermas, first in *The Structural Transformation of the Public Sphere*, and was further developed in later work.

servitude (although having no insight into what they are doing) in order to become petty tyrants (de Montaigne 1998). Their careers advance by following a simple algorithm: ingratiate oneself to more powerful people and undermine the power of people lower down in the hierarchy, especially if they question the powerful to whom one wants to ingratiate oneself. This strategy is more effective when such individuals form cliques based on extra-professional criteria to create little empires that they consolidate by targeting, isolating, and undermining those whom they see as more able and more professional than themselves. The outcome of people acting in this way is the creation of hierarchical structures in which the people who work hardest have the least power and are paid least, and the people who work least have most power and get paid most. In US universities,

tenured and tenure track teachers now make up only 35 % of the workforce, and the number is steadily falling, while senior management is getting bigger and more highly paid. Between 1993 and 2007 management staffs at the University of California increased by 259 %, total employees by 24 %, and fulltime faculty by 1 % (Hedges 2009).

After having being socialized into such structural arrangements this structure is then replicated in other public institutions and in business, where it has come to appear as the natural order of things. As Dmitry Orlov, a Russian who emigrated to USA and discovered astonishing similarities between the Soviet Union and the US (which he pointed out, were mirror images of each other), observed:

At the top, there is a group of highly compensated senior lunch-eaters. They tend to spend all of their time pleasing each other in various ways, big and small. . . . They are obsessive on the subject of money and cultivate a posh country set atmosphere, even if they are just one generation out of the coal mines. Ask them to solve a technical problem and they will politely demur, often taking the opportunity to flash their wit with a self-deprecating joke or two (2008).

The effect on education is to stunt people's intellectual development. As Orlov noted, there were some crucial differences between the US and the Soviet Union. "Public primary and secondary education in the US fails to achieve in 12 years what Soviet schools generally achieved in 8." In fact, "American colleges and universities often fail to achieve in 4 years what Soviet secondary schools achieved in two (9th and 10th grades)." Comparing teaching approaches of US and Russians teachers, he found US teachers inevitably try to prepare students for exams while Russian teachers

. . . tried to teach us to think based on general principles, presenting each topic in the most general terms possible, sometimes even including some background information on how the particular theoretical point was settled and why on earth it was still being presented to us.

This was not simply a matter of defective teachers in the US. When Russian teachers who emigrated to the US attempted to teach American students in the way they had taught in Russia, their approach was resisted.

Most American students found the Russian approach cruel and unusual. They just wanted to know what was going to be on the midterm and the final and were frustrated by the fact that the professor had not given the question any thought.

Orlov's own education had led him to believe that "an educated person is someone free in mind and spirit to explore the universe on their own," but concluded that in the United States, "higher education is rarely about educating people, in the sense of them learning how to learn, and having intellectual freedom to do so. It is most commonly about training: the imparting of temporary, quickly obsolescent skills, not universal knowledge." He finally realized that "American schools fail to educate because that is not their function. . . . The American higher education system succeeds brilliantly at one thing: producing a subservient graduate who has no choice but to join the labor force on the terms dictated by her future corporate masters" (Orlov 2008). Orlov's observations have since been confirmed by studies of American university students. It has been found that most of them learn very little or nothing (Arum and Roksa 2011). Furthermore, an increasing proportion of the population is illiterate. Thirty million Americans cannot read a simple sentence, and almost a third of the population is illiterate or barely literate (Hedges 2009).

Such developments in the US parallel developments in other Anglophone countries. A study in Britain of 10,000 11- and 12-year olds completed in 2005 found that there were "now on average between 2 and 3 years behind where they were 15 years ago" in conceptual development (Crace 2006). In a later study of 14 year olds, they were found to be much worse at answering complex questions than teenagers in the 1970s (BBC News 2008). The education systems of these countries are preparing their young for servitude, having gained complicity from pupils, students, teachers, and academics.

16.9 Prospects for the Future

It would seem from this description of inverted totalitarianism that the corporatocracy are now invulnerable. They have created a culture in which people are intellectually incapable of opposing their rule and governing themselves. The next act in the drama is being played out. From denying the reality of global climate destabilization and global ecological destruction, or claiming that if there are any problems, the best way to deal with these is to promote more economic growth to provide the resources to deal with these as they arise, the corporatocracy and its allies are claiming that they now recognize the problem and are dealing with it. The development of green technology is being touted as the driver for a new phase in the expansion of the economy. Astute university managers of the new business model of the university are vying with each other to capture market share in this new growth industry in sustainability expertise.

There is hope for proponents of ecological civilization, however. The new experts in sustainability will not deal with the problems. As Orlov observed, in the US, as in the SU just before its collapse,

it is . . . quite possible to talk about separate difficulties and singular problems, provided they are kept separate and singular and served up under a patriotic sauce with a dash of optimism on top (Orlov 2008).

The new experts will be products of an education system that regards problems as separate and singular, and will be unable to grapple with a problem that is systemic and requires major transformations affecting all aspects of society. As Chris Hedges observed of ruling elites trained to carry out system management, they will see, “only piecemeal solutions that will satisfy the corporate structure.” The entire focus of the new experts will be on “numbers, profits, and personal advancement.” They will “lack a moral and intellectual core” and believe that “[t]he democratic system . . . is a secondary product of the free market—which they [will] slavishly serve” (Hedges 2009).

No amount of optimism or deconstruction is going to make the reality of ecological destruction, or other problems generated by the rule of the corporatocracy, go away, and one crisis after another will discredit the new transnational class of rulers and their palliative solutions. With each crisis, the radical environmentalists are advancing their ideas and their appeal and attracting greater support, particularly among young people, many of whom are also reacting against the nihilism of deconstructive postmodernism and searching for genuine comprehension of reality. There is also more support coming from the elite members of the corporatocracy. The potential of these people is amplified by the development of new media, such as the Internet, which has made it far easier for people who are interested to find out what is really going on in the world.

Furthermore, the social order driving us to disaster looked decidedly sick even before the 2008 financial crash. While the corporatocracy is transnational, it operates largely through its control of the institutions and military might of the US government. Johan Galtung, who predicted that the Soviet Union would collapse in 10 years, nine and a half years before it did, predicted in 2000 that the US Empire would collapse in 2025. He reduced this estimate to 2020 after George Bush Jr. was elected president, and in a recent book, *The Fall of the US Empire*, stood by this prediction (Galtung 2009). While he believes that there could be a fascist coup in the US before this, he is optimistic that there will be a relatively smooth transition to a post-imperial republic. That is, the American people will regain control over their institutions of government.

Orlov also believes that the US empire will collapse, but he sees this as the kind of collapse that occurred in the Soviet Union. Just as the US closed the jail gap and the missile gap, it will close the collapse gap. The parallels are inescapable. “Let us not even try to imagine that this will just blow over” he proclaimed. “Make no mistake about it: this soup will be served, and it will not be tasty!” (Orlov 2008). Orlov, who has paid more attention to environmental factors than Galtung, believes that the collapse will be even worse than in the Soviet Union because Americans are more dependent on the functioning of the existing economic system that is totally dependent on oil, and they are less prepared to build something new in its place. As he noted, “A lot of the people, who just waddle to and from their cars, seem unprepared for what is coming next. If they suddenly had to start living like Russians they would blow out their knees” (Orlov 2008). The collapse of the US will destabilize the entire world system.

It is in this more chaotic world that the genuine environmentalists with their commitment to life, truth, justice, community, and civilization, inspired by a philosophy aligned with ecology that enables them to appreciate the meaning of life and the complexity of the world and provides them with a vision of a future ecological civilization to aspire to, will have an advantage over the senior lunch eaters, neo-classical economists, ultra-specialists, petty tyrants, and fake environmentalists. With the benefit of new media, they will be able to take the initiative in this crisis and mobilize people by reorienting them around the new grand narrative of creating an ecological civilization. By this time, more and more members of the ruling class will have become disaffected with the destruction being wrought on culture, humanity, and nature, and more and more young people will have faced up to the dismal future being bequeathed to them. They will align themselves with the radical environmentalists and embrace their defense of civilization.

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Chapter 17

Epilogue: The End of the Arctic as We Know It

Robert Harriss

Abstract The word *unaami* from the Alaskan Native Yup'ik language translates broadly to “tomorrow” and is commonly used with a connotation of change. There is no question that Arctic environments are changing, and not just the climate. There are a host of cultural, ecological, and economic factors that are also transitioning to unknown futures. Two powerful change-agents, climate change and culture-shift are a reality and challenge to the traditional communities in the high northern latitudes. This epilogue briefly explores how circumpolar Inuit communities are responding to this “double whammy.”

What we anticipate seldom occurs; what we least expect generally happens.
Benjamin Disraeli, British prime minister (1891)

Everything is provisional at this frontier of the oncoming twenty-first century climate change. Indigenous people in the circumpolar north are now confronted with situations that Thomas Berry creatively described as a time between stories.

We are in trouble now because we do not have a good story. The old story sustained us for a long period of time. It consecrated suffering, integrated knowledge, and guided education. It provided a context in which life could function in a meaningful manner (2012).

Aqqaluk Lyngé, chair of the Inuit Circumpolar Council, said in a lecture at Dartmouth College, “Traditionally, we care about the environment because we live off the land,” adding that the Inuit are the “guardians of the Arctic.” He also noted that arctic environments are “silently changing,” and the Inuits are facing a conflicting desire between combating climate change and sustaining traditional cultures versus embracing the potential for economic growth through commercial developments (Lyngé 2012).

To most of the global populous, the Arctic represents one of the most desolate and sparsely populated areas in the world with few economic opportunities and a hostile climate. Yet in one generation, the foundations for all living systems in the Arctic are transforming in all likelihood as a response to a global climate change that is driven by the actions of seven billion humans living south of the Arctic Circle. Shocks to one part of an arctic social-ecological community often ripple through and affect seemingly unrelated other parts of the system.

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In addition to climate change, Inuit populations are experiencing an invasion of people from the south that are seeking wealth from the extraction of natural resources. Like the previous gold rush days and the Prudhoe Bay oil and gas boom, a transformation of the Inuit economies and cultures may be reshaped by finite sources of wealth and with little attention to the long-term sustainability of the landscape and its permanent residents.

The Alaska Native Claims Settlement Act (ANCSA), enacted by the United States Congress in 1971, resulted in many Alaska Natives seeing it as an encroachment on their subsistence rights and traditional knowledge (Ristroph 2010). The federally recognized Alaskan tribes value subsistence foods gathered through hunting, fishing, and harvesting edible foods from nature as a fundamental part of their culture. Alaskan Native culture has traditionally been based on communal sharing of subsistence foods to satisfy individual and community needs. Climate change now threatens the availability and safety of subsistence foods, the costs and risks of subsistence activities, and the ecological processes on which subsistence living depends. While there are federal and state programs dedicated to environmental and health impacts related to climate change, there is little likelihood that the Alaskan Natives will be able to continue their traditional cultures and subsistence lifestyles (Ristroph 2010).

The warming of the Arctic and reductions in the extent and thickness of sea ice is accelerating access to the exploitation of offshore oil and natural gas resources, ice-free shipping lanes, nature tourism, and other commercial opportunities that have been previously restricted by harsh environmental conditions. A manifestation of this increasingly open access is an accelerating international scramble for economic profits (Borgerson 2008; Howard 2009). This social, economic, and geopolitical transformation of the Arctic, combined with the expected continuation of climate warming, is Act I of the emerging age of the Anthropocene.

17.1 Arctic Amplification of Climate Change

Understanding the basis for arctic amplification of climate change is important to grasping the complexity and the inevitable uncertainties associated with future culture-change. The arctic amplification concept is based on observations that temperature variability and trends in the Arctic tend to be larger than trends and variability for the Northern Hemisphere or the earth as a whole. This concept has to do with interacting factors that are unique to the arctic environments and involve feedbacks between sea ice, snow, water vapor, and clouds. As the area warms in response to climate change, melting ice and snow allow exposed land and water to absorb more of the Sun's heat, which melts more ice and snow, and so on. A relatively small amount of initial warming can be greatly magnified by positive feedbacks in arctic environments.

Sea ice has a high albedo that reflects approximately 80 % of the sunlight landing on ice back into space. As sea ice melts in the summer, a darker ocean surface absorbs approximately 90 % of the sunlight. The warming of the ocean further accelerates sea ice melting and warms the marine and coastal atmospheric boundary layer. In combination, these processes accelerate the decline of sea ice, warming of

the atmosphere, and the thawing of frozen soils and sediments. In addition, preliminary evidence suggests that the expanding area of ice-free ocean has resulted in an increase of marine storms that have dramatically increased coastal erosion. The US Arctic Research Commission stated “Change in the Arctic may play a substantial role in climate change throughout the globe. Yet, the Arctic remains one of the least explored, studied, and understood places on earth.”

The arctic amplification concept was suspected early in the development of global climate models by Manabe and Stouffer (1980). Several recent publications provide comprehensive overviews of the current scientific evidence for the arctic amplification concept and its role and consequences in initiating current and future transitions in arctic environments (Serreze et al. 2009; Miller et al. 2010). A comprehensive review by Serreze and Barry (2011) concluded that “periods of arctic amplification are evident from the analysis of both warm and cool periods over at least the past three million years. It may become stronger in coming decades, invoking changes in atmospheric circulation, vegetation, and carbon cycle, with impacts both within and beyond the Arctic.” The authors of this book have anticipated this future spread of the “double whammy” climate change and culture-shift and provided scenarios to stimulate our interest in anticipatory planning.

17.2 Culture-Shift

Culture-shift is accelerated by the need to adapt or die when confronted by climate change. Arctic coastal communities are experiencing the impacts of an increasing number of severe ocean storm landfalls, which are stimulated in part by warmer waters and changes in atmospheric conditions (ACIA 2004). Coastal erosion is a growing problem as reductions in sea ice increase the number of storm surges generated and making landfall on exposed shorelines. Communities and industrial facilities in coastal zones vulnerable to storm surge are already threatened or being forced to relocate, while others face increasing risks and mitigation costs (ACIA 2004).

Circumpolar arctic communities are also beginning to experience the thawing of permafrost that will disrupt transportation, buildings, and other infrastructures (Lantuit et al. 2011; Romanovsky et al. 2010; AMAP 2011). An increasing number of existing buildings, roads, pipelines, airports, and industrial facilities are likely to be destabilized, requiring substantial rebuilding, maintenance, and investment. Transportation and industry on land, including oil and gas extraction and forestry, have been increasingly disrupted by the shortening of the periods during which ice roads and tundra are frozen sufficiently to permit travel. Future development will require new design elements and increased investments to adapt to an ongoing warming.

Warming temperatures and environmental changes like those mentioned above make living on both the tundra and boreal forest regions more dangerous and complicated. Nicole Herman-Mercer and Paul F. Schuster, researchers from the U.S. Geological Survey, along with Karonhiakt'tie Bryan Maracle of the Council of

Athabaskan Tribal Governments in Fort Yukon, have interviewed residents in outlying Yup'ik villages in the Yukon Delta, Alaska, to understand how their lives have been affected by current environmental changes (Herman-Mercer et al. 2011). Like most of the villages in the delta, the population is made up of Alaskan Natives who live a subsistence-based lifestyle. All of the subjects interviewed remarked that the weather has been warmer in recent years, most notably in the winter. Previously winter temperatures commonly fell to -40°F (-40°C) for days. Now if they sink that low, it is for shorter periods of time. The weather also has become less predictable as well as more dangerous.

The Yup'iks also noted that previously they believed they could accurately predict the weather sometimes a week in advance by looking at the moon, but they cannot do so any longer with any reliability. This makes it more likely hunters would be caught out on the tundra when the weather changes for the worse, particularly in dark winter days. They also noted a decrease in precipitation, especially snow. Frozen rivers are the highways that link communities in the winter. The ice is now almost half as thick as they remember it, making travel more difficult and considerably more dangerous. The rivers also contain much less driftwood, used by the villagers for heating. The growing need for expensive commercial fuels threatens the economics of subsistence living on the tundra.

17.3 Arctic Anarchy or Panarchy?

The Inuit have lived in the Arctic region for thousands of years. In what must seem to be an instant, their relatively isolated world is becoming a source of global news and geopolitical discussions and debates. There are many different visions of the Arctic as a resource frontier, global commons, strategic zone, and last great wilderness in the Northern Hemisphere. Attempts to define the Arctic now and in the future are inherently complex, and outcomes could easily trend towards anarchy or panarchy (Westley et al. 2002). Panarchy is an integrative theory to help us understand the source and role of change in adaptive systems (Gunderson and Holling 2002). Such changes comprise economic, ecological, and social systems, and they are evolutionary. They concern rapidly unfolding processes and slowly changing ones; gradual change and episodic change; and they take place and interact at many scales from local to global. Numerous scenarios of arctic futures, especially those conceived by geopolitical experts, environmental scientists, and commercial interests, are wide ranging and most typically emphasize extreme doom-or-boom outcomes (Anderson 2009; Sale and Potapov 2010; Emmerson 2010).

In 2008, for the first time in the Arctic's modern history, two major navigable routes opened to both commercial and personal sea travel—the Northwest Passage along the Canadian and Alaskan coasts and the Northeast Passage that Russians usually refer to as the Northern sea route (O'Rourke 2012). For a few weeks that late summer, commercial shipping could circumnavigate the North Pole without being trapped between massive sheets of ice and the shores of northern Siberia or

the Canadian archipelago. Summer ice-free coastal ocean conditions are expected to result in an international competition for onshore and offshore natural resources, increasing use of commercial maritime passages, and the intrusion of the modern world into the homeland of the Inuit and other indigenous peoples of the Arctic.

Distance savings of up to 50 % are possible on important shipping trade routes between nations bordering the northern Atlantic and Pacific Oceans (Arctic Marine Shipping Assessment 2009 Report 2009). A container ship sailing from Western Europe to Japan, for example, could save several thousand miles by using a polar route instead of the Suez Canal.

Offshore oil and natural gas resources are of great interest to Arctic nations and international energy companies. The precise quantities of these resources remain unknown. However, a study conducted in 2008 by the United States Geological Survey (USGS) suggests the Arctic may contain approximately 13 % of the global mean estimate of undiscovered oil, which is approximately 618 billion barrels of oil (BBO). The North American side of the Arctic is estimated to have about 65 % of the undiscovered Arctic oil, but only 26 % of the undiscovered natural gas (Arctic Marine Shipping Assessment 2009 Report 2009; U.S. Geological Survey 2008; Gautier 2009).

A currently unknown fraction of oil, gas, and mineral resources in the Arctic Basin will be in international waters. An agreement by the Arctic states in 2008 to resolve their disputes through the United Nations Convention on the Law of the Sea (UNCLOS) framework suggests that the overlapping boundary issues will be settled amicably, although it is likely that they will take some time to be finalized. The United States is the only Arctic nation that has not signed on to the UNCLOS framework (O'Rourke 2012).

Further issues raised by energy analysts relate to the likely efforts of Japan, South Korea, and China to gain access to Arctic oil and gas. These non-Arctic nations are making attempts to gain status in both geopolitical venues and through joint commercial agreements with Arctic nations. China, in particular, has been very active in advancing its interests at the multilateral and bilateral level. President Hu acknowledged that the Arctic is mainly a regional issue but said that it is also an inter-regional issue due to the international issues associated with climate change and international shipping (Hong 2012).

Oran Young, a highly respected expert on arctic governance issues, has recently analyzed the Arctic through the lens of a transforming socio-ecological system that is likely to cross one or more thresholds leading to non-linear developments and eventuating in an irreversible state change. He notes that the evolving Arctic region is characterized by high levels of uncertainty and conventional forms of risk assessment and procedures for spreading risks (e.g., private sector insurance and re-insurance) will not suffice to deal effectively with the many challenges. He concludes that there is a compelling case for engagement on the part of the public sector in three areas:

1. by operating early warning systems,
2. by developing contingency plans regarding how to respond to a range of possible emergencies, and
3. by creating disaster relief capabilities that can be deployed quickly in case of need.

Young suggests that successful implementation in these areas would be a step towards enhanced regional resilience and adaptive capacity that would favor an outcome of panarchy rather than anarchy (Young 2012).

17.4 Arctic Climate Change and Culture-Shift as Post-Normal Science

Anticipating the double whammy of climate change and culture-shift can be considered a topic of post-normal science in the sense that facts and values are no longer clearly separated (Hulme 2007, 2009, 2010a, b, c, 2012). A very important perspective on climate change is *Why We Disagree About Climate Change*, authored by Professor Mike Hulme at the University of East Anglia (2009). The book is a widely discussed and important contribution to the discourse surrounding climate science, policy, culture, and politics. Hulme notes that decisions and actions on climate change will be neither made nor implemented without a sustained engagement of political and public leaders. He notes that the most important question for every individual is what will climate change mean for the people and things I care about?

For the indigenous people living in the Arctic, the recent changes in climate, weather, and most poignantly, the ice has greatly diminished their horizon of certainty and reality within which they sustain their life course. Knowing about homelands is an all-pervading, life-giving force connecting a person with the rhythms of their universe, and integrating the self with the natural world (Nuttall 2009). This is a quintessential example of the double whammy in action.

Aqqaluk Lyngé, Chair of the Inuit Circumpolar Council (ICC), addressed the Royal Scottish Geographical Society:

When you think of Greenland, you likely think of glaciers and icebergs, and more generally, of ice. I hope that after this talk you will also think of my people and our intimate relationship with the ice. In the Inuit language, we use the word *sila* for ice. But *sila* also means much more than ice. It also means weather, climate, environment, sky, and indeed, the universe. So when Inuit experience changes in the ice, as we are now due to the first effects of climate change, this is more than “just” a change in ice conditions and climate, it is a change in our basic environment and indeed, our universe (Lyngé 2009).

Earth scientists have tried to make the task of understanding climate change simple with the use of global temperature trends in simple graphic formats, videos of pulsating Arctic sea ice based on satellite images, and future climate scenarios portrayed in color coded yellow and red maps. These products of science remain too abstract and feeble to reach broad audiences. Social and cultural scholars often communicate in academic language about ambiguities and emotional responses that reflect human frailties arising from overwhelming environmental change. These efforts also connect with a relatively small audience of devoted scholars and environmentalists.

We need a new narrative about climate change and sustainability—about our appropriation of the environment as a human prosthetic for sustaining the familiar. Social and technological advancement has come to a point where it is no longer

possible to understand the Earth as independent of human influence, hence the Anthropocene has arrived (Ehkers and Kraft 2006). After more than 12,000 years of agricultural development, 200 years of intense industrialization, exponential global population growth, and a new trend to massive urbanization, the human fingerprint is everywhere, on the land surface, in the atmosphere, and in the melting of Arctic sea ice.

The multidimensionality of global sustainability and climate includes issues of poverty, energy security, culture change, climate change, urbanization, armed conflicts, and many other factors. There can be no silver bullet to solve everything at once. Hulme questions whether climate change should be thought of as a problem at all. He suggests

We can use the idea of climate change—the matrix of ecological functions, power relationships, cultural discourses, and material flows that climate change reveals—to rethink how we take forward our political, social, economic, and personal projects over the decades to come.

Adopting this approach accepts the notions that “we must now accept climate change operating as an overlying, but more fluid, imaginative condition of human condition,” and “at least recognize that the sources of our disagreement about climate change lie deep within us, in our values and in our sense of identity and purpose” (Hulme 2009). Future pathways to sustainability at human scales will inevitably require balancing complex tradeoffs between tradition, identity, and change.

17.5 Winners and Losers

Gro Harlem Brundtland, currently serving as a Special Envoy on Climate Change for the United Nations Secretary-General Ban Ki-moon, advocated “serious and strict regulation” and avoidance of a *laissez-faire* attitude towards climate change in keynote speech at the recent International Polar Year 2012 review in Montreal. She also expressed a level of impatience with the pace of global activity to mitigate climate change, pointing out that, although we are now 20 years out from the Rio declaration, not much has changed (Peritz 2012).

The beginning of the twenty-first century finds arctic regions experiencing the “double whammy” due to at least six factors: the current unpredictability of land, ocean, and atmospheric changes related to climate change; threats to the traditional cultures of indigenous populations; economic dependencies on finite energy and mining resources; unsettled issues of international law and rights of coastal states; the role and concerns of domestic and international audiences with sovereignty issues; and the inability of global institutions to reach a consensus on climate change issues (O’Rourke 2012).

For the Inuit peoples of the Arctic, there is a clear realization that their homelands are under stress with receding sea ice, eroding glaciers, accumulating pollution, declining wildlife, and diminished wilderness. Coastal Alaska villagers have become climate refugees, retreating from the threats posed by melting of permafrost, unprecedented storm surges, and coastal erosion. The critical challenges ahead for

numerous subsistence communities in the circumpolar Arctic include preserving human dignity and cultural foundations while being confronted by environmental threats, uncertainties, and risks generated locally and from afar.

As Arctic nations encourage the exploitation of national and international natural resources, public expectations for benefits will rise. It remains to be seen how populations in each country will benefit from future oil, natural gas, and mining projects. The finite character of oil, gas, and mineral resources will raise issues known as the resource curse. Who will be the winners and losers when the resource-based bonanzas end?

The globalization of economies and societies has increased the frequency of “concatenated crises,” disturbances, or shocks that often emerge simultaneously, spread rapidly and interact with each other across the globe. Will climate change and culture-shift lead to a supercharged era of complex concatenated crises? Perhaps not, if local and regional scale decision-making incorporates broader segments of the informed and committed public in a discussion on community experiences, hopes, and aspirations. Youth, for example, have their own set of experiences and values that are important for consideration as the community imagines evolving into a new climate and culture. This would have the added benefit of promoting social learning, an important component of resilience and adaptability, in the continuous dialogue and deliberations necessary to identifying problems and creating solutions.

As for nature and climate change, it will always be moving and evolving. The key understanding about the future of nature is that there must be surrounding places where the species are interacting in an ecosystem that was not mostly engineered by humans—those places that can become future “wild places.” The thing to remember is that those places are going to change dramatically in the next century, and the species and interactions in them will be in a large part different. That doesn’t mean that nature will have disappeared. Nature will only disappear if we don’t have places where those natural interactions no longer exist (Barnosky 2009; Davis et al. 2009).

The confusion and disagreements that accompany discussions of sustainability often relate to the quality to be sustained. Here we have focused on the climate and culture-change threats that most obviously create vulnerable conditions for Arctic indigenous populations and their surrounding environments. We may see the emergence of resilient and adaptive strategies developed by indigenous peoples that sustain a clear connection to their lands and waters and retain links to their history and culture. However, environmental histories offer little cause for optimism (Barnosky 2009). Knowing our past failures has not prevented us from repeating them.

17.6 Will Rapid Climate Change in the Arctic Lead to Geoengineering the Earth’s Climate?

The Anthropocene era is characterized by unprecedented rates of change in the Earth’s climate, biosphere, and human settlements. Climate change and rapid rates of urbanization in most regions of the planet are well documented contemporary trends.

The future outcomes and evolving responses to these global trends are fraught with risks and uncertainties.

Earth history is characterized by dramatic environmental changes recorded in the geological records. The primary distinction between the present era climate change and the geological past is the dominant role of human agency in the combustion of fossil fuels. Social and political transitions and challenges dominate citizen attention as affluent democracies of North America, Europe, Russia, and Japan contemplate their faltering economies, aging populations, and ebbing geopolitical influence. China, India, Brazil, and other countries with growing economies and populations are now focused on gaining the status of global economic and political leaders rather than striving for moderation of their fossil fuel energy use. Current evidence suggests that breaking the world's fossil-fuel addiction will be unlikely for decades (Davis et al. 2009).

Human societies are now a significant factor in determining future climates—physically and politically. Predictions are that the summer Arctic sea ice will continue to shrink in the years ahead, and in so doing, it will significantly increase the amount of solar energy that the darker ice-free Arctic Ocean regions absorb from the sun. This positive feedback loop further accelerates climate change and unexpected changes in weather patterns.

Geoengineering of the Earth is increasingly of interest to groups across the political spectrum. It can be attractive to climate skeptics, since it reduces interest in taking action now. On the other hand, geoengineering is also of interest to environmentalists as a means of averting catastrophic climate change, since time is running out to reduce the growth of greenhouse gas emissions. Geoengineering might also prove attractive to politicians because it allows them to avoid making difficult decisions now.

A variety of geoengineering approaches to counteract the effects of a global warming are being designed and debated, including techniques to limit how much sunlight reaches the earth (usually referred to as “solar radiation management,” as well techniques to remove carbon dioxide from the atmosphere “carbon dioxide removal” (Bodansky 2011). Calls for more research on geoengineering are sensible to understand whether these techniques could work, and if so, to what extent and with what side effects.

Unfortunately, there is no precedence for how to set up a form of governance for such geoengineering efforts that would be both enduring and equitable. A Royal Society analysis of geoengineering raised the very important issue of a moral hazard arising from diverting attention from more traditional and benign climate change mitigation and adaptation solutions (The Royal Society 2009).

Scenarios that include the rapid expansion of natural gas technologies with carbon dioxide capture and sequestration and/or renewable energy technologies may prove to provide the most benign and effective technical solutions (Hoffert et al. 2002; Jacobson 2009; Delucchi and Jacobson 2011; Lu et al. 2009; GEA 2012). A primary concern for the future of humanity is that currently powerful political and financial institutions will not change investment strategies in time to avoid a world of disruptions.

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