Ethno-ornithology

Birds, Indigenous Peoples, Culture and Society

Edited by
Sonia Tidemann
and
Andrew Gosler

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Foreword

Eugene S. Hunn

What is ethno-ornithology? The essays in this volume should provide some answers. It has to do with the study of birds, of course, and the ethno- prefix calls to mind ethnology, ethnography and all things ethnic – that is, having to do with the diverse peoples of the Earth. It is, as is the better-known field of ethnobotany, a particular aspect of *ethnoscience*, implying if not asserting that science is not the sole prerogative of those in white lab coats at the controls of expensive high-tech experimental machinery. Rather, science is something we all do, each in our own way, using eyes, ears and brain to make some sense of things.

Ethno-ornithology explores how peoples of various times and places seek to understand the lives of the birds around them. As the chapters here show, we humans recognize a diversity of kinds of birds, giving each a name, often a name descriptive of the birds' voices, colours, actions or haunts. Professional ornithologists have discovered that they share with unschooled hunters and farmers a common appreciation of the beauty and fascination of birds and that they also share a common language of equivalent bird names with which to compare their ornithological observations.

The present contributors are a varied lot: anthropologists, linguists, biologists of several stripes, geographers, historians, folklorists, curators, activists and indigenous scholars. They are at home in Europe, North and Central America, East Africa, India, and from Indonesia through Melanesia to New Zealand and Australia. Their ornithological evidence is drawn from all these places and more. These scholars share not only their fascination with birds but also their dedication to bird conservation. They are convinced that this goal is best achieved through close and respectful collaboration of 'scientists' (commonly construed as university-trained professionals) with indigenous peoples and rural residents, whose lives and livelihoods are most directly linked to the fates of local avifaunas.

These essays make clear that 'Western' or 'modern' science offers only a partial truth, however precise and sophisticated the methods employed. Ethnoscience can provide a fresh perspective, a sort of binocular vision, of what birds mean for us humans: by virtue of the intimate and multigenerational connections established with a local avifauna by communities rooted in local landscapes and by virtue of the often radically different ontological understandings that inform such a community's appreciation of the lives of birds – that is, the local *worldview* or *cosmovisión*. Birds are not just feathered self-replicating machines, but sentient beings that may speak to us (if we are ready to listen) and that demand our respect.

One thread weaves throughout these chapters: how can we work together to preserve the wonderful diversity of the world's birds? Indigenous peoples in the past have been implicated in a wave of avian extinctions across the Pacific Islands, as the evidence from New Zealand to Hawai'i attests. Likewise, Euro-American colonists left a trail of destruction in their wake. Consider the poignant story of New Zealand's striking and exotic *huia*, which survived the extinction of the *moas* at the hands of the Polynesian colonists to become the object of worshipful care by the latter-day Māori, only to fall victim to the European travellers' passion for museum specimens.

The authors seek not to lay blame for past offences against our bird neighbours, but rather to find ways to work together for the preservation not only of the world's birds, but also of a moral community that binds together peoples of all nations and birds of all colours.

Preface

The impetus for creating this book arose from the discourse of a group of enthusiastic ornithologists who work not only within the framework of Western-style research, but also have experience in, and knowledge of, indigenous ornithology. At the 24th International Ornithological Congress, Hamburg, in July 2006, Sonia Tidemann had the honour of being the only participant from Australia to have a round-table discussion (RTD) accepted; but that RTD was the first on indigenous ornithological knowledge to have ever been held at an international ornithological congress. Participants requested that Sonia and Andrew Gosler combine their editorial expertise to produce a book to ensure that the diverse knowledge and approaches that emerged could be disseminated more widely, as well as preserved for future generations.

This is the first edited collection to bring together indigenous ornithological work from a number of different countries, as well as from an indigenous perspective and knowledge base. Through a series of studies from various parts of the world, this book deals with the relationships between birds and people; birds and language; collaboration between indigenous communities and others to protect birds; integrating indigenous knowledge within the management of threatened species; using knowledge to change attitudes; bird products as currency; hunting practices; and how birds are linked with land, life and everyday culture. It combines the work of ornithologists, linguists, conservationists and anthropologists who are, themselves, immersed in indigenous knowledge, working from an indigenous perspective and with indigenous peoples. We aim to present indigenous knowledge itself rather than a commentary on, or comparison with, Western and indigenous viewpoints. However, particularly in considering the conservation significance of indigenous knowledge, it is inevitable that some commentary and comparison will arise because of the dominance of the Western framework in international bird conservation.

An African proverb states that when a knowledgeable old person dies, a whole library disappears. In that light, this book presents knowledge that is new because it has not previously been captured or reported by indigenous peoples in English. It enhances engagement with some of the intangible dimensions and wider social aspects of indigenous ornithological knowledge so that they are not subsumed by mainstream agendas. The book also provides practical advice for professionals, demonstrating the relationship between mutual respect, local participation and the building of partnerships for research, as well as the resolution of joint problems. It identifies techniques that can be transferred to different regions, situations, environments and collections. It identifies practices suitable for investigation, adaptation and improvement of knowledge exchange and collection so that there is a building of a sustainable future and holism of indigenous research and documentation practices in the field of ornithology, in particular.

The book would not have been possible without the vision and guidance of our publisher Tim Hardwick at Earthscan. We owe much to him, and to Claire Lamont, for their encouragement and the quality of the finished product. We are also particularly grateful to Mark Simon and Ian Sherman for their valuable publishing advice at key points in the project, and to our sponsors: Batchelor Institute of Indigenous Tertiary Education; BirdLife International; British Ornithologists' Union; British Ornithologists' Club; Edward Grey Institute of Field Ornithology, Oxford University; and the Institute of Human Sciences, School of Anthropology, Oxford University.

Indigenous knowledge that embraces ornithology takes in whole social dimensions that are interlinked with environmental ethos, conservation and management for sustainability. The book is a global collection of indigenous ornithological knowledge from the 'inside', rather than an attempt to fit the content, approaches and messages into Western frameworks, and we hope you find it enriching.

Sonia Tidemann and Andrew Gosler
January 2010

Contributors

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Abbreviations

ACP	Panama Canal Authority
APCB	Assosiasi Pelestari Curik Bali (Bali Starling Association)
BCE	before the Christian Era
BP	before present
CE	Christian Era
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMP	Central-Malayo-Polynesian
COICA	Coordinating Body of Indigenous Organizations of the Amazon Basin
DDT	dichlorodiphenyltrichloroethane
DoC	Department of Conservation (New Zealand)
EBA	Endemic Bird Area
FRST	Foundation for Research, Science and Technology
g	gram
ha	hectare
IBA	Important Bird Area
IUCN	World Conservation Union
KENRIK	Kenya Resource Centre for Indigenous Knowledge
km	kilometre
LEK	local ecological knowledge
m	metre
NGO	non-governmental organization
NZ	New Zealand
ON	onomatopoeic name
PBI	Pelestari Burung Indonesian (Indonesian Ornithological Society)
pM	Proto-Mayan
PNG	Papua New Guinea
RMA	Resource Management Act (New Zealand)
RSPB	Royal Society for the Protection of Birds
RTD	round-table discussion
SEK	scientific ecological knowledge
SSSR	Scientific Species Recognition Ratio
TEK	traditional ecological knowledge
TK	traditional knowledge
UK	United Kingdom

UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USAID	US Agency for International Development
WCS	Wildlife Conservation Society
WMP	Western-Malayo-Polynesian
WWF	World Wide Fund for Nature (*formerly* the World Wildlife Fund)

Part I

Introduction

1

Indigenous Knowledges, Birds that Have 'Spoken' and Science

Sonia Tidemann, Sharon Chirgwin and J. Ross Sinclair

Knowledges and ethno-ornithology

The accumulated knowledge of indigenous peoples has enabled them to survive and flourish in some of the most difficult environments of the world, and to develop rich and diverse cultures that describe quite different relationships with their surroundings from those of most Western cultures. In order to understand and appreciate indigenous perspectives on creatures such as birds, it is necessary first to review how indigenous peoples view the world, and how their knowledge is produced, owned and recorded (Medin and Atran, 1999).

Indigenous peoples have been accumulating knowledge for many generations about their interactions with the physical and spiritual world through processes of conceiving, considering and experimenting (Arbon, 2008; Trafzer et al, 2008). Typically, the knowledge that results from these processes is unique to the particular indigenous group and the specific geographical location. Accordingly, there is no one homogeneous body of indigenous knowledge; neither are there globally recognizable methods of categorizing, as there are for the Western disciplines. It is therefore not surprising that some researchers describe what is known by indigenous peoples as *local knowledges* (Briggs et al, 2006).

What indigenous peoples know about the world, and the place of people in it, forms a broad understanding of existence that is intertwined with spirituality, language and the environment. Indigenous knowledge is therefore variously described by Western scholars as holistic (Christie, 2006), utilitarian and grounded (Briggs et al, 2006), but by indigenous peoples themselves as 'a living, breathing concept' (Whap, 2001) that is relational, pluralistic and infinite (Malloch, 1989; Little Bear, 2000; Shiva, 2000). Irrespective of how it is described, the central tenet of indigenous knowledge is connectivity, where all elements may be infused with spirit and where human life is not superior to other elements (Johnson, 1992). The place of spirituality in 'other knowledges' may be hard for the Western mind to grasp; but it is a dominant feature of many indigenous cultures. From the indigenous perspective, it is the Western way that misses this: the Western culture is the only culture in the world – perhaps the only culture that the world has ever known – that argues for the non-existence of any dimension or reality which the senses cannot perceive. Accordingly, every alternative to scientific, sensorial reality is rendered as metaphor (Lehman, 2008).

Indigenous knowledge is passed to successive generations by cultural transmission (Berkes, 1999). Symbols and totems, art, song, ritual ceremonies and dance (Janke, 2005) may be used, or in a more prosaic setting a young weaver or hunter or gardener may learn by working with older people. There may be chosen 'keepers' who have the responsibility to both safeguard and transmit portions of the knowledge to future generations (Bell et al, 2007), or particular forms of knowledge that belong to a specific demographic within the group such as one sex or a particular family (Bourke, 1997; Whap, 2001).

Over the last three decades there has gradually been wider and better understanding and appreciation of the indigenous perspective and indigenous knowledge. This has occurred as more and more indigenous scholars have taken their place in academia and presented their ontological and epistemological stance using the medium that Western scholars understand, and as some Western scholars have developed a more nuanced approach to studying indigenous knowledge. Many indigenous scholars have argued strongly for the parallel status of their knowledge in academia (Raseroka, 2008). They argue for their form of knowledge, which represents many different ways of making sense of the world, to be extended alongside that of existing Western knowledge (Tuhiwai Smith, 1999).

There is also an argument for the improved status of the methodologies used in the collection and interpretation of knowledge. Some indigenous researchers feel that, at best, certain methodologies favoured in the collection and interpretation of indigenous knowledge have had little acceptance by Western academics as authentic research tools (Lekolo, 2007). The methodologies of narrative and storytelling are two of these, and have revealed a lot of the knowledge about birds presented in this book. Narrative has, however, gradually found a place in a plethora of Western disciplines in many diverse forms, and has been identified as a methodology that enables individuals to claim identity (Reissman, 2008). While Western minds may have issues with validation in both narration and storytelling, from the indigenous perspective it is the relationship between the researcher and the narrator who claims to have the right to narrate, the authorship of stories and the intelligibility of the work that are important considerations (Lekolo, 2007).

In applying a Western perspective to indigenous knowledge, it has been compartmentalized and disconnected from the history and culture of which it is part (Sillitoe, 1998; Ellis and West, 2004). Although the antithesis of the indigenous worldview, this process has contributed to the understanding of indigenous knowledge with terms such as ethno-ecology, ethnobotany, ethno-ornithology, indigenous knowledge and traditional ecological knowledge (TEK), now commonplace and useful constructs, particularly for those brought up in the Western paradigm. These terms also provide a useful base and starting point in the dialogue between indigenous and Western bodies of knowledge.

Birds that have 'spoken' and science

The focus of this book is *ethno-ornithology*. Ethno-ornithology is a Western term, although, as a concept, it is embraced by many cultures across the world. It is more than ornithology or just 'the study of' birds in cultures: it is all that, but it is also more. Portrayals of birds through art, patterns of utilization, language, life from creation to death, bearers of messages and interactions in everyday life are all examples of ethno-ornithology. As a term, ethno-ornithology is useful because it refers broadly to the complex of inter-relationships between birds, humans and all other living and non-living things, whether in terrestrial or extra-terrestrial spheres or in body or in spirit.

Too often, ethno-ornithological knowledge is reported from the perspective of an outsider and therefore appears to be in some way devalued. The terms *legends*, *fables*, *tales*, *myths* and *stories* are frequently used for indigenous knowledge, but not always in a way that engenders respect or an understanding of the place of birds in cultures. As an example, del Hoyo et al (1992) report that Cassowaries *Casuarius* spp. of the island of New Guinea are of 'great ritual and mystical significance. They appear in numerous legends and tribal tales and many strange beliefs are held about them.'

The importance of birds in non-Western cultures is all too frequently ignored in even the most comprehensive of Western texts. For example, in Australia, the Emu *Dromaius novaehollandiae*, a large, iconic flightless bird, can be found across about three-quarters of the continent. Despite there being dozens of published accounts of Emus from over 40 Aboriginal languages, not a single mention of Emus from an Aboriginal perspective occurs in the authoritative *Handbook of the Birds of the World* (edited by del Hoyo et al, 1992–2008).

This book will have succeeded if it does nothing more than raise awareness of alternative bodies of ornithological knowledge. This introductory chapter looks at indigenous knowledge and ethno-ornithological knowledge. It examines portrayals of birds from an historical perspective and uses this platform to introduce the chapters in Part II. Chapters 2 and 3 look broadly at ethno-ornithology, its relationships with conservation and its wider significance for the increasingly globalized, and globalizing, Western cultures of the world.

Historically, birds have been prominent in art, literature and sculpture, have been accredited with supernatural powers, have played a role in songs, ceremony and dance, as well as day-to-day existence, and have been linked to both death and some of life's greatest challenges. Birds have featured widely in art for thousands of years – they are sometimes represented in stylized form, without being clearly identifiable as a particular species, and their feather products appear in art or as artefacts. Their functions in artistic depiction range from simple to ornate decoration, from symbols of religious significance through to symbols of power and links both with things of, and not of, this Earth (a distinction which might not be made by the creator of the art or artefacts themselves).

Egyptian art shows relief sculptures of birds, dating back to about 3100 BC and a variety of species, including Hoopoe *Upupa epops*, occurring in the carved hieroglyphs, the painted mud of tombs, wooden sarcophagi and painted chests found in tombs. Also occurring are depictions of the Sacred Ibis *Threskiornis aethiopicus*, the reincarnation of Thoth, the god of wisdom and knowledge, and a large falcon *Falco* sp. that is the personification of the god Horus, who was the protector of royalty and recurs in bas reliefs from then on (Andreu et al, 1997). There is a spiritual connection between birds and man in Egypt that is paralleled by the Māori, of New Zealand. Chapter 16 details how elders from three tribal groups have shared their *mātauranga* (traditional environmental knowledge) about spiritual guardianship of three native bird species: kererū (*Hemiphaga novaeseelandiae novaeseelandiae*), oi (*Pterodroma macroptera gouldi*) and tītī (*Puffinus griseus*). The authors show that maintaining the integrity of the spiritual component of *mātauranga* is crucial for cultural sustainability of each tribal group, but also that upholding the *mana* (authority), *mauri* (life force) and *tikanga* (customs and practices) related to a species is fundamental to ensuring its persistence and well-being. On the other side of the globe, and described in Chapter 19, Sault demonstrates how, for the Bribri of southern Costa Rica, birds do not simply inhabit the landscape – they are beings with knowledge that can benefit people in everyday life, as well as in critical times of change or disaster. The Bribri, as in many other cultures, also have a responsibility towards the birds in the reciprocal actions that they need to undertake to fulfil their part of the interrelationship.

In the prehistoric Minoan era (2600 to 1100 BC) some of the earliest depictions of birds were on seals. Around 2000 BC, three doves (Columbidae), ritual objects symbolizing the manifestation of a goddess (Sakellarakis, 2001), appeared as miniature figurines, each perched atop a column of a tri-columnar shrine, also in miniature. Excavations of tombs, villas and caves from 1700 to 1300 BC produced pots and jugs on which stylized birds were painted. Around 1600 BC, individual species of birds are identifiable in frescoes – for example, one from the walls of the Palace of Knossos that shows Chukar, *Alectoris chukar*, a type of partridge, wandering singly or in pairs amongst brightly coloured stones, together with a Hoopoe.

In ancient times the pilgrim to the Borobudur Temple in Java circumambulated the narrow corridors of each level, keeping the main wall always to his right, tracing a slow but spiritual progress to the summit. Had he the time during his prayers and meditation he would have found numerous depictions of birds. For example, two pigeons (Columbidae) rest on the roof of a house set on pillars. In others, birds, including a hornbill (Bucerotinae) and a pigeon, perch in a tree above seated figures, ducks (Anatidae) fly overhead, and stylized birds are shown about to land in a tree. In all of these depictions, the birds have a naturalistic role: they are part of the environment. In none do birds dominate the scene, but rather add a dimension and indicate the awareness that the sculptors had of different species, their habitats and their relationship with people. These sorts of relationships – the links through birds with the gods, the presence of birds in structures important to religion and life, and their depiction as part of everyday surroundings – are shown in Chapter 11 for Gujarat, India. Between the 7th and the 19th centuries AD, thousands of stepwells were built to provide water in the parched and arid lands of Gujarat. These became a familiar feature of the landscape. While they served a utilitarian purpose of providing life-giving waters, these multi-storeyed stepwells also became a site for women's rites and rituals and the focal point for the worship of local goddesses. Amongst other things, the carvings and images inside the stepwells depict people, divine beings and birds: they portray the sacred universe of the Indians and reveal their understanding of the world of nature.

Birds have 'spoken' through their depictions in art; but there are more direct relationships between birds and language. An example is the stylized passerines that are included in the, as yet, undecipherable hieroglyphs of a clay disc from Phaistos (circa 1700 BC). Using translations from Spanish of 16th-century writers such as Herrera, Oviedo, Sahagún and Hernández in Honduras, Bonta, in Chapter 8, shows that their works reflect the beginnings of melding the distinct traditions of three continents (Latin America, Europe and Africa) into one diverse but coherent body of knowledge about flora and fauna. There are also contemporary studies of birds and language in Chapters 13, 14 and 15. Chapter 13 demonstrates the extensive bird knowledge of the Tlingit people of south-eastern Alaska to whom birds are sustenance, icons and symbols of cultural and environmental identity. Chapter 14 discusses how, despite their distributional and morphological differences, ravens (Corvidae) and herons (Ardeidae) are linked linguistically in the prehistory of Mayan languages of Mesoamerica: descendent words found in Mayan daughter languages spoken in highland areas denote ravens, while the descendent words in daughter languages of lowland areas designate herons. Chapter 15 links the names of locally recognized categories of birds amongst the Nage people of Flores Island, eastern Indonesia, with those in other Central-Malayo-Polynesian languages, considering the kinds of bird species that tend to be named in the same, or related, ways in languages belonging to different language groups; bird names that change little, if at all, through time; and the role of onomatopoeia in the similarity of names.

Birds depicted in geometric shapes and woven in the rich colours of burgundy, brick red, orange, yellow and red ochre are a feature of the shrouds that have been found in tombs of the Chimú people at Paracas and in other sites in the Peruvian coastal deserts, and date back to the period of 350 BC to 200 AD (Stierlin, 1979). Stylized birds occur, such as parrots, possibly macaws *Ara* spp., and storks on a nest. Also found were feather mosaics made from predominantly brown, red, green and white feathers and in the form of a poncho. Thus, birds were significant and not only a source of inspiration for their textile designs, but also as a source of feathers. Feathers also feature in many ceremonies, being incorporated within the head-dresses of dancers or those of high rank. Greater Rhea feathers are used in South American dances, while feathers of the Blue Crane *Anthropoides paradise* are used in the head-dress of a Zulu prince or king to signal their royal status (Magubane, 1998). In north-western Australia, extending inland to the desert, feather down is used in the head-dresses for dancers who perform at ceremonies. Conical-shaped head-dresses have a plant and human-hair twine base on which is imposed blood and feather down (Berndt and Berndt, 1964). The relationship between feathers and people is explored by Houston for the Huia *Heteralocha acutirostris* (see Chapter 4), and the Scarlet Honeyeater *Myzomela cardinalis* (see Chapter 5). In New Zealand, Māori revered a now extinct bird, the Huia, whose distinctive black-and-white tail feathers could only be worn by chiefs of distinction for special ceremonies or when going into battle. These feathers were stored in specially constructed, and intricately carved, boxes passed from one generation to the next. In Santa Cruz, Solomon Islands, feather currency, in the form of elaborate coils of red feathers from the Scarlet Honeyeater, is the basis of a complex trading network between Santa Cruz and neighbouring islands.

The hunting of birds has appeared as a theme in art works for hundreds of years. An example comes from the Roman mosaics of Tunisia, North Africa. An early third-century mosaic from Le Kef shows 20 Ostriches *Struthio camelus* being hunted into a netted enclosure, while a fifth-century mosaic from Kelibia depicts different forms of trapping, such as using sticky materials placed on twigs to entrap birds. While some hunting was done for pleasure, most was done to provide food, and the still-life depictions of birds on the mosaic floors of dining rooms indicate those species used for sustenance (Tidemann, 2009). Chapter 6 describes contemporary methods by which waterbirds have been trapped in Central Java, Indonesia, utilized as food for personal use, or sold as food items in the marketplace. The authors also describe the taboos surrounding hunting. Further east, in the Indonesian province of Papua, Pangau-Adam and Noske, in Chapter 7, investigate hunting preferences in relation to the economic benefits for the hunter, suggesting that hunting has shifted from a purely subsistence form towards a more commercial form. Both of these chapters also consider the issues surrounding sustainability.

Many Australian Aboriginal stories involve birds travelling up to the sky and becoming celestial objects, such as the moon and stars. The Adnyamathanha of central-southern Australia have a story of Yurlu, the Red-backed Kingfisher *Halcyon pyrrhopygia*, who travelled south, making fires that became coal deposits. Yurlu travelled until he came to a mountain range where a special ceremony had commenced. He flew down, snatched a firestick from an Australian Bustard *Ardeotis australis* and flung it up into the air where it turned into Mars, Wildu (Tunbridge 1988). Birds were also assimilated within the supernatural world of ancient India because their essential nature was believed to be celestial and solar. Wild ducks and migratory geese (Anatidae) symbolized souls journeying towards the moon. The crow *Corvus* sp., characterized as garrulous, inquisitive and greedy, was made responsible for transmitting love messages and also for delivering oracles. The cuckoo *Cuculus* sp. awoke amorous desires with its languorous cries. The parrot (Psittacidae), traditional confidant of young lovers, had the power to cure certain diseases, including jaundice, by transferring them magically to another object. And the partridge *Francolinus* sp. had the reputation of feeding on the rays of the moon (Auboyer, 1965). Birds also have supernatural powers in other cultures. In parts of Africa, for example, Ostrich eggs are kept in houses to protect them against lightning and the Hammerkop *Scopus umbretta*, if harmed, can wreak vengeance on the perpetrator and his property – the hills around the village could melt, his cattle could be hit by an epidemic, lightning may strike the person's house or he may die (del Hoyo et al, 1992).

Birds, and parts of birds, are also known for their healing properties. For example, the fat of the Greater Rhea *Rhea americana* in South America is valued as an antidote to venomous snake bites, while in the Andes, the fat of the flamingo *Phoenicoparrus* sp. has been used as a cure for tuberculosis. The horn of the Horned Screamer *Anhima cornuta*, ground into a powder, has also been used as an antidote to the bites of venomous snakes, while, in Argentina, the insides of a Neotropic Cormorant, *Phalacrocorax olivaceus*, spread on the chest, was an antidote for a person suffering from asthma (del Hoyo et al, 1992). The variety of themes and roles of birds is continued in Chapter 18, which describes the significance of the birds to the people of Kenya in their roles in ceremonies, medicine, as messengers, as well as the taboos surrounding certain species. In Chapter 12, Tidemann and Whiteside show that bird stories are a part of the fabric of Aboriginal culture, often indicating expected cultural behaviour, but also account for plumage characteristics, calls, habitat, food, the relationships between Earth and extraterrestrial objects, as well as inter-specific behaviour.

In this age of dwindling ecological resources and loss of land, language and knowledge, it is not sufficient to bask in the warmth of the riches of thousands of years of indigenous knowledge of birds. There needs to be a link with the realities of modern-day research and conservation. More than that, indigenous ecological knowledge needs to be integrated with scientific knowledge for conservation and management. Fraser et al (2006) state that attempts at integration have failed to engage sceptical scientists and the two knowledge systems often operate in parallel, but are seldom integrated. While all the chapters in the book consider issues of conservation, sustainability and management as part of their themes, three include the ideas of indigenous and scientific knowledge more explicitly. For example, Chapter 9 looks at the possible pitfalls and their solutions during the collection of ethno-ornithological information in Kenya. Chapters 10 and 17 point out the value of indigenous knowledge because of its collection over the long term, in contrast to the more often short-term scientific studies. By surveying traditional ecological knowledge of megapodes in the Solomon Islands and Papua New Guinea and comparing it to scientific ecological knowledge, Chapter 10 attempts to quantify what is 'reliable' traditional knowledge and discusses how the two knowledge systems can be integrated. Chapter 17 looks at how communication between conservationists and indigenous peoples can be facilitated by using the bird knowledge of the Hewa, of Papua New Guinea, to identify the impacts of tradition upon biodiversity in their shaping of the environment by creating a mosaic of habitats of varying diversity. Chapters 20 and 21 demonstrate how the interplay between cultural contexts and biological conservation can inform preservation and conservation. In Chapter 20, Barua and Jepson demonstrate how the cultural popularity of the threatened Great Bittern *Botaurus stellaris* raised its profile and led to its preservation. Jepson, in Chapter 21, examines how understanding the keeping and competing of songbirds in a cultural context (and as assets) could inform the visions and practices of conservation. He concludes that an effective starting point for conservation, in Indonesia at least, is to understand and then amplify local frames relating to birds and allow these the space to generate new conservation governance techniques.

Birds have enriched the lives of humankind for thousands of years. They support life and livelihoods. They are symbols in art, story and dance. They are the conveyors to an afterlife. They have been symbols of war, peace, wisdom, love, evil, hope and luck. They provide moral guidance through stories and contribute to the consequences of misbehaviour and have been used as perpetrators of ideals. For some peoples, the relationship that they have with birds continues to be a guiding principle of life. For others, as science has pushed objective thought, the sense of a holistic relationship with birds may have been lost; but the possibility of a link with alternative bodies of knowledge still exists and is explored in this book. The challenges of embracing ethno-ornithological knowledge and integrating it with Western investigative studies of birds need to be met. If it is not, and those 'other knowledges' are lost, the world of birds and people will be a poorer place.

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2

Ethno-ornithology and Biological Conservation

Mark Bonta

Ethno-ornithology has not yet become well integrated within avian conservation. With few exceptions, indigenous and other local and traditional knowledge about birds is not yet integral to the study, management and protection of avifauna carried out by governments and non-governmental groups. This chapter attempts to lay the groundwork for the integration of ethno-ornithology into wildlife management and conservation by first addressing the issue of the adequacy of local and traditional knowledge of ecological and other land management issues, in general, and then showing how ethno-ornithological knowledge is already incorporated within conservation, albeit in a largely unheralded fashion, using examples from Honduras and the US. A discussion of methods for conservation-friendly ethno-ornithology follows; this draws largely on the author's prior work in Honduras. Another section examines a few existing wildlife research and management cases in New Zealand and the Arctic that have incorporated local and traditional knowledge about birds. The chapter concludes with a discussion of the utility of multicultural field guides.

Introduction: Recognizing the local

Despite the increasing enfranchisement of indigenous groups and local people, in general, in environmental conservation, their traditional ecological knowledge (TEK) and local ecological knowledge (LEK) are very rarely incorporated within the management and protection of avifauna (Gilchrist et al, 2005) (promising examples from New Zealand and the Arctic are discussed later in this chapter, but they do not constitute a trend or movement; see also Hunn et al, 2003). The reason for this appears to lie in Western science's failure to accept the parallel authority of non-Western knowledge systems within conservation, even while conservation itself is increasingly becoming an endeavour favoured and even controlled by local people rather than something only imposed from the top down. The hypothetico-deductive model that is employed in the ecological and biological studies that inform wildlife management and other types of environmental conservation involves rigorous gathering and testing of data and is designed to be replicable. Traditional and local knowledge 'systems' are often not 'systematic' in the modern Western sense, and frequently involve unprovable assertions, anecdotal information and other 'unscientific' components that may or may not be correct. Uncertainty about how to deal with non-scientific data pervades academic discussions (e.g. Brook and McLachlan, 2005; Gilchrist and Mallory, 2007). In sum, there exists great sensitivity to the need for the recording and analysing of traditional and local ecological knowledge, but just as great uncertainty about what to do with it. In addition, the issue of knowledge ownership is centrally important to the debates on how to incorporate non-scientific knowledge into conservation.

Clearly, it is difficult to have a discussion that is not contextual: legal frameworks and land tenure vary radically from country to country, and the definitions of what is traditional or local, and who is indigenous, are also highly divergent. Furthermore, terms such as 'wildlife management', 'conservation', 'protection', 'preservation' and others have highly variable meanings. Even concepts as seemingly basic as 'nature' and 'the environment' cannot easily be used without qualification. These distinctions, however, have become obscured with the growth of worldwide conservation paradigms both within science (e.g. in conservation biology) and as a function of the discourses disseminated by environmental groups of 'worldwide reach', such as Conservation International, the World Conservation Union (IUCN) and BirdLife International. Local people from extremely diverse backgrounds who are brought into conservation begin to speak a common language and, to a certain extent, their very contribution to this discourse is a factor in shaping it. But their enfranchisement is a far cry from the recognition of local and traditional knowledge as valuable to the extent that it is always studied and considered prior to conservation action. Indeed, even where conservation projects are initiated and controlled by local people, there can be no assumption of an automatic engagement with their own knowledge. When outside experts are brought in to work alongside local people, it is generally to do science in the Western mode, albeit sensitive (ideally) to local social constraints and concerns.

Traditional and local ecological knowledge should not continue to be ignored or sidelined, particularly when species of interest to conservation inhabit landscapes that local people own or have rights to use. A small number of authors (e.g. Berkes et al, 2000; Huntington, 2000; Mauro and Hardison, 2000; Hunn et al, 2003; Gilchrist et al, 2005) have addressed these concerns over the last decade. However, many practitioners of the sciences that inform conservation plans and actions have been justly cautious of overly idealistic approaches to indigenous management of the environment, assuming that 'traditional people are wise and always know best' (Brook and McLachlan, 2005); but at the same time they have perhaps not been attentive enough to the myriad pressures of modernization, such as the free market, that have contorted and destroyed even the most resilient of traditional systems.

Minoritarian ways of knowing, which inform ways of managing the environment, have come under assault and are thus often encountered by outsiders in a weak and fragmented state. This is perhaps part of the universal story of humanity – it is nothing inherently new. Hybridization of knowledge and practice is the norm, sometimes to the detriment and sometimes to the benefit of local people. What is new, however, is the scope and velocity of this transformation. The 20th century brought the Green Revolution, massive political upheaval and rapid cultural change on a global scale, and this continues unabated. It became nearly impossible to claim that traditional resource management systems were 'better' (e.g. for the environment) when they were being rapidly abandoned by their own practitioners. Pest birds, for example, went from contextual problems with contextual solutions to national issues addressed by modern scientific methods: a transition from scarecrows to inorganic pesticides, perhaps. In many cases, such efforts were seen as superior in local context because they were more effective than older methods, notwithstanding the numerous ecologically undesirable side effects. In the latter part of the 20th century, the true environmental costs of 'scientific' agriculture, forestry and other land management techniques invented in the West and imposed on, or adopted eagerly by, the rest of the world began to be understood; but too often those who sought alternative ecologically friendly (including 'bird-friendly') solutions failed to recognize how thoroughly pervasive modernism had become, reaching even into the most supposedly 'traditional' of settings. It has been enormously difficult to disentangle ourselves from modernity enough to rediscover and re-implement appropriate local and traditional solutions.

In addition, plenty of counter-examples were discovered where complex adaptive systems that presumably had allowed human societies to flourish comfortably alongside natural systems broke down long before the onslaught of European colonialism, capitalism and other ills of the post-1500 Common Era world. Famous examples include Easter Island and the Classic Maya, where environmental degradation is believed by some to have been a determining factor in societal collapse. These examples are often cited to 'prove' that humans, by some biological imperative, invariably damage the environment when they 'overpopulate' and, thence, that non-Western environmental knowledge and land management are inherently damaging or at least not beneficial. But regarding such examples, it is important to understand that it is often the political dimension of human endeavour that is the determining factor in a society's collapse and attendant environmental degradation; yet it is easy to interpret the evidence in other ways. In truth, it is difficult, if not impossible, to understand the intricacies of political change among the classic Maya, given the biased nature of the accounts we possess (inscriptions commissioned by the Mayan elites). However, it is quite easy, using the tools of geo-archaeology, to find abundant evidence for environmental degradation. Which came first, the environmental degradation or the political change that brought on collapse? An analogous modern situation can be used. Are the effects of free market capitalism and its associated political structures driving worldwide environmental decay and ecological collapse, or is it the other way around? The consensus favours the former interpretation.

In reality, human management of the environment is highly contextual in time and place, and even biological factors such as carrying capacity, when strained, can be mitigated by new human adaptations. The question of whether traditional and local ecological knowledge is adequate for the essential activity of conservation of biodiversity is inextricably bound up with perceptions of how adequate it has been in the past. The proof of the pudding, however, is in the landscape itself: more specifically, in a comparative approach to the study of habitat that clearly recognizes how much habitat remains in a traditional or local context not highly affected by the pressures of modernization. A diverse habitat mosaic, such as that created and maintained by agricultural smallholders, traditional cattle ranchers, fishermen, hunters, gatherers and even small-scale logging operations, is likely to contain far more biodiversity than a large-scale plantation or a capital-intensive agricultural or pastoral landscape dominated by few large landholders. Where smallholders are marginalized or even where they are fully involved in modern 'scientific' agriculture, rural landscapes of the so-called 'Third World' differ little in this respect from those of North America, Europe or elsewhere in the 'First World'. Maximization of profits has spurred the massive destruction of the Amazon Basin, the overwhelming devastation of the bottomland hardwood forests of the US South (most recently with the soybean boom in the 1970s) and, in general, the worldwide decimation of farm-and-forest landscape mosaics that have ceded to pineapple, oil palm, banana, rubber, sugar and other plantations, turning them into virtual biotic deserts.

A case that highlights avian diversity is the coffee plantation. In Latin America, coffee has long been a cash crop for all social classes. Where it is grown for export and for profit on a large scale, high-yielding varieties that favour direct sunlight are preferred by farmers who have capital or can be persuaded to take out loans. This has resulted in the massive deforestation of highland landscapes, accompanied by roads and by the expulsion of prior owners, normally smallholders, who often end up as landless peons on coffee plantations. In some cases, sparse shade is planted; but, regardless of this, high-yielding coffee demands massive chemical inputs and plants live, at most, for a decade, after which new ones must be planted. In addition, coffee is labour intensive because it must be weeded and picked by hand – contamination of water and soil by seasonal labourers, who lack even basic sanitation, compounds the environmental disaster. Needless to say, such landscapes can become as biotically sterile as high-input plantations of plants such as pineapple, maize or cotton.

Smallholder coffee, on the other hand, generally involves 'archaic', low-yielding, non-genetically 'improved' strains that demand partial and even full shade. In the best cases, old-growth humid forest is retained, with only the understorey being modified. Plants produce beans for 50 years or more. Coffee from these beans is usually better tasting and has recently come under high demand in the organic ecologically friendly market. The traditional coffee landscape is a complex adaptive system that, essentially by accident (i.e. not planned by the growers or necessary for their coffee), favours high avian diversity (Moguel and Toledo, 1999). Smallholders now find that if bean selection, drying, sanitary issues and other local conditions are controlled, they can have access to a highly lucrative market.

Thus, birds benefit from traditional and local environmental knowledge and management practices simply because a traditional agroforestry practice creates and protects a landscape that harbours them. Conservation on top of this, such as the widespread incorporation of shaded coffee within the buffer zones of cloud-forest protected areas in Central America, can do more to address the needs of bird populations specifically. But even without this, something traditional and 'low tech' is better for the avifauna than the modern alternative, and so it goes for non-capital-intensive land use around the world. If this can be recognized and accepted, then the next step can be taken: the consideration of traditional and local ecological knowledge as integral to conservation even where it is not accorded recognition.

Local people and avian conservation in Honduras and the US

In its decades-long push to become politically feasible and socially sustainable, conservation, in general, has already enfranchised local people, not only training them as guides and guards but also making them the co-designers and co-managers of protected areas. Where, scant decades ago, indigenous peoples were excluded from both conservation and from rights to use land that they used to possess, today national governments across the world, accompanying changing conservation wisdom and robust indigenous rights movements, are including them in the very fabric of the officially sanctioned protection of national and global natural heritage. The establishment of parks such as the

Tawahka-Asangni Biosphere Reserve in Honduras has been based on indigenous maps and a long history of occupancy and land use. Tribal lands, towns, sacred forests, fishing grounds, *ad infinitum* have been reinvented as zones for habitat protection, in many, but not all, cases also accompanied by carefully proscribed sustainable extraction measures. There have been many successes, and just as many failures, given the implacable forces of modernization mentioned above and the rethinking that has needed to occur at local, national and international scales.

Myriad new–old, modern–traditional hybrid conservation models now exist across the world. Some acknowledge the importance of complex adaptive systems such as the coffee farms mentioned above, while others incorporate solely Western models and perceptions of nature. Nevertheless, to become accepted locally and achieve a modicum of real sustainability, conservation projects (e.g. those involving protected areas) need to take on local characteristics that reflect their specific status as elements of the local landscape. Parks in Latin America that were originally based on US models (and thus often rejected as 'imperialist' land grabs in countries such as Honduras) have become accepted parts of the local landscape (Bonta, 2005).

The author's experience in Honduras led him to the realization that individual local people with sufficient interest, integrity and leadership qualities are a key factor in achieving success in conservation (Bonta, 2003). In the case of the large national park, Sierra de Agalta, the efforts of such local conservationists have made the difference between the reality, more than two decades after the park's founding, and what would have been otherwise if local people had been non-committal toward the park or, at worst, excluded from its management and protection altogether. Had no local people been involved, this massive and biodiversity-rich reserve would have been destroyed, for it would have remained effectively a paper park, one of many in a country that has been able to afford very few allocations for park management. Complete destruction of the Sierra de Agalta National Park would have happened inevitably as small farmers continued to emigrate from the surrounding fertile plains, pushed off their lands by large-scale cattle ranchers and agro-industries, and forced to maintain their families by slashing and burning the Sierra. Destruction would also have gone unchecked due to the rampant expansion of capital-intensive coffee plantations and the roads that accompany them; loggers, cattle ranchers and others would have followed close behind. The tragedy that befalls the commons in the modern era, so well known across the world, would have replicated itself there. After all, the only immediate practical benefit to surrounding tropical dry lowland communities of 50,000ha of biodiversity-rich highland wet forest was its provision of a dependable water supply. The forces of modernization arrayed against the traditional wisdom of leaving the Sierra alone (and forested sierras like it across the country) would have been overwhelming.

Instead, the germ of salvation was planted through the Honduran government's 1991 hiring of a few local people from villages who farm, hunt and gather in the outliers of the Sierra as park employees. The most successful of these park extensionist-guards was Francisco Urbina, who went on to become the *de facto* manager of Sierra de Agalta, and is one of the country's most respected conservationists and a top-rate field ornithologist. During his 17 years of employment for the parks service he was virtually able to stabilize deforestation in large parts of the Sierra de Agalta and accomplish other seemingly Herculean tasks despite an annual parks budget in the low thousands of dollars.

The fact that Francisco Urbina was local but also incorporated outsider knowledge and practices made him effective in negotiating many difficult and dangerous issues, such as traditional hunting relabelled 'clandestine' and traditional agriculture redesignated 'illegal'. His focus on birds and their protection – partly a result of his association with this author and other US Peace Corps Volunteers (many of whom were assigned to work with parks management personnel in Honduras) – is the reason for his story being told here. The Sierra de Agalta and surrounding valleys hold nearly 500 bird species, several of which are regional endemics, globally threatened or otherwise of special concern. In Urbina's endless conservation proselytizing in communities around the park, he emphasized birds for the value that they had in themselves as well as for the benefits that they could provide through sustainable harvesting, ecotourism and other reasons that appealed to people's need for material gain. He, and others in his mould, promoted birds within a respect for the knowledge that other local people already had, but supplemented by the field guides and conservation ideas of the outside world.

The heart of Urbina's argument to the thousands of people he has affected is that birds and the rest of the environment have value in and of themselves; that they are part of local heritage; that they exist there and nowhere else in the world. The very revelation that local people possessed something that no one else did was completely new to most, accustomed to being told that they were 'backward' and of little consequence to the modern world. A hummingbird, (Honduran Emerald *Amazilia luciae*) found nowhere else on the planet went from being the exclusive provenance of obscure ornithology journals in another language to a point of pride for many villagers. Urbina successfully tapped into local pride in place and knowledge about place, sowing or rescuing respect for the life-ways of local hunters and gatherers and gardeners and, indeed, everyone who interacted with nature. In many cases, it turned out that what people thought they knew about birds was wrong or insufficient; but, just as often, local people knew things that weren't in the field guides or even in the literature. At no point did 'pure' ethno-ornithological knowledge take precedence in a formal way; rather, Urbina, as the leading force for conservation in the region, always mixed Western science and local knowledge together in the task of protecting the park and, increasingly, other landscapes in the region. And his legacy has in many ways been infectious, part of the 'Honduranization' of environmentalism that continues to mould global paradigms and concerns to local realities. Thus, traditional and local ornithological knowledge is already woven into the fabric of conservation if one knows where to look.

A second example of this involves wild turkey (*Meleagris gallopavo*) and waterfowl hunters in Mississippi and in Pennsylvania, states of the eastern US where this author has resided for much of his life. The cultures of these two states, one northern, one southern, are popularly thought of as highly distinct from each other; yet local people share an abiding passion for the outdoors in the form of hunting, to the extent that it is easily one of the most centrally important cultural activities, not only for men but also for women and children. Because hunters spend so much time outdoors, they learn much about the environment and especially about the species that they are hunting. They pass this knowledge on to others, particularly to family members. But what does this phenomenon have to do with ethno-ornithology and conservation?

The protection of wild turkeys and waterfowl has happened largely because of hunter-conservationists' concern following the near-extirpation of many gamebird species in early 20th-century US. Following major environmental legislation, the state and federal agencies that were tasked with managing game species were successful, in large part, because of the money generated by hunting licences. In addition to the government, such hunter-conservationist groups as Ducks Unlimited have played significant roles in the fostering of a protectionist culture among hunters that extends to attitudes toward species as well as habitat preservation.

What has largely passed unheralded is the extent to which the entire hybrid government–non-governmental organization (NGO) management system for game species and their habitats is perpetuated by the local and traditional ethno-ornithological knowledge innate to hunting cultures. Simply put: local turkey and waterfowl hunters are generally *not* relying solely on written material and other wisdom from non-local sources to learn everything they need to know about where, when and how to hunt their prey. Although their hunting does, in part, reflect what science, conservation and government decide and stipulate, their own traditional and local ecological knowledge also plays a large part. Hunters are successful inasmuch as they learn about their prey and exchange this knowledge among themselves, passing it down to the next generation. By spending so much time at the duck blind, or in the tree stand, they come to learn enormous amounts about the life histories of the species they seek. Thus, although largely unacknowledged, traditional and local ecological knowledge is an integral part of a system in which the licence fees of millions of hunters help to prop up the entire system of game management.

The above examples suggest that if we were to re-examine existing situations, we would most likely find many other cases of unheralded traditional and local ecological knowledge contributing 'informally' to conservation. Such recognition could go far towards strengthening the case for planned incorporation of ethno-ornithology within avian conservation. The following sections suggest some practical methods and conceptual frameworks for achieving this 'next step'.

Doing ethno-ornithology with conservation in mind

Ethno-ornithological studies are lacking for most contexts where avian conservation is practised. Although lists of local names of birds (and other fauna) may be available, folk taxonomies alone are insufficient. Instead, detailed data are needed on all aspects of human interaction with birds (Bonta, 2008). While it is certainly true that the above examples contain overlooked and *de facto* cases of ethno-ornithological incorporation within conservation, the ultimate challenge is for ethno-ornithology to play a central acknowledged role. This can happen only when informed by studies carried out by teams that combine local and outsider expertise.

Local and traditional knowledge about birds is contextual and place specific; this author (Bonta, 2008) has named this geographic phenomenon the 'landscape of human–bird encounter' in recognition of the interaction that takes place – a function of the constant criss-crossing paths of birds and people in daily life. Birds are expert at transgressing human-imposed spatial boundaries, particularly in their foraging routes. Birds 'refuse' to stay within the boundaries of public protected spaces, often creating problems for park managers who by necessity must engage with private landowners. Of course, numerous species, some of great concern for conservation, forage and nest in human landscapes, thus necessitating conservation with people in mind.

With the landscape of human–bird encounter as setting, a range of interactions between people and avifauna can be studied and the results sifted through for relevancy to conservation goals (Bonta, 2008). Categories of interaction range from:

- simple awareness of the presence of birds; to
- some sort of knowledge about them; to
- interaction with them; and on to
- interest in them;
- concern about them; and even
- obsession with them (what this author has termed 'ornithophilia' and 'ornithophobia'); and finally
- a reliance on them.

These are conceptualized as value-neutral categories – more interaction with a bird does not necessarily mean more benefit for it; but neither does it signify an automatic threat.

It is crucial to formulate conservation plans and carry out actions based on local and traditional knowledge of what is already occurring. Only with this knowledge is it possible to reach consensus on what practices, traditional or otherwise, are damaging to which avifauna and need to be (further) regulated or prohibited, and which are favourable and need to be encouraged.

In countries such as the US, bird-feeding, birdwatching, and other types of ornithophilic behaviour form the basis of huge conservation efforts, in tandem with science. At the most basic level, for example, people's love of birds finds outlets in massive monetary support for conservation organizations. But risks are also huge – attracting birds to feeders, and to yards and gardens in general, makes them susceptible to all sorts of threats (e.g. house cats) that they would not otherwise be exposed to in less humanized landscapes. Thus, ornithophilia isn't necessarily an ideal; but avian conservation *without* acknowledgement of the backyard, such an important landscape of human–bird encounter, should come to be as impossible to envisage in countries such as Honduras as it is in the US.

Landscapes of all types contain birds, and even many landscapes containing 'worthless scrub' turn out to have endangered populations. There is no such thing as a landscape completely unaffected by human activity, and neither has there been for many millennia. Certainly, bird conservation has to take place even in the most humanized landscapes, the hacking of Peregrine Falcons *Falco peregrinus* on New York City bridges being an excellent example. Declared endangered in the US after having declined in number because of the effects of DDT, breeding programmes in the eastern US involved 'hacking' chicks back to the wild, using puppets and the like, so that they did not imprint on people. When they were ready to fly, they were placed in cages on tops of buildings or bridges, or on cliffs, to get acclimated before their final release. Peregrines are no longer endangered in the US, and often nest on bridges and high buildings in cities such as New York. Even where direct interaction between people and birds does not occur (particularly among the myriad species for which local people have no names or uses), it is always possible to return to a complex system of adaptive management, such as the traditional coffee forest, that is still in place in some form or another. Such systems incorporate avifauna regardless of people's awareness of the birds' presence and, thus, must also be studied and understood.

In the process of describing and categorizing how local people and landscapes relate to avifauna, distinctions should be drawn between societal groups. Ethno-ornithological knowledge and resultant practice vary by livelihood, by gender, by age and by social class, as well as by ethnicity (Bonta, 2008). Women and girls encounter different types of birds than men and boys in societies where women are largely in domestic roles, while men farm the forest frontier. Women are not shooting hawks and owls; men are not planting flowers for hummingbirds. Or, perhaps, women are making the scarecrows to scare away the seedeaters or the parrots because they are the ones doing the farming; men are engaged in utilizing cormorants for fishing or shooting gulls. Children, in the mean time, are gaining an intricate knowledge of the birds of hedgerows and marshes, whether 'protecting' nests or sling-shotting sparrows. The elderly retain enormous knowledge that may die with them, unrecorded and forgotten. Coffee farmers often know about, and are certainly involved with, the fates of birds in shade coffee plantations, while ranchers harbour important biodiversity and, in many countries, are, essentially, absolute protectors or destroyers of 'their' biodiversity, as they see fit. And so on it goes.

A distinction is often made between birds as utilitarian objects and birds as symbols. We already possess, if not enough case studies, sufficient theoretical background to differentiate and appreciate the two categories (e.g. Rowland, 1978). But there is a third category to consider that fuses the other two: bird as sentient being. In reality, birds in local culture are not just material objects, but neither are they just symbols of something else. When symbol and flesh combine in one we arrive at the realization that birds have souls or (depending on one's proclivity) at least sets of behaviours that characterize them as individuals and as families. Birds are perceived as sentient beings not only by many local indigenous peoples, but by people everywhere, particularly where they are 'owned' as pets. Indeed, ornithophilia could be the result of the overwhelming human feeling that birds have feelings; whether this is anthropomorphic or not is immaterial, the recognition and cultivation of such feelings in people and entire cultures can result in the most amazing protection of birds.

Testing a new model

Conservation is a messy and uncertain business; overturning the paradigm of 'the West always knows best in the management and protection of the environment' has been and continues to be a long and difficult endeavour. Engaging ethno-ecology and ethnobiology is a step off the deep end for many, something unknown and alien that is safer to debate in the pages of journals than actually attempt to achieve.

The leap of faith was taken some time ago by a project in New Zealand that has sought to preserve the Sooty Shearwater *Puffinus griseus*, called 'tītī' by the 'muttonbirders', Māoris who harvest it, who themselves have worked hand in hand with Otago University researchers and conservationists to study this harvest and, indeed, all aspects of the species' life history (Tītī Project, 2002). Māori political considerations have been paramount at all stages of the project, not as a convenience but as a primary reason why the research and conservation are happening in the first place. Intellectual rights are carefully negotiated; local knowledge is valued side by side with Western science. In this case, ethno-ornithological knowledge and practice is not a chapter in a conservation proposal, but rather its very raison d'être. What is happening in New Zealand is proof that such work is possible and desirable elsewhere.

In 'A bicultural research approach,' Tītī Project (2002) managers write: 'Our case study is an opportunity for wildlife managers and researchers to learn the value of Matauranga (Māori traditional environmental knowledge) and of Kaitiakitanga (environmental stewardship). It also allows Māori to learn how ecological science can help other customary uses of natural resources in Aotearoa (New Zealand).' To this end, a 'cultural safety contract' was drawn up that details how rights to knowledge and data are to be negotiated: a *sine qua non* for all successful research in the local context and, particularly, that of the participatory and multicultural variety. In 'Uses of traditional knowledge by Rakiura Maori to guide Sooty Shearwater harvests' (Lyver, 2002), it is revealed that both traditional knowledge (TK) and 'ecological science' contribute valid data of use in the conservation of the species:

> *Traditional knowledge can predict scientific findings for some key parameters of harvest, such as chick abundance, but also has value for understanding an ecological system. Complete integration of TK and ecological science is unlikely because of the spiritual and holistic aspects that partially define TK. However, parallel use of the two knowledge systems may improve the understanding and decision-making for conservation and natural resource use.* (Lyver, 2002)

It should be noted that the Māori already possess considerable legal and territorial autonomy within New Zealand, itself a highly developed country. In the second case, that of the Arctic, a similar situation exists: native peoples referred to collectively as First Nations have considerable rights to territory and resource usage within Canada and Greenland. Although certainly not free from exploitation and the erosion of traditional culture, neither the Māori nor the peoples of the Arctic are as marginalized as are the majority of indigenous and other minorities in the world, and the wildlife management agencies and universities with which they come into contact are financially well equipped and able to act quickly in the interest of national legal frameworks for the protection of the environment. While gross abuses in developed countries do, of course, exist, the overall situation is a far cry from that of many developing countries, both in the status of minority indigenous peoples and in the effectiveness of governmental agencies.

Nevertheless, the question of whether 'local ecological knowledge [can] contribute to wildlife management', posed by Gilchrist et al (2005) in the context of the Arctic, is still highly relevant. In studies of four migratory bird species among the Inuit, the authors compared the values of local ecological knowledge with scientific data and found that what the Inuit knew ranged from helpful to harmful for conservation. The key finding was that LEK was species specific and highly contextual, thus, in a sense, obviating the debates in the literature that attempt to resolve general and global situations.

In the case of the Common Eider (*Somateria mollissima sedentari*), what the Inuit knew – that eider were dying off in large numbers due to lack of access to open water – was critically important in spurring scientific studies; Gilchrist et al (2005) admit that without the Inuit of Sanikiluaq's relaying of specific data about this to outsiders, Western science would never have known. The local knowledge that Inuit possessed, and which was incorporated within resulting conservation measures, was highly specific due to the fact that the species is harvested, non-migratory and closely monitored by hunters. In another case, a population of the eastern Harlequin Duck (*Histrionicus histrionicus*) on Baffin Island was 'rediscovered' (by scientists) thanks to reports from local Inuit. Their knowledge of the bird was not as specific as that of the eider, but nonetheless was initially far superior to that of outside scientists who were wholly ignorant of its occurrence.

Gilchrist et al (2005) also provide two examples of the relative uselessness of local knowledge. In the first case, what Inuit knew about the Ivory Gull *Pagophila ebunrea*, a rapidly declining species, was not of use to scientists, who later went on to do their own studies. The species, not one that is hunted locally, was of little concern to the Inuit, who had, as a result, not focused their attention on it and could tell scientists very little. In the last case, in Upernavik, Greenland, the reasons given by local hunters for the decline of the Thick-billed Murre *Uria lomvia* were incorrect and the authors linked Inuit misconceptions with hunters' overexploitation of the species.

The findings concur with this author's observations in Honduras (Bonta, 2003), where the birds that people are most knowledgeable about are those that are hunted and those that are kept as pets. The highly specific knowledge that local Hondurans have about tinamous (Tinamidae), guans, chachalacas, and curassows (Cracidae), doves and pigeons (Columbidae), parrots, parakeets and macaws (Psittacidae), and others are, in a few cases (e.g. in the Sierra de Agalta) already of great utility for conservation, for it is in many aspects superior to what is known about them by scientists, at least in the context of local populations. On the other hand, what people believe about raptors and owls is often wrong and can be highly damaging (though highly significant in terms of folkloric value).

The best of the new conservation

Like the cases of the muttonbirders of New Zealand and Francisco Urbina in Honduras, avian conservation involves 'conservation dialogues' (Bonta, 2003) between all stakeholders in an atmosphere of mutual respect where the building of trust results. Conservation projects come and go; communities endure. Governments come and go; communities endure. Thus, the best long-term solutions are those where avian conservation practices are embedded in the landscape of human–bird encounter and in the fabric of human economic, political and cultural activity. Such solutions, participatory by nature, recognize and build upon what already exists, and go on to change what is necessary. The results should be resilient and locally accepted sets of land management practices that favour the avifauna of concern. In this milieu, however, a deceptively simple component is still missing and its lack may result in a fragmented and weak conservation project easily overturned by the 'prerogatives' of socio-economic development and human survival, in general.

To endure in the modern world, environmental conservation and all its offshoots and variants as an evolving global heterodox system of beliefs and practices, by necessity, needs a corpus of 'sacred' texts – a canon – accessible not only to 'elite' practitioners in science and government, written not only in Western languages, but disseminated widely to local people in local languages, and codifying local and traditional ecological knowledge as well as Western conservation biology. The world needs more 'sacred' texts that codify the ownership and knowledge of 'resources' possessed by local people, such as the *Mayan Atlas* has done in Belize (Harris and Vang, 1998). Such texts may incorporate cosmology, ethics, legal concerns, resource issues, maps and a host of narratives, many formerly found only in the oral state. 'Resources' atlases of local worlds become a powerful tool for cultural preservation through the support of ethnic and other local claims to land. They are strengthened by combining diverse local and outsider knowledge and, of paramount importance, by being made widely available in different media, including online. Too often, the studies and reports that inform conservation are produced in limited numbers and are not easily accessible to local people even where they are understandable and relevant.

A 'sacred' text of great relevance to avian conservation is the field guide and, in this, much work needs to be done. It is difficult to believe that 20th-century bird conservation could have been as successful as it was without mass-market field guides; yet the best and most comprehensive of these are still monolingual. An argument often heard by this author is that people who watch birds – who become a constituency of paramount importance to avian conservation – are able to read the one language utilized in the text. Issues of expense and bulkiness inevitably arise when discussions of guides that should also contain species accounts in local languages are broached. The argument, of course, is circular: how can there even be a widespread culture of bird appreciation, which, in turn, can serve as a basis for conservation, if local people cannot have access to field guides (much less cheap binoculars) in a language that they can understand? A region-wide frame of reference for bird knowledge, in the form of a multicultural field guide, also means that urban as well as rural people, and more 'traditional' as well as more 'modern' people, within the same country may come to base their beliefs and practices on the same text, but one that does not privilege a certain way of knowing. The issue directly involves the numerous birds, obscure forest interior species and tiny canopy migrants, not known at all to local people, where a field guide may become the only authority. The field guide is a hybrid text, capable of weaving many 'knowledges' into one, and reaches a completeness not possible even in the most intricately detailed of local knowledge systems. Although field guides are not of the local world *per se*, they can easily become indispensable to conservation dialogues. We return to Francisco Urbina's experience.

In the Sierra de Agalta of the 1990s, only with a combination of three field guides, all in English, could one possess both illustrations and descriptions of the approximately 600 bird species occurring in the eastern half of Honduras. Neither a guide to southern Central America nor one to Mexico, alone, provided full coverage of the resident avifauna of Honduras, a country without a guide of its own. Both together were sufficient; but a North American guide was also necessary for complete coverage of Neotropical migrants, plates of which were usually excluded from Neotropical field guides, because it was assumed that birdwatchers already knew these species or possessed a North

American guide. The sole concession to traditional knowledge was the inclusion of local names of birds; but, because these vary widely between countries, they were usually not relevant in Honduras. To say the least, three bulky field guides were inconvenient to bring into the field. Yet the effect of showing plates to local people was overwhelming – most had never seen their birds represented in this fashion before (loans and donations of binoculars also helped to foment a much better understanding of why so many outsiders were intensely focused on the avifauna).

Urbina's resolution of the field guide dilemma was to cut out the relevant plates and tape them together in a binder, accompanied by names in Spanish that dispensed with such locally meaningless epithets as 'Tennessee warbler' and invented new terms where there were no local equivalents. Nevertheless, the technical English descriptions remained a struggle. Today in Honduras, despite the growing availability of binoculars and the increasing societal focus on environmental conservation, no adequate guide in Spanish is available, even though the burgeoning ecotourism to the country is resulting in the training of local bird guides who memorize the English names of birds.

This author co-wrote a birdwatching guide (Bonta and Anderson, 2004) financially supported by the Honduran ministries of tourism and natural resources/environment. The terms of the grant were that the guide be in English only since it was deemed important to attract birdwatchers to the country. It was thought that internal bird tourists were unlikely to become an economic factor large enough to merit attention. But bird tourism is good business in other countries, such as the US, where birders in regions such as the coast of the Gulf of Mexico fill local motels and eat at local restaurants during peak migration periods. By contrast, the monolingual Hondurans who take to their beaches and parks on holidays at best have access only to pamphlets and popular books that portray a select few species of birds. This is, no doubt, the same in other countries.

Field guides and other popular literature should not exist solely for the fostering of transnational ecotourism. As multicultural 'bibles', they hold great promise for bridging gaps within countries and across cultures, and for fostering the types of dynamic, hybrid conservation models that accept the incorporation of traditional and local ecological knowledge. If this is not feasible in print form, it certainly is for an online format. Indeed, if support becomes available, multicultural atlases of birds far better and more detailed than anything currently available in print form can be envisaged.

Conclusions

The whole issue of conservation and ethno-ecology, in particular, ethno-ornithology, is a complex one that requires a shift in thinking away from the maximization of profits and an incorporation, if not return to, a conceptual ethic of 'small is beautiful'. Owners of traditional knowledge and management practices must become the co-designers and co-managers of protected areas and become these in more ways than, as is still often seen, that of the token indigenous person. What takes place at the local level needs to be re-emphasized and to stand on its own: too frequently, when coupled to the national and international levels, it becomes marginalized and, consequently, devalued. Greater publicizing of role models is needed, whether they be the inspirational one-person model of Urbina or the group model of the Māori and the Sooty Shearwater, not only to demonstrate to minority groups that they, too, can make a difference, but also to enhance the enlightenment of scientists, business entrepreneurs and governmental agencies. Finally, value-adding must become a mandatory practice whether it is in the form of ecotourism, land use, joint 'scientific' endeavours or making knowledge available to all.

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3

The Broader Significance of Ethno-ornithology

Andrew Gosler with Deborah Buehler and Alberto Castillo

This chapter considers significant recent changes in perception in the global science within which global ornithology is situated. Highlighted, in particular, is a declining confidence in the ability of a purely reductionist paradigm to explain the nature of reality. In its place is developing a more holistic perception of reality that recognizes the functional unity of natural systems, whose integrity is difficult to explain through a reductionist programme. An example of such a system is Gaia, which defies explanation through the reductionist perspective of natural selection. The movement towards a holistic perception heralds a growth in ethical, spiritual and environmental awareness, bringing global knowledge closer to the holistic knowledges of indigenous peoples. A growth in understanding and respect for indigenous knowledges is predicted to emerge from these developments, with benefits to all.

> *The Indian stands free and unconstrained in Nature, is her inhabitant and not her guest, and wears her easily and gracefully. But the civilized man has the habits of the house. His house is a prison.* (Thoreau, 1841)

Global science and the place of ornithology

One question ultimately (though rarely explicitly) driving the most intense philosophical and scientific research and debate in the West for centuries has been 'What does it mean to be human?' It was to answer this question that people variously asked whether it was through our use of tools, our intelligence, upright posture, language, moral sense or spirituality, etc. that we were distinct from other animals. Gradually, through scientific discovery and description of humans in relation to other species by piecing together the course of human evolution (bones, stones and genetics), and through studies recognizing the sophisticated behaviour of other species, including the use of tools (e.g. Goodall, 1986, 2005; Weir et al, 2002), communication (e.g. Janik et al, 2006) and even morality (e.g. de Waal, 2006), we came to understand that we are not as different as we had hoped. In other words, while there may be a qualitative difference between humans and other animals, there is no single defining characteristic: the distinction, the 'sense' of separation from the rest of nature, where our roots lie, is precisely that, it is in our heads alone. Furthermore, through the study of ecology, we are coming to understand the extent to which we depend on the persistence of a healthy biosphere, and that the global human enterprise is, as Berry (2006) puts it, but 'a subsystem of the Earth system': the former has no future without the latter. Looking back to the concerted efforts of the 19th century to prove by scientific means the superiority not just of humans but, specifically, of Caucasian humans (see, for example, Gould, 1981), this has surely been a humbling experience. But it has demonstrated the objective power of the scientific method to reveal the truth, even when unpalatable to the researcher. What has emerged from this, however, is a new hegemony concerned with the power and dominion of science (perhaps most strikingly enunciated in the writings of Dawkins, 1986, 1998, 2006), rather than that of the rulers of Western empires.

Ornithology, as the scientific study of birds, stands now as a leading example of the power of global science (*sensu* Sillitoe, 2007) to explain the functioning of the natural world through an experimental (i.e. hypothesis-testing) paradigm. Studies of birds have, for example, been of inestimable value in the development of scientific thought in evolution, population ecology and genetics, and conservation biology, to say nothing of its contributions in animal behaviour. It was not ever thus however. Ornithology struggled through the early years of the 20th century to establish the credibility of its few professional exponents within a scientific community prejudiced against it by what it regarded as an amateur preoccupation. It was partly for this reason that the neo-Darwinian ornithologists of the 1920s and 1930s emphasized the importance of ecology, ethology and evolution, and distanced themselves from the broadly taxonomic interests of ornithologists of the 19th century, associated as they were with amateur bird collectors (Johnson, 2004). It might seem ironic, then, that the new ornithology stimulated a revolution in amateur ornithological involvement through the founding of organizations such as the British Trust for Ornithology in the UK. However, this demonstrates not the supremacy or attractiveness either of science or its proponents, but the inherent attraction of birds themselves: there is simply something about birds; or, as Thomas puts it in the title of his chapter, *everyone loves birds* (see Chapter 17 in this volume).

The rise of a global ornithology has come at a cost. Having now won its place within the global scientific establishment, the distinctive knowledge framework of global ornithology is compelled to follow the dominant paradigms appertaining to global scientific biology at a particular time. Chief amongst these paradigms has been a reductionist view, which argues that the behaviour of any entity, whether a molecule, bird or ecosystem, can ultimately be explained by the behaviour of its constituent parts (i.e. a bottom-up perception of causality). The reductionist perception can be likened to our perception of directionality in time (time's arrow: Gould, 1987). Hence, as consequences appear only to follow causes (the cause is not apparently dependent on the consequence, although a goal, which becomes a consequence if achieved, precedes the causal actions that achieve it), so material effects are assumed to be dependent on their constituent elements. The reductionist agenda stands in direct opposition to a holistic perception of nature, which, in science, views the functioning of whole systems as integrated units (i.e. it is not necessarily top down, but rather perceives simultaneous multidirectional causality in the same way that scientific equations such as $E = mc^2$ are not directional). Holism is concerned more with how things are now than with the reductionist preoccupation of how they came to be as they are. A powerful example is the Gaia hypothesis (Lovelock, 2000), which suggests that the whole Earth (biosphere, atmosphere and geosphere) operates as an integrated functional unit. Since the Gaia insight was proposed in 1979, the evidence for Gaia has accumulated and the hypothesis is now widely accepted by environmental scientists. It is significant that Gaia was accepted more readily by systems ecologists than by population and evolutionary ecologists (Barlow, 1992) whose perspective has a strong temporal element and is typically reductionist. Despite such observations and the fact that the assumptions of reductionism do not hold any more fully for molecules (e.g. the properties of water are not readily predicted by the properties of hydrogen and oxygen) than they do for a bird or an ecosystem, reductionism still dominates areas of global biological science within which global ornithology operates. Reductionists have responded to the recognition that systems operate as functional wholes by developing a metaphysic of emergence, arguing that new properties 'emerge' from systems as they are built up from their component elements (Holland, 2000); resistance persists either to the perception of top-down control within biological systems (see, for example, Noble, 2006) or to a teleological metaphysic, in which a goal might contribute to its causation (see, for example, Ruse, 2004).

What is distinctive about the reductionist paradigm in global biology is that it cannot accommodate the perception of holistic unity unless it has arisen through natural selection. Gaia challenges this because it demands a non-selective, even top-down, metaphysic (Lenton, 1998). Reductionism views through the separating prism of specialist knowledges that reality is an existence of disparate units (e.g. genes and geography, economy, environment and ethics) without recognizing the unity of the whole. As should be expected from the power of the global scientific method to reveal the nature of reality (the convergence of epistemology and ontology), the reductionist paradigm and agenda are increasingly challenged from within science itself. The unity of nature and knowledge of it, what Wilson (1999), himself a reductionist, has called 'consilience', has stood like the elephant in the room of biology; it is now becoming recognized.

The significance of reductionism for ethno-ornithology

Maintained within the framework of global ornithology, and combined with the hypothesis-testing methodology of global science, the reductionist paradigm remains effective in explaining the evolution, behaviour and ecology of birds. It has been signally unsuccessful, however, in providing an effective environmental ethic with which to guide conservation action. This is because an important feature of the reductionist paradigm is its incapacity to recognize intrinsic value within nature. Since the intrinsic value of life and living organisms is regarded within global conservation as a significant motivational driver underlying personal environmental ethics (Gaston and Spicer, 1998; Hambler, 2004), this can lead to a philosophical conflict (Gosler, 2009). This is especially intense when the scientific methodology is stressed at the expense of the ethics whose ground cannot be ascertained through the dominant methodology of reductionism. A consequence of the new scientific hegemony is its regarding other knowledges as inferior, a position which carries with it a disrespect for the carriers of those knowledges.

Indigenous knowledges are, or reflect, a holistic perception of reality (see Chapter 1 in this volume) – that is, there is a seamless continuity of perception between the physical, spiritual and cultural environments of people. In this perception, humans do not stand distinct from their environments or other animals but are an integral part of the former interacting on equal terms with the latter. This is illustrated well by the stories of Australian Aboriginal people presented by Tidemann and Whiteside (see Chapter 12). Here, birds may be referred to as men, and their familial relationships recognized in human terms (brothers: Silver Gulls; children playing at home: Beach Stone-curlews). Here also is a sense of the natural, comfortable position of humans belonging within this physical and conscious environment. The relationship between humans and birds revealed in these and other stories is complex, yet insightful. In addition to showing a perceptive knowledge of bird behaviour, indigenous stories involving birds are frequently used as exemplars of morality, as sources of knowledge or pointers to wisdom, or their behaviour or very occurrence might mark specific events such as the passing seasons. They may also capture deeper truths allegorically. For example, stories about how particular bird species came to be as they are imply that these birds are not as they were created but have changed subsequently, often through some action of the animal itself. This genre, which recalls Kipling's *Just So Stories* (Kipling, 1902), offers an evolutionary allegory. Similarly, stories such as that of how the Emu and Pelican came to occupy different habitats through quarrelling offers a cogent allegory of ecological niche segregation. This is not to suggest that the scientific description (evolution, ecological niche) is superior, since this too is a narrative (it is not, itself, reality), but that each describes unseen events in terms appropriate to their human place and setting.

A helpful guide (analogy) to the contrast between a reductionist and a holistic viewpoint can be found in Thomas's study (see Chapter 17) of the effects on biodiversity of the Hewa people of New Guinea, who cut 'gardens' in the forest in the course of a practice of swidden or shifting agriculture. As Thomas describes, the people are aware of a reduction in biodiversity within clearings as they are cut; but they point to the increased diversity and abundance of creatures in the clearings after several decades have elapsed since the garden was left – a diversity that is greater than that of untouched or 'pristine' forest. Several ecological studies now support this view of humans as a keystone species, in many cases increasing local diversity not only by diversifying the structure of the forest at a landscape scale (through producing patches at different successional stages of regrowth), but also by the concentration of fruit tree seeds at middens, which give rise to clumps of fruit trees of different species. These are important for invertebrates, birds and mammals, including bats, which can themselves be significant pollinators and seed dispersers. While the reductionist sees the immediate effect of cutting the forest (reduced biodiversity) as a significant detriment, it is the human effect at the landscape scale over the longer term that is ultimately important to biodiversity and, therefore, conservation: this is the correct holistic perception.

Birds are distinctly important to humans. This is indicated by the numbers of stories about birds, which as Tidemann and Whiteside indicate (see Chapter 12), can far exceed those of other organisms. Perrins (2003) has pointed out that birds are more conspicuous to humans than are other animals because of their size, colour, diurnal behaviour (most) and vocalizations. A distinct element of the relationship expressed by indigenous people is a sense of gratitude to birds, which might be shown through a specific concern for the birds' welfare (see, for example, Chapter 19 in this volume). Hence, birds enter into the world of reciprocal human interactions, which underpins all human morality, ethics, law and trade. This moral sense is consistent with the holistic sense of connection with nature, inherent to which is a respect for the rest of the natural order since it is self-evident that a common interest is shared between humans and other creatures: to harm them is to harm oneself. There is no sign here of the restless search to discover the 'true nature' of humanity, or its 'true place' in the Universe, because these things are felt to be self-evident, natural and ordained (i.e. it is a given). That search is a distinctly Western obsession, a specific kind of conceit born out of a specific perception of humanity as separate from the rest of nature. What shines out from the chapters that follow is the unity of consciousness that typifies the knowledges of peoples who live close to nature. Thoreau's observation on the native North American, at the start of this chapter, captures this distinction precisely. One gets a sense, then, that the scientific 'discovery' of a holistic nature to reality now emerging is a 'rediscovering' of the natural order long expressed by indigenous knowledges.

One might ask at what point did the Western consciousness diverge, in terms of the sense of separateness from nature, from that exhibited by indigenous peoples. But this would be an inappropriate framing of the question. There has been no evolutionary or genetic divergence in perception like some kind of speciation event. It is the direct, living, day-to-day contact with nature itself that develops and maintains this holistic, spiritual and respectful sense, and separation from nature that can lead to the fragmented perception that humans are out of place, separate. It is notable that the cases of environmental damage and extinctions that implicate human agency prior to the expansion of Western culture and industrialization typically involved the immigration of people whose cultural and environmental consciousness was in some way inappropriate or out of phase with the land into which they were moving (e.g. Polynesian migration and Pacific Island bird extinctions; see Steadman, 1995, and Chapter 7 in this volume).

In a valuable synthesis of research on perceptions of nature, Ingold (1996) cites the work of Turnbull (1965) on Mbuti Pygmies of the Ituri Forest who refer to the forest as 'Father' or 'Mother'. They do this, they say, because 'it gives them food, warmth, shelter and clothing, just like their parents' and moreover because it 'gives them affection'. Ingold describes further examples, from the Batek Negritos of Malaysia (Endicott, 1979) and of the forest-dwelling hunter–gatherer Nayaka people of Tamil Nadu (Bird-David, 1990), suggesting that this sense of being children of the father or mother forest is not uncommon. He suggests that the relationship expressed here is of nurture, of being loved by ones' environment. But the nature of this relationship is yet more profound. Citing Bird-David (1990, 1992), Ingold states that the principal metaphor of forest as parent is represented 'more generally by the notion that the environment gives the wherewithal of life to people – not in return for appropriate conduct, but unconditionally'. Bird-David (1990) noted that this perception of unconditional gift or love contrasted with that of neighbouring populations of cultivators who likened their environment to an ancestor, rather than a parent, who 'yields its bounty only reciprocally, *in return* for favours rendered' (Ingold, 1996). Hence, by implication, the shift from hunter–gatherer to cultivator may be associated with a shift in perceived relationship with the land, from one of unconditional gift to one of payment for service, with a concomitant displacement of a loving relationship by a fearful one because cultivation involves greater risk: under cultivation the land is a fickle partner. Whether or not this analysis is correct, the significance of reciprocity in the human understanding, and use, of gifts (Mauss, 1922), coupled with a perception of the ecosystem as an extension of human society (ecosystem as society; Hunn, pers comm, 20 July 2009), suggests that the appropriate human response to a perception of one's environment as a provider of gifts, or as a gift itself, is one in which the ecosystem is regarded with empathy and mutual respect (see, for example, Hunn, 1990, and Chapter 19 in this volume).

In recognizing that direct interaction with wild nature heals the distorted perception of the human's place in nature, Thoreau (1851) wrote: 'It is the marriage of the soul with Nature that makes the intellect fruitful, and gives birth to imagination.' As the holistic consciousness engenders respect, so the West's rediscovery of holism is associated with a spiritual awakening and regaining of respect for, rather than fear of, the Earth, and for other creatures (see, for example, Goodenough, 2000). The relationship between holism and morality is recognized in the shared etymology of the English words integration and integrity (and, indeed, integer). While Thoreau, author, naturalist, philosopher, frontiersman and co-founder of the Wilderness Movement, has been criticized for romanticizing the state of the Indian (Anderson, 2005), what Thoreau demonstrates clearly through his discourse on the Indian perception is his genuine respect for indigenous culture. So here it is: the search to discover what it 'means' to be human is well served through a willingness to respect, and listen to, indigenous people. Buehler and Castillo take up the importance of respect in ethno-ornithological activities in their 'Snapshot' on guide/ornithologist cooperation in Panama at the end of this chapter. The exercising of respect, for each other, for other species and for the Earth, requires a humility far beyond that prompted by discovering that we are primates; but I suggest that it is nothing less than essential for the future of humanity. Thoreau (1849) warned: 'This world is but canvas to our imagination.' And so it may appear; but if that imagination divorces humans from nature the separation has the potential to be a lethal illusion (Kellert, 2007). This is because the fundamental relationship between humans and the Earth is not a reciprocal one: while we depend on the Earth, the Earth does not depend on us – it owes us nothing; we owe it all. We are reminded of this by the very word 'human' (from the Latin '*humanus*') meaning lowly (hence, 'humility') or 'of the earth' (hence 'humus'). Recognizing the asymmetry of our relationship with the Earth (as do the forest-dwellers studied by Endicott and Bird-David), then, is the ultimate basis for acknowledging our existence as a gift. It is only when we explore that realization with humility that we develop a correct (i.e. viable and sustainable) environmental ethic.

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Snapshot

Mutual Respect: An Example of Local Guide and Ornithologist Cooperation in the Republic of Panama

Deborah M. Buehler and Alberto I. Castillo

The word Panama is said to stem from an indigenous word meaning 'the abundance of fish', or 'the abundance of butterflies', or even 'the abundance of a certain species of tree'. One thing is for certain, Panama means 'abundance' and locals, as well as trained researchers, have been working together and learning about its abundance for many years. For this collaboration to be optimized, a few simple guidelines are needed emphasizing mutual respect, open communication and the importance of liaisons.

The Republic of Panama is a tropical country located 7° to 10°N and 77° to 83°W. It is a small country with an area about 75,517 square kilometres and is a land of contrasts in terms of natural habitats and species diversity, as well as people and their cultures.

Panama has been of interest to European and North American scientists for decades because of the Panama Canal, and has a long history of collaboration with scientists and engineers from all over the world. However, both international and Panamanian scientific bodies are largely based in the capital, Panama City, whereas much of the fieldwork for research takes place in remote areas. Thus, cooperation between scientists and locals living in remote areas becomes of paramount importance. This snapshot is a description of how such collaboration can be optimized and presents a few simple guidelines emphasizing mutual respect, open communication and the importance of liaisons.

In 2001 and 2002, Alberto Castillo participated in a study initiated by the Panama Canal Authority (ACP) to evaluate the feasibility of constructing facilities to provide additional water supply for the Panama Canal. The main focus of the study was to weigh the environmental and cultural impacts of competing projects and involved sending out teams of trained scientists (anthropologists, ichthyologists, botanists, herpetologists, ornithologists, etc.) to collect detailed data at a variety of remote sites within the Panama Canal watershed area. Alberto Castillo headed the ornithological expeditions, training and leading a team of University of Panama graduates as well as project leaders, including researchers from the Smithsonian Tropical Research Institute and University of Panama. The remote sites visited during the project were often accessible only by boat or helicopter. Alberto Castillo is a University of Panama botany graduate and was trained in ornithology at the Smithsonian Tropical Research Institute. He grew up in an urban environment, but prior to this project had gained experience with locals from remote areas during travels in Central and South America. This background allowed him to liaise both between international researchers and Panamanians and between rural and urban Panamanians.

The code of conduct

To perform his task, Alberto Castillo developed a code of conduct to follow when visiting remote areas and connecting his team with locals. This code is presented here and outlines the challenges and what works to overcome them.

The challenges

Lack of respect for locals

Unfortunately and rarely admitted, there is often a lack of respect for local knowledge in the academic community despite locals knowing the native flora and fauna far better than the most educated of researchers. Hence, visitors often come across as superior and aloof and this strains communication with locals. However, admitting a deep-seated lack of respect, and actively changing that belief, can go a long way towards improving communications and the science produced via collaboration.

The need to assess the skills of the local guide tactfully

The level of expertise of local guides will vary, and researchers must be able to assess their skills without offending them. For example, some guides would rather give a wrong answer than admit that they do not know the answer. Often this is done out of a desire to please the visitor. One way of getting around this is to ask the same question (e.g. the name of a particular bird) in different contexts and over a period of time to see if the answer changes.

Miscommunication between researchers and local guides

At times, even when researchers and local guides enter into a collaboration with open minds, there can be miscommunication due to different ways of thinking and cultural differences between urban and remote communities. A further complication arises because local names for flora and fauna often differ from the accepted common and scientific names, so researchers and locals need to 'learn the language' of the other.

What works

Begin with mutual respect

Researchers should begin by being honest with themselves and identifying whether they have feelings of superiority. A university-trained academic, no matter how well educated and open minded, cannot know specific rural areas to the depth that local guides know them. Rural guides are educated, but their education is different and more applied, and they may have a different way of expressing their knowledge. 'City folk' need to start by being humble, accepting local knowledge and sharing their own. Both locals and researchers can learn a lot from open-minded collaboration.

Be flexible

Every remote site is different and every local guide is different. Although researchers must, by definition, have pre-planned census methods and even routes, when entering a new community it is worthwhile spending a day or so walking with the local guide to get a feel for the area, the guide and the ways in which locals interact with their bird community. Scientific methods need not exclude local knowledge that includes information on present and historical land use, as well as on distributions of birds, possible nesting and roosting areas, etc.

Learn the language

Make an effort to learn the ways in which the locals refer to 'their' birds: get to know the naming system. When learning a local name, share the names listed in the official bird book with the guide, but ensure that this is a mutual sharing of information, not force-feeding of the 'correct' name. Researchers often enter remote areas and attempt to use keys and identification systems from books to classify birds without the help of local guides. However, without an in-depth knowledge of behaviour and habitat use, this system can lead to misclassifications. It is better to take the time to listen to local guides and understand their systems of classification and naming.

Additional information gained from collaboration

In this snapshot we provide a small example of additional information that can be gained from local collaboration. The data in Table 3.1 were collected out of personal curiosity by Alberto Castillo and contain local names used in the mid-western Coclé Province of Panama (El Copé, Rio Indio, Penonomé, Coclesito and El Congal). The local names where supplied by Agustín Ojo in El Congal, Santana and Junior Arcia in El Copé, and a series of other knowledgeable local birders in the other sites. Spanish names were taken from Ridgely and Gwynne (1992), unless otherwise indicated.

What the locals can gain from the collaboration

Local guides can gain immensely from collaboration with trained researchers. These gains include a deeper understanding of the importance of their knowledge and their natural communities, as well as different research methods. In many remote areas locals are impressed that outsiders are keenly interested in their local flora and fauna. In many cases, contact between adjacent communities was enhanced by their being put into contact via Alberto Castillo, who had visited both locations, and local guides began internal collaborations. Local guides also gained greater respect within their own communities when their knowledge was seen to be respected by outsiders. This has the additional bonus of enhancing liaison between researchers and the community in the future, and can be important when working with whole communities to preserve natural resources.

Future work

There are many ways in which successful collaborations between researchers and local guides in rural communities can be encouraged in the future. These include:

- funding and expansion of programmes such as the Bird Book and Binoculars Programme run by the Panama Audubon Society, which supplies locals with field guides, binoculars and training on how to watch birds;
- interpersonal skills training for researchers and academics with an emphasis on communication, ‘learning the language’, how to be ‘humble’ and avoid miscommunication; and
- the creation of ‘dictionaries’ of bird names to allow communication between researchers and locals and between communities.

Table 3.1 is an example of this type of dictionary and could be expanded to include local names from many different regions.

Table 3.1 *Local, Spanish, English and Latin names collected in the mid-western Coclé Province of Panama*

Family	*Local name*	*Spanish name*	*English name*	*Latin name*
TINAMIDAE	Poclora	Tinamú Grande	Great Tinamou	*Tinamus major*
CATHARTIDAE	Gallote, Gallinazo	Gallinazo Negro	Black Vulture	*Coragyps atratus*
	Noneca	Gallinazo Cabecirrojo	Turkey Vulture	*Cathartes aura*
	Cacicón	Gallinazo Rey	King Vulture	*Sarcoramphus papa*
ACCIPTRIDAE	Guincho	Águila Pescadora	Osprey	*Pandion haliaetus*
FALCONIDAE	Lenguao	Chupacacao ventriblanco[1]	Red-throated Caracara	*Daptrius americanus*
CRACIDAE	Pava de monte	Chachalaca Cabecigris	Gray-headed Chachalaca	*Ortalis cinereiceps*
PHASIANIDAE	Corocobao, perdiz	Codorniz Jaspeada	Marbled Wood-Quail	*Odontophorus gujanensis*
RALLIDAE	Cocaleca	Rascón-Montés Cuelligris	Gray-necked Wood-Rail	*Aramides cajanea*
	Gallo de monte	Rascón café[2]	Uniform Crake	*Amaurolimnas concolor*
	Querguero	Gallineta Morada[3]	Purple Gallinule	*Porphyrula martinica*
EURYPYGIDAE	Pavito de quebrada	Garza de Sol	Sunbittern	*Eurypyga helias*
COLUMBIDAE	Torcaza	Calzonario Patirrojo	Pale-vented Pigeon	*Columba cayennensis*
	Torcaza	Paloma Escamosa	Scaled Pigeon	*Columba speciosa*
	Palomina	Paloma Collareja	Band-tailed Pigeon	*Columba fasciata*
	Tres pesos son	Paloma Piquicorta	Short-billed Pigeon	*Columba nigrirostris*
	Tierrerita	Tortolita Rojiza	Ruddy Ground-dove	*Columbina talpacoti*
	Azulita	Tortolita Azul	Blue Ground-dove	*Claravis pretiosa*
PSITTACIDAE	Carisucio		Brown-throated Parakeet	*Aratinga pertinax*
	Casanga	Loro Cabeciazul	Blue-headed Parrot	*Pionus menstruus*
	Chirota	Loro Cabecipardo	Brow-hooded Parrot	*Pionopsitta haematotis*
	Loro verde	Amazona Harinoso	Mealy Amazon	*Amazona farinosa*
CUCULIDAE	Chiscuao, Brujo	Cuco Ardilla	Squirrel Cuckoo	*Piaya cayana*
	Fin fin	Cuclillo Listado	Striped Cuckoo	*Tapera naevia*
	Paisana guerrera	Cuco Hormiguero[3]	Rufous-vented Ground-Cuckoo	*Neomorphus geoffoyi*
NYCTIBIIDAE	Deonora	Nictibio Grande	Great Potoo	*Nyctibus grandis*
	Cerococo	Nictibio Común	Common Potoo	*Nyctibus griseus*
MOMOTIDAE	Tunturura, barranquero	Momoto Rufo	Rufous Motmot	*Baryphthengus martii*
RAMPHASTIDAE	Pichilingo	Tucancillo Collarejo	Collared Aricari	*Pteroglossus torquatus*
	Calabo	Tucancillo Orejiamarillo	Yellow-eared Toucanet	*Selenidera spectabilis*
	Urraco	Tucán Pico Iris	Keel-billed Toucan	*Ramphastos sulfuratus*
	Cajinegro, Dios te de	Tucán de Swainson	Chestnut-mandibled Toucan	*Ramphastos swainsonii*

Family	*Local name*	*Spanish name*	*English name*	*Latin name*
TYRANNIDAE	Chuzpita	Elenia Penachuda	Yellow-bellied Elaenia	*Elaenia flavogaster*
	Pimpirin, Timbirilla	Bienteveo Grande	Great Kiskadee	*Pitangus sulphuratus*
	Cherrelle	Mosquero Picudo	Boat-billed Flycatcher	*Megarynchus pitangua*
	Pechiamarillo	Tirano Tropical	Tropical Kingbird	*Tyrannus melanncholicus*
	Tijereta	Tirano-Tijereta Rosado[3]	Scissor-tailed Flycatcher	*Tyrannus forficatus*
	Porroco, puerquita, Pedreco	Titira Enmascarada	Masked Tityra	*Tityra Semifasciata*
PIPRIDAE	Quiebra palito, Ñue	Saltarín Cuellidorado	Golden-collared Manakin	*Manacus vitellinus*
CORVIDAE	Cho cho	Urraca Pechinegra	Black-chested Jay	*Cyanocorax affinis*
TROGLODYTIDAE	Ruiseñor	Soterrey Común	House Wren	*Troglodytes aedon*
	Tigrero	Soterrey-Selvático Pechiblanco	White-breasted Wood-Wren	*Henicorhina leucosticta*
TURDINAE	Octubreñita	Zorzal Carigris	Swainson's Thrush	*Catharus ustulatus*
	Chuera, Cascas, capisucia	Mirlo Pardo	Clay-coloured Robin	*Turdus grayi*
THRAUPINAE	Chuzerito	Mielero Patirrojo	Red-legged Honeycreeper	*Cyanerpes cyaneus*
	Bin-Bin	Eufonia Coroniamarilla	Yellow-crowned Euphonia	*Euphonia luteicapilla*
	Azulejo	Tangara Azuleja	Blue-gray Tanager	*Thrauìs episcopus*
	Palmero	Tangara Palmera	Palm Tanager	*Thrauìs palmarum*
	Re-Re	Tangara-Hormiguera Coronirroja	Red-crowned Ant-Tanager	*Habia rubica*
	Re-Re	Tangara-Hormiguera Gorgirroja	Red-throated Ant-Tanager	*Habia fucicauda*
	Primavera	Tangara Veranera	Summer Tanager	*Piranga rubra*
	Chichemero	Tangara Lomiflama	Flame-rumped Tanager	*Ramphocelus flammigerus*
CARDINALINAE	Pifasero	Saltador Listado	Streaked Saltator	*Saltator albicollis*
	Chachalia	Saltador Cabecinegro	Black-headed Saltator	*Saltator atriceps*
EMBERIZINAE	Chio	Semillerito Negriazulado	Blue-black Grassquit	*Volatinia jacarina*
	Arrocero	Espiguero Variable	Variable Seedeater	*Sporophila americana*
	Pico de ají	Gorrión Piquinaranja	Orange-billed Sparrow	*Arremon aurantiirostris*
	Redonmdillo blanco	Gorrión Negrilistado	Black-striped Sparrow	*Arremenops conirostris*
ICTERINAE	Tordo	Vaquero Ojirrojo	Bronzed Cowbird	*Molothrus aeneus*
	Tordo	Vaquero Gigante	Giant Cowbird	*Scaphidura oryzivora*
	Parao, Chompín	Bolsero Dorsiamarillo	Yellow-backed Oriole	*Icterus chrysater*

Family	*Local name*	*Spanish name*	*English name*	*Latin name*
	Chojean	Cacique Piquiamarillo	Yellow-billed Cacique	*Amblycercus holosericeus*
	Cujurucho	Oropéndola Cabecicastaña	Chestnut-headed Oropendola	*Psarocolius wagleri*
Special cases				
Almost all members of the following families are known as the following:				
TROCHILIDAE	Visita Flor, Trompita	Colibríes	Hummingbirds	
TROGONIDAE	Uaquitas, Cas-cas, Gallineta	Trogones	Trogons	
TROGLODYTIDAE	Redondillos, ruiseñores	Sotereyes	Wrens	

Notes:
1 Spanish name obtained from http://www1.nhl.nl/~ribot/english/daam_ng.htm.
2 Spanish name obtained from http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=176308.
3 Spanish names obtained from http://www.natureserve.org/infonatura.
Source: local names supplied by Agustín Ojo, Santana and Junior Arcia, and a series of other knowledgeable local birders; 'official' Spanish names taken from Ridgely and Gwynne (1992), unless otherwise indicated.

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Part II

Birds: Hunting and Products

4

The Māori and the Huia

David C. Houston

Māori ancestors came from Polynesia and after reaching New Zealand developed their cultural associations with their natural surroundings. An extinct bird, the Huia, was especially revered. The distinctive black-and-white tail feathers were prized and could only be worn by chiefs of distinction for special ceremonies or when going into battle. Huia were remarkable in the extent of their bill dimorphism, which was probably greater than that of any other bird species. As a consequence, the male and female assisted each other in finding food and were always found together. It is likely that Huia were revered by the Māori because their foraging behaviour came to represent extreme fidelity, devotion and faithfulness. The tail feathers were stored in specially constructed and intricately carved boxes, and were passed from one generation to the next.

Introduction

The ancestors of the Māori people probably reached New Zealand from the Cook Islands within the last 800 years (Howe, 2006). Once established they developed a complex and close association with their natural surroundings, and especially with the bird fauna. Birds were important as sources of food and were also the basis for a great many legends and beliefs. Riley (2001) has given a detailed account of the attitude and relationship of the Māori to all the birds of New Zealand. Some species were regarded as '*tapu*', being sacred and protected, especially the extinct Huia *Heteralocha acutirostris*, which is described by Phillips (1963) as 'sacred above all other denizens of the forest' and the spirit of this bird protected the *tapu* of the whole forest (Riley, 2001). The distinctive black-and-white tail feathers of Huia were especially prized as hair decoration, and could only be worn by chiefs of distinction (see Plate 1) and the Huia came to be highly esteemed by the Māori.

The peopling of the Pacific is a remarkable aspect of human expansion around the world. The navigation technology that allowed canoes to undertake the epic ocean voyages only developed during the last few thousand years (Howe, 2006). Pacific colonization all occurred from a single source, the Lapita peoples of South-East Asia. They eventually would become established on all the habitable islands of the Pacific, as far east as Easter Island, and also travelled west across the Indian Ocean to people Madagascar. These journeys were comparatively recent. Fiji and Samoa may have been reached by 2500 to 3000 years BP and, from there, the further islands of Hawai'i and Easter Island were probably settled in the last 1000 years. New Zealand was the last sizeable habitable land mass on the planet to be reached by humans.

The bird assembly that the Māori found in New Zealand was unique. New Zealand became isolated from Gondwanaland about 80 million years ago and is the only large land mass in which evolution has proceeded in the absence of any terrestrial mammals (Gibbs, 2006). Bird radiation proceeded to occupy many unique niches, some of which would in other parts of the world be expected to be taken by mammals, such as the nine species of Moas in the endemic order Dinornithiformes, the endemic order of kiwis Apterygiformes and the endemic family of wattlebirds, Callaeatidae – which is the group to which the Huia belonged. The Huia was a medium-sized passerine bird, about 45cm long (see Plate 2). It had an orange wattle at the base of the bill, black iridescent plumage, with a white band at the tip of the tail. Despite being seemingly dull in colour, it was the tail feathers that were especially prized by the Māori as decoration, with single tail feathers worn in the hair, or the 12 tail feathers kept together by severing the entire tail, which was called a *marereko* (Philips, 1963). These were the emblem of a high chief, and were only worn in the hair for special ceremonies or when going into battle (Riley, 2001). They were highly valued and carefully stored and protected when not in use. Although Māori beliefs and traditions developed within New Zealand, they retain many features common to all Pacific cultures. Among these is the association of the colour red as a symbol of rank and status (Kaeppler, 2008). The reason for this is unclear; but red has obvious richness and vibrancy as a colour and the association with blood (childbirth) and sunrise may also have been significant. Whatever the origin, Māori maintain this tradition and use red paint or ochre widely on important buildings or carvings (Neich, 1996). Feathers were also of important symbolism in themselves through their association with birds as symbols of the link between the land of the living and spirits of the air. Because of these varied associations, red feathers were considered especially significant and, throughout Polynesia, were widely used in personal adornment for people of status and rank. Perhaps their most spectacular use is in the feather cloaks of Hawai'i, where brilliant red feathers from the extinct and endangered species of Hawaiian Honeycreepers (Drepanididae) were combined with yellow plumes from the extinct O'o *Moho nobilis* and Mamo *Drepanis pacifica* to create striking colour patterns. It might have been expected that when the Māori reached New Zealand they would have selected from the native birds those with red feathers to use as their symbol of rank or status. Several suitable species were available. The most brilliant red feathers among New Zealand birds are to be found on the head of the Red-crowned Parakeet *Cyanoramphus novaezelandiae* and the Yellow-crowned Parakeet *Cyanoramphus auriceps*, and a duller red feathering is found on the underwing coverts and other parts of two parrots, the Kaka *Nestor meridionalis* and Kea *Nestor nobilis*. Kaka were, after the Pigeon *Hemiphaga novaeseelandiae*, the bird that was most frequently caught by the Māori for food (Riley, 2001), so red feathers would have been freely available. Kaka feathers were used to a limited extent on feather cloaks (Riley, 2001). Perhaps the reason that the Māori revered the comparatively dull black-and-white feathers of the Huia so highly may lie in the behaviour of Huia.

Biology of the Huia

Huia became extinct in 1907. New Zealand has lost 58 (26 per cent) of the 223 bird species thought to have occurred there at the time of first human settlement (Tennyson and Martinson, 2006), the causes being a familiar story of habitat destruction, introduced predators and, in the case the Huia, possibly exacerbated by excessive collecting (Wilson, 2004; Tennyson and Martinson, 2006). Several reviews of what is known about Huia have been published by Phillips (1963), Moorhouse (1996), Tennyson and Martinson (2006) and other earlier authors. Huia were remarkable in the extent of their bill dimorphism, which was probably greater than that of any other bird species. The male's bill was stout and chisel-like, while the female's was slender, with a downward curve (see Plate 2). Moorhouse (1996) measured 30 Huia skins in New Zealand museums and found a mean length of 62.3mm for males and 91.6mm for females: I measured 23 skins in the collection of the Natural History Museum at Tring (UK), using the same methods described by Moorhouse, and these give very similar values, with mean bill lengths for the 15 males of

59.3mm (width 12mm) and for the eight females 90.2mm (width 9.5mm). As Moorhouse (1996) points out, all such measurements from skins have some potential error. In ten of the British Museum skins the sex is not identified on the label, and even in those where it is stated it is not known whether sexing was based on dissection or assumed from bill morphology. Bills of juvenile females may have been similar to those of males, and so young birds may have been assigned to the wrong sex. But, despite this, it seems clear that the female bill was about 30 per cent longer than that of the male and also differed in being considerably thinner as well as being markedly de-curved (see Plate 2). Their bills were so dissimilar that Gould, the first ornithologist to describe the bird, regarded them as belonging to separate species (Phillips, 1963). Jamieson and Spencer (1996) and Frith (1997) pointed out that sexual bill dimorphism is not unique to the Huia, but the Huia is remarkable both in the extent of this bill dimorphism and because, in tarsus and wing length measurements, the size differences between the sexes were otherwise modest. The significance of the different bill shapes has been much debated (e.g. Moorhouse, 1996; Wilson, 2004); but most authors agree that the two sexes must have foraged in quite different ways. Detailed observations on Huia feeding appear in the classic work of Buller (1888), who observed birds in the wild and also kept a pair in captivity in his house for about a year. They fed on the large grubs of wood-boring beetles, especially Huhu grubs *Prionoplus reticularis*, which grow to the size of a man's finger. Buller provided his captive birds with larvae-infested logs and observed how the shorter bill of the male was used on the more decayed timber, hammering it open like a woodpecker to reach the large grubs, while the female's long probing bill was used on the more resistant timber that had then been exposed, probing into holes in the hard wood to seize the smaller grubs that were out of reach of the male. Burton (1974) has shown that the musculature of the jaw also differed between the sexes and allowed the male to use the bill to prize open rotting wood in a way that would not have been possible for the female. Once a Huhu or other insect grub had been extracted, the bird then clipped off the hard head and jaws before tossing the grub into the air so that it could be swallowed whole. The main disagreement in the subsequent literature was over whether the male and female actually shared any food items that they obtained, or just foraged together and both benefited from the activities of the other (Wilson, 2004). Jamieson and Spencer (1996) have pointed out that when other authors misinterpreted his writing to imply a sharing of the food, Buller (1888) himself corrected this and stated that the pair did not share their food once it had been obtained. There seems no doubt from Buller's observations that the pair foraged together and their extreme bill dimorphism makes it likely that to forage optimally, both sexes needed to cooperate. Such niche separation in feeding, in which the two sexes avoid competition for the same prey items, is thought to be one of the main evolutionary factors leading to bill dimorphism in birds (Selander, 1966). All accounts suggest that in Huia, the sexes were always seen together in the forest, in close proximity, not only when feeding but also when flying around the forest. Buller (1888) reports that at night the male and female would perch together, their bodies snuggled together in close contact. He records how the pair would play with each other, were constantly active, and would regularly meet to caress each other with their bills, uttering low twittering noises. When his male captive bird died accidentally, the female 'manifested the utmost distress, pined for her mate, and died ten days afterwards'. Colenso, another early writer on New Zealand natural history (cited in Phillips, 1963) also noted that the birds kept together in pairs and that the male and female were greatly attached to each other and that they, naturally and mutually, helped in their search for food. It seems likely that Huia were revered by the Māori because their foraging behaviour came to represent extreme fidelity, devotion and faithfulness. Maybe these features more than compensated for their apparently dull colour and explains the high status with which the birds were revered.

Huia were hunted by the Māori, under a quota system, for their tail feathers. These were highly valued, and when not in use were carefully stored and protected in specially carved wooden feather boxes. Huia feathers were passed from one generation to the next and, because they were so carefully preserved in these feather boxes, there were probably few birds originally killed for their feathers. This was to change when Europeans developed a fashion for the feathers, leading to overhunting that may have contributed to species extinction (Phillips, 1963). Wood carving was integral to all Polynesian cultures, but New Zealand had several natural advantages which led Māori carving to develop into the finest examples of this art form in Polynesia. First, New Zealand had abundant forests, with trees that provided excellent timber, especially totara *Podocarpus totara* and kauri *Agathis australis*. Wood from these species was ideal for carving, being rich in colour and having a dense, short grain that allowed and retained great detail in the carving (Neich, 2001). Equally important, and uniquely among Pacific Islands, the south island of New Zealand had supplies of jade (greenstone) from which fine woodcarving chisels could be made. New Zealand, being derived from Gondwanaland, is geologically complex and includes areas of dense metamorphic rocks. Most other Pacific Islands are volcanic or uplifted coral atolls and lack hard rocks suitable for making fine stone tools. Greenstone, although extremely hard, and so difficult and time consuming to work, made chisels that were capable of a similar level of complex woodcarving to modern steel tools (Neich, pers comm). The feather boxes (see Plate 3), made to contain the tail feathers of Huia, perhaps represent the finest examples of all Māori woodcarving (Neich, 1996, 2001). There were two basic shapes to these feather boxes. *Wakahuias* were long and thin in shape, specifically to hold the single Huia tail feathers (see Plate 1), from which the boxes get their name (*waka* signifies a long canoe-shaped box; *huia* the bird). The second form is a *paphou*, which is rectangular in shape. The word *hou* denotes tail feathers and these boxes were probably used for whole Huia tails and feathers from other birds, as well as greenstone pendants and other precious items. The boxes were suspended by cords from the roofs of houses, probably so that the feathers would be in dry, smoky air that would help to preserve them from insect attack. As a consequence, often the most detailed and complex carving was on the base of the boxes because these were normally viewed from below. These boxes to hold Huia feathers are supreme examples of Māori art. They demonstrate the status that the Huia received from the Māori. And the choice of the Huia as a bird of such high esteem may be one of many indications of the close observation and study that lay behind the Māori view of their world.

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5

The Impact of Red Feather Currency on the Population of the Scarlet Honeyeater on Santa Cruz

David C. Houston

Currency, in the form of elaborate coils of red feathers from the Scarlet Honeyeater, *Myzomela cardinalis*, was the basis of a complex trading network between Santa Cruz and neighbouring Pacific Islands. The feather currency was in the form of rolls that could be up to 10m in length. They were not worn, displayed or used in any decorative way, and were manufactured by only a few families, the skills passing from father to son down the generations. The feather currency rolls had a complex valuation system. It is estimated that 20,000 male honeyeaters were killed each year to supply this currency and this may have added 12 per cent male mortality to the bird population. Despite this heavy and sustained hunting pressure, the species did not become extinct on Santa Cruz.

Introduction

Our lives are so dominated by credit cards, coins and banknotes that it is difficult to visualize how societies can function without conventional money. But all over the world alternative forms of currency were once widespread (Quiggin, 1949; Opitz, 2000). One of the most remarkable of these developed on the Pacific Islands of Santa Cruz, based on elaborate coils of red feathers taken from the Scarlet Honeyeater, *Myzomela cardinalis* (see Plate 4). This form of currency was the basis for a trading network between neighbouring islands (Davenport, 1962). It is the only case known where a whole currency system was based on the exploitation of a wild bird population and, to sustain this currency, must have required killing a considerable number of birds each year. This chapter considers the possible scale of the hunting pressure exerted on the bird population to support this money supply.

The remote Santa Cruz and associated islands are part of the Solomon Islands group, to the east of New Guinea. Their red feather money was only one of many early money systems to develop in the Pacific cultures (Quiggin, 1949). Such societies relied on barter for most routine transactions. A fisherman would exchange a few fish with a farmer for some of his taro and so a chain of exchanges allowed people to obtain their daily needs. But bartering systems cannot function when it is necessary to trade in large quantities of produce or buy something of exceptional value: this requires a currency. In Santa Cruz the small, outer reef islands had sandy, infertile soils that made them unsuitable for growing root crops but had a comparatively high human population, who mainly relied on fishing and rearing pigs. The main Santa Cruz island was comparatively large, under-populated, but with fertile soil suitable for growing the staple crops of taro root and yams. Red-feather money was the basis for the trade in these essential commodities between island communities (Davenport, 1962). Money was also needed to pay for expensive items, perhaps to hire someone to carve a canoe, obtain pigs for a feast day or to buy a wife. These purchases needed some exchange of goods that were recognized by the whole community as of great and permanent value. Western societies, from early times, based their currency on coins of rare metals. But the Pacific cultures mostly developed on islands of volcanic or coral rocks that lacked metal ores. Coal and other fuels that could generate temperatures high enough to smelt metals were also absent. These societies, instead, had to develop an alternative currency of recognized worth and usually relied on objects made from scarce natural resources, together with the display of skill, time and craft for their manufacture.

A wide range of shell, stone and other currencies developed (Quiggin, 1949), of which the Santa Cruz feather money is the most spectacular and intricate. In Polynesian societies the colour red was especially significant, as were feathers (Kaeppler, 2008). Red was the colour of the gods and, consequently, was used for personal adornment by chiefs, who were the embodiment of the gods (Beasley, 1936). However, natural sources of red were rare in the environment. The red pigments of marine mollusc shells fade rapidly in sunlight and the only source of a permanent, vibrant red colour came from the feathers of certain birds. Particularly brilliant red feathers are found on the Scarlet Honeyeater, a species with a wide distribution over the Pacific Islands, and the Santa Cruz race *M.c. sanctaecrucis* has more scarlet in the plumage than most other subspecies. Mayr (1945) reports that in males only the wings, tail and lower abdomen were black and totally lacked any red feathers, although my examination of the six Santa Cruz skins in the British Museum suggest that the extent of red feathering may vary between individuals, perhaps depending on the age of the bird. Mayr (1945) reports that females are sooty olive in colour, with dull scarlet feathers usually confined to the rump.

Santa Cruz is still a relatively remote island group. The original Melanesian and Polynesian inhabitants had a fierce reputation and resisted early European settlement. It was probably not until the timber industry developed during the 1930s, and then World War II, that Western influences became firmly established. The first published account of their currency was in 1891 by Codrington (1891). This, however, contained many errors that were copied by subsequent authors (Edge-Partington and Heape, 1890–1898). For example, he stated that the source of the feathers was the lorikeet *Trichoglossus massena* (now *T. haematodus*), a mistake that was only corrected by Beasley in 1936. Beasley's (1936) account remains one of the most detailed and informative records, although he never visited Santa Cruz. He relied for his information on a correspondent on the island, F. L. Jones. Two other authors who give accounts are Davenport (1962), who worked on the islands (and took most of the photographs reproduced here) and Koch (1971). Their accounts are anecdotal and it is not clear to what extent the information they contain was based on original field observations, from questioning local people who had been involved in the feather money trade in their youth or copied from Codrington's or Beasley's earlier accounts.

Manufacture of feather currency

The feather rolls, which can be up to 10m in length, were not worn, displayed or used in any decorative way whatsoever. They were stored, wrapped in palm leaves or trade cloth, on shelves in the roofs of houses, where the smoke from fires probably deterred insect deterioration. In some cases special huts were constructed for their storage. The feather money was only manufactured on Santa Cruz and was then traded with the other islands (Davenport, 1962). Beasley (1936), Davenport (1962) and Koch (1971) all describe how three specialists were needed to manufacture each roll. These skills were restricted to a few families, were passed from father to son down the generations, together with various incantations and chants that were used during manufacture to communicate with the spirits and endow the currency with special power.

First, a bird catcher caught the birds, normally using sticky latex from the sap of the paper mulberry tree, *Broussonetia papyrifera*. This was smeared onto a prominent perch, to which birds were attracted by either a tethered live bird, dead decoy (see Plate 5) or an imitation of their call made by a flute played by the hunter (Koch, 1971). Birds were caught on the outer islands, as well as on Santa Cruz itself. Beasley (1936) reports that a hunter could usually capture 5 to 10 birds in a day, up to 20 on a good day (see Plate 6). Presumably the birds were both relatively abundant and easily lured.

The feathers were then plucked. Beasley (1936) says that the birds were killed because if they had been released they were unlikely to be caught by the same technique again. Both Davenport and Koch report that the birds were released after their feathers had been plucked. However, Davenport considers that they would have died later and it is extremely unlikely that birds could have survived such extensive de-feathering, making them virtually bald. It is more likely that they were either killed or died later. The feathers were then packed in coconut shells, the feathers from ten birds in each shell being regarded as a trading unit by the hunter (Koch, 1971); if they had been collected on one of the outer islands, they would have then been sent to Santa Cruz for the second stage of manufacture.

A second craftsman then constructed a series of small platelets (see Plate 7) based on the feathers of the grey Pacific Pigeon, *Ducula pacifica*, which were shot by bow and arrow. The pigeons are dull in plumage but have stiff, grey flight feathers that could be glued together using the sticky sap from the mulberry tree to form a flexible, plastic-like pad. Each such platelet, made of feathers and glue, was about 6cm wide and 3cm long, and was constructed on a wooden template in order to maintain a standard size and shape.

The final stage of platelet manufacture was when a 1cm band of the small red honeyeater feathers were glued along one of the long edges so that they protruded beyond the edge of the plate to form a red fringe. These platelets were constructed very carefully. The feathers were selected for consistent size and colour, and spaced uniformly. Beasley (1936) reports the involvement of another craftsman who finished the plates by adding a second row of small red feathers taken from the head of the birds. None of the rolls that I examined showed any evidence of this second row of feathers, so it may have been only done for the highest-quality currency.

Koch (1971) records that between 1500 and 1800 platelets were needed to make one roll and this required about 700 hours of work. When finished, these platelets were then passed onto the third specialist, who bound them into a long coil, constructed using cords and long strips of bark taken from the tree *Gnetum gnemon* (see Plates 7 and 8). Two fibre cords were stretched between posts or trees and a spacer bar made from the wing bone of a fruit bat was used to keep the cords a constant distance apart. The platelets were then bound one at a time onto the cords using vegetable fibres and with a backing strip of bark, starting in the centre and working outwards towards the two ends. The platelets were overlapped like tiles on a roof so that only the edge of red honeyeater feathers was visible. Each platelet overlapped the previous one so that the red feathers hid the basal and supporting structure of the preceding plates.

The finished rolls were brilliant in colour, uniform in texture and feather density, and spectacular objects in themselves (see Plate 4). Most rolls were decorated by a woven pattern of plant fibres on the underside, in their mid-point and at their two ends (see Plate 9). These woven designs were the hallmark signature of the person who made them and only visible when the feather money was unrolled. Several decorative strings of small shells, plates of turtle shell, beads or pigs' teeth were attached to both the mid-point of each roll and the two ends. Finally, the rolls were usually accompanied by a wooden 'charm'. These were cross- or Y-shaped pieces of wood, sometimes with a turtle or fish carved on them (see Plate 4). Others consisted of flat boards with a painted pattern in red, black and white. Little is known of the function of these 'charms'. They were not tied onto the currency, but loosely placed on top of the rolls before these were wrapped in trade cloth and palm leaves for storage. It seems that the 'charms' in some way protected the value, status or magic of the feather currency (Davenport, 1962).

These feather currency rolls had a complex valuation system based on two factors: their original form of construction and their condition. Beasley (1936) details 11 forms of this currency, all of which differed in value. Each was given a different name and they seemed to differ mainly in their size (both width and length) and in whether they were made using only the red feathers, only black feathers or a combination of the two. Those found in museum collections usually belong to Beasley's second description that he identified as *Mar-Li* and which used only the red feathers. This was the second highest value form of feather currency, only exceeded by the largest form of red feather currency, *Nopamur*, which were over 8cm in width and at least 11m in length. Beasley reports that these were no longer being produced in the 1930s because their exchange value was too great to be useful. All the lower value forms were smaller and had black or grey feathers: few examples of these remain in any museum.

Each of these different types of feather currency had a different value, a roll of *Nopamur* being about four times more valuable than a roll of *Mar-Li*. Alongside the different values of each form of feather currency, the value of each type also depended heavily on its condition. With time the feathers faded and lost their vibrancy. The currency also deteriorated from the loss of red feathers, so that the rolls became initially patchy and eventually bald (see Plates 10 and 11). The value of each roll was judged by these factors. This was a complex process and the cause for great discussion between the parties in any monetary transaction. Davenport (1962) reports a 10-unit value system, while Koch (1971) describes a scale with 15 units. Progression was not arithmetic but geometric, such that each piece of a given unit was worth twice as much as the one below it. For example, if a low value piece had a value of 1, a number 5 piece had a value of 16 and a top unit piece of number 10 was worth 512. There was no formal value system associated with these units; but there was a general understanding of what condition a roll had to be in to be allocated a certain value on this scale. Rolls in units 1 to 5 were called 'porkers' because they were within the range usually used to buy a pig suitable for a feast day celebration, whereas currency units from 6 to 10 were called ‘sucklings’ because they were of much lower value and each one would only buy a young pig too small to be worth eating (Davenport, 1962).

In contrast to Davenport’s (1962) opinion that the construction of these rolls required little skill, Beasley (1936) comments on how difficult it was to work with such tiny feathers because even in a closed room it was impossible to handle the feathers without many floating away in the air. All of the completed rolls held in museum collections are extraordinarily well made with very uniform feather distribution and no trace whatever of the glue spoiling their visible surface. Beasley (1936) states that each roll took about a year to make and that a skilled worker would make five in a year. These statements might appear contradictory; but probably a craftsman would have several rolls at different stages of manufacture at any one time. Clearly, many months of work went into making each individual roll. They were made to order and each of the three craftsmen involved had to be contracted separately. There is no information on how quickly the rolls deteriorated. Beasley’s (1936) account states that locals claimed that some rolls survived for 150 years; but this may be an exaggeration. Many of the rolls in museum collections are completely bald of feathers and little more than dull leather-like rolls of bark. It may be that once rolls had deteriorated to this state they would, indeed, last 150 years, or almost indefinitely, but their value would have been low. In the humid tropics, any structure made of tree bark, vegetable glue and feathers is unlikely to remain in good condition for long, even if stored in the smoky atmosphere of a hut roof. The high-value rolls, with a full covering of uniform red feathers, are unlikely to have lasted in prime condition for more than a few decades, but may have retained some red feathers for up to 50 years (M. Pendergrast, pers comm, 2007).

The fact that feather money deteriorated with time was important for its effectiveness as a currency. To avoid inflationary pressure on an economy there has to be a limit on money supply or else it becomes devalued as more is produced. Feather money was an effective currency that retained its value: rolls deteriorated with time and there was a limit to the number of new feather rolls that could be manufactured each year, probably set both by the limited availability of the required feathers, the length of time taken for their manufacture, and the limited number of families who were allowed to carry out this work. Provided that the rate of production closely matched the rate at which old currency rolls deteriorated each year, there would be little inflationary pressure on the economy.

Beasley (1936) and Davenport (1962) both report that the normal price for a wife was ten feather rolls of a range of value units. Being a market system, there was variation, with some wives fetching more than others. Beasley (1936) comments that wives from the outer isles were considered less valuable; but Davenport (1962) reports they were more expensive. Concubines were ten times more expensive than wives (Davenport, 1962). A good wife had about

Source: Auckland War Memorial Museum, negative number 6750 (J. W. Beattie 60)

Figure 5.1 *Photograph taken in 1909 by J. W. Beattie of the first missionary to live on Santa Cruz, W. C. O'Ferrall, standing with local villagers beside a bride price payment of feather rolls (O'Ferrall, 1908)*

the same value as a small canoe (Beasley, 1936). Early photographs suggest that obtaining a high-status wife was clearly a substantial financial outlay (see Plate 12 and Figure 5.1), although from such early photographs it is impossible to judge the condition of the feather rolls and some brides might have been obtained by large numbers of low-value rolls.

Impact on the honeyeater population

If the mean price of a bride is taken as ten quality rolls (Beasley, 1936; Davenport, 1962), and the unknown scale of concubine ownership ignored, it is possible to make some rough estimates of how many Scarlet Honeyeaters were taken each year from the wild population. The following figures are intended to indicate orders of magnitude, rather than be precise estimates. Beasley (1936) gives two different figures for the human population of Santa Cruz during the 1930s: 1200 and 1500. If it is the higher figure, and an equal sex ratio assumed, there would have been about 750 females in the population. If an average life expectancy is 45 years, (reasonable for the period before World War II when Western medicine and influence had not yet become established), and that the population was stable such that the number of deaths was balanced by the number of children surviving to adulthood, this would suggest about 16 women attaining marriageable age each year. If 10 feather rolls were needed to buy each wife, this would require a currency supply of 160 rolls. If each roll lasted for about 15 years before its condition started to deteriorate to such an extent that its value started to fall, this would suggest about ten new feather rolls needed to be manufactured each year for the marriage market alone. Feather currency was also used for buying goods, pigs and canoes, and to pay fines for fornication, theft and other gross misdemeanours (Beasley 1936); but we have no information on the scale of these transactions. It is perhaps unlikely that the cost of marriage was the major part of the economy; but there is also no doubt that marriage was regarded as an extremely important social event that was expected to be marked by a conspicuous display of wealth. If the bride price element of the economy represented 25 per cent of all economic activity involving currency, it suggests that the feather money system may have required a manufacture rate of about 40 rolls per year. Davenport (1962) reports that during the 1960s no more than ten rolls could be made per year; but, by this time, feather currency had been replaced by the Australian dollar for most normal transactions. Beasley (1936) estimated that during the 1930s only ten people were making currency and their total output could not exceed 20 per year. But even in the 1930s, feather currency was declining in use, so maybe 40 rolls per year is about the right order of magnitude for the time before Western influence.

The next estimate needed is the number of birds required to make each roll. Beasley (1936) reports 400 to 600 birds, Davenport (1962) 300, and Koch does not give the number of birds but says from 50,000 to 60,000 feathers were needed. It is not clear if any of these estimates are based on feather counts or from questioning the craftsmen who made the rolls. During the early years of Pacific trade with Europe, the inhabitants of the Santa Cruz islands had a reputation for being hostile to visitors and were rarely visited by trading ships; as a result, there are relatively few feather rolls in museum and private collections. Beasley suggests only 20 remain in museum collections, certainly an underestimate: I took measurements from 11 rolls. Because of their fragile condition, they were not uncoiled; but soft string was used to trace the total length of that part of each roll to which cardinal honeyeater feathers had been applied. On each roll, five randomly selected measurements were also taken of the width and the feathered edge of each roll to give a mean area of feathered surface of 6223 square centimetres (see Table 5.1).

It was not possible to estimate the total number of feathers needed to manufacture each roll without taking them apart. Scarlet Honeyeater feathers only have the red pigment on their outer 5mm tip, the remainder (10mm to 12mm) being grey in colour. When the feathers were glued onto the platelets, the grey base of each feather, with the feather shaft, was obscured by the overlapping platelets. Only the tip red fringe of each feather was visible, making it impossible to count individual feathers from the external appearance of a roll. It was also not possible to obtain an accurate estimate of the total number of red feathers to be found on each bird (without plucking them); but it was clear from examining both bird skins and feather currency side by side

Table 5.1 *Measurements from Santa Cruz feather money rolls held in Auckland Museum (A), British Museum (BM), Cambridge University Museum of Archaeology and Anthropology (C), and private collections (PC)*

Location	*Length of feather section (cm)*	*Width (cm)*	*Edge (cm)*	*Total feather area (cm²)*
A 18346.1	834	4.5	0.5	4587
A 23667.1	826	4.5	0.3	4212
A No 18346.2	852	5.3	1.0	6220
BM 91.3-22.1a	832	5.2	1.0	5990
BM 1963.Oc+4	823	5.6	1.2	6584
BM 1976 Oc11	869	5.1	1.6	7212
BM 1963 Oc+3a	853	4.8	0.6	5118
C 1954.80	886	5.7	1.9	8417
C 1901.208	843	5.5	1.1	6491
PC	900	5.5	1.2	7110
PC	905	5.0	1.1	6516
Mean	**857**	**5.2**	**1.05**	**6223**

that the density of red feathers on the rolls is about the same as that on the bird. Examination of skins in the British Museum revealed the mean total area of suitably sized feathering on each bird is 18 square centimetres maximum (six male skins, Santa Cruz race of *M. cardinalis*, three held in Natural History Museum, Tring, three in British Museum, London). This suggests that, taking a mean value of 6223 square centimetre feather area per currency roll (from Table 5.1), there would be a need for 345 birds to supply sufficient feathers for each roll. This supports the figures of 300 to 500 birds quoted by Beasley (1936) and Davenport (1962). It is impossible to estimate the wastage or loss during each stage of the manufacturing process. The feathers are extremely small and delicate, and the work was so intricate that it must have been conducted outdoors to provide sufficient light. Many of the feathers must have been blown away or were rendered useless by traces of glue. Bearing this in mind, a figure of about 500 birds killed for each roll may be reasonable. Assuming 40 rolls were being produced each year, this suggests that around 20,000 male honeyeaters were being killed per year. There are no data on the scale of the earlier trade using the most valuable form of feather currency, the *Nopamur* rolls, which each required the feathers from 1000 birds (Beasley, 1936). Trade in this form of currency had died out before published records. There are many assumptions in these calculations; but the figure of 20,000 birds killed per year is probably conservative. The availability of sufficient birds was probably a real factor limiting the money supply.

While there are no recent field studies on the birds of Santa Cruz, on other Pacific Islands such as Samoa (Freifeld, 1999) and Pohnpei (Buden, 2000), honeyeaters are among the most abundant bird species. In native forest they are canopy feeders (Craig and Beal, 2001); but nectar-bearing flowers are often more abundant in secondary forest or cultivated land, especially ornamental gardens, and birds are more abundant there (Cain and Galbraith, 1956; Bregulla, 1992; Craig, 1996; Freifeld, 1999; Steadman and Franklin, 2000; Craig and Beal, 2001). On Santa Cruz, the original forest was heavily logged during the 1930s for the extraction of kauri timber, and most of the island is now secondary forest and agricultural land. Honeyeater density, today, may be quite different from that found in the original forest cover of the islands. Noske (1996) provides the only data on density of honeyeaters, finding a mean of 5.5 ± 0.63 standard deviations birds per hectare for the similar sized Red-headed Honeyeater *M. erythrocephala* in mangrove forest in Darwin, Australia. The land area of the Santa Cruz islands is a total of 797 square kilometres. If it is assumed that 75 per cent of the islands is of suitable habitat, and a density of 5.5 birds per hectare, it suggests a population of 329,000 birds. Only male birds were used, which, assuming an equal sex ratio, suggests 165,000 males. The feather currency trade might therefore have been responsible for killing perhaps 12 per cent of the male population each year.

The Scarlet Honeyeater has a comparatively low potential rate of reproduction and the normal clutch size is two eggs (Mayr, 1945). Tropical passerines have markedly lower mortality rates than temperate (Johnston et al, 1997), probably because of more stable climate and food supplies. Even very small birds such as hummingbirds and wrens can have mortality rates as low as 30 to 48 per cent (Parker et al, 2006), and in a survey of 17 passerines in Trinidad, annual mortality rates ranged from 15 to 55 per cent (Johnston et al, 1997). Tropical island species seem to have particularly low mortality, probably because they evolved in predator-free environments (Faaborg and Arendt, 1995). If Santa Cruz Scarlet Honeyeaters had similar demography, the imposition of an additional 12 per cent annual male mortality by human hunting pressure must have been substantial. This did not lead to the species' extinction and today the honeyeaters are among the most abundant birds on Santa Cruz. Pendergrast (pers comm, 2007) comments that the islands, being uplifted coral, have areas that are difficult to access, which may have provided refuges for the birds from heavy hunting.

Island bird species are particularly vulnerable to extinction and Pacific Islands have probably lost one half or more of their bird species during the process of human settlement (Milberg and Tyrberg, 1993; Pimm et al, 1994). Habitat destruction, introduced predators and persecution were the major cause of past extinction; but introduced predators were the most deleterious (Johnson and Stattersfield, 1990; Blackburn et al, 2004). These studies showed that human persecution (although this term must be qualified in relation to feather money, since the killing of birds was an effect of these activities rather than their object) was of less importance and might only be significant when in association with other risk factors. The Santa Cruz honeyeater population perhaps demonstrates that a heavy and sustained hunting pressure on a small isolated bird population does not necessarily result in their extinction if this is not associated with other risk factors. In Hawai'i, the Mamo Honeycreeper *Drepanis pacifica* and O'o *Moho* sp. were similarly hunted to supply the brilliant yellow feathers used to make royal cloaks. Fuller (2000) estimates that 80,000 Mamo were killed to make a single cloak. Mamo became extinct in 1899, the four species of O'o later, although other factors were certainly involved in all these extinctions (Fuller, 2000).

It is not clear when the widespread use of feather currency, as the normal method of monetary transaction in Santa Cruz, died out. It was probably early in the 20th century, alongside the establishment of missionary settlement and the widespread cultural changes that later followed. Although Speiser in 1916 (cited in Quiggan, 1949) believed that no new currency was being made then, it is probable that a limited amount of new production continued for some time after the adoption of the Australian dollar as the normal currency. Writing in the 1930s, Beasley (1936) reported that manufacture had almost stopped because workers could earn far more from the timber industry than creating currency rolls. Davenport (1962) reports that by the 1960s, although there was no longer any traffic in feather money as a normal currency, five people were still making feather rolls. The photographs taken by Davenport, and reproduced here, show that feather money was retained on a small scale into the 1960s because some men still demanded the traditional feather money before they would allow their daughters to be married. Small feather items, such as hair stick decorations, are made today on a small scale for tourists; but this is all that remains of one of the most remarkable currency systems that human societies ever developed.

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6

Entrapment of Wetland Birds: Local Customs and Methods of Hunting in Krangkeng, Indramayu, Central Java

Surya Purnama and Mochamad Indrawan

Hunting of birds in the wetlands of Krangkeng (central Java) has expanded from small-scale subsistence level to sales in markets. In spite of self-imposed limits by hunters in relation to trapping method used and certain hunting taboos, populations of wetland birds have declined. Alternative methods of income generation for local people, such as ecotourism, and paid roles in pest and disease surveillance, need to be supplemented by increased agricultural training and productivity, community organization and education if bird populations are to recover.

For centuries, people in Indonesia have hunted birds to satisfy their personal need for food as well as to sell, on a small scale, in the local marketplace, with consequent income for the vendors to enable them to gain the basic necessities of life. Given the huge geographical, cultural and environmental diversity present in Indonesia, it is to be expected that people differ in their attitudes towards, and utilization of, birds across the archipelago. It is also possible that the changing nature of the economy is forcing a change in the nature of the relationship between birds and humans.

Snapshot from Krangkeng, Indramayu, Central Java

In the Krangkeng sub-district (Indramayu district, Central Java Province), systematic hunting of waterbirds has been occurring for more than 60 years. Initially, bird hunting was primarily for individual subsistence; but with the proliferation of a market economy, birds entered the food trade in the district and nearby cities. With increasing prevalence of birds in the larger markets, bird hunting expanded into chains of hunters, wholesalers, processors (who plucked the birds), vendors and consumers, with numerous families depending upon bird hunting as a major source of income (McCarthy and Noor, 1996). The shift to using wildlife to supplement income was accentuated by increased poverty experienced by the local population whose livelihood also included a combination of fishing and farming (Aminah and Rachmina, 1993).

Large numbers of waterbirds have been collected. For example, it is estimated that in 1979, approximately 1 million birds were collected along 60km of shoreline (5km to 10km wide). The estimated catch then declined from about 300,000 between 1984 and 1985, to 200,000 in 1987 and 150,000 in 1992 (Noor, 1987; Milton and Mahardi, 1989; Johnston et al, 1990; McCarthy and Noor, 1996; Howes et al, 2003). The overall number of hunters also declined from about 300 in 1985 to 1986 to about 20 in 2006 to 2007. It is likely that the decline in the number of hunters was linked to a decline in species being caught. Data were collected during extensive visits that included some time with both the hunters and the middlemen/women (see Table 6.1).

Many of the birds collected were migratory shorebirds (63 species) originating from the north and using the East Asian–Australasian flyway from September to April each year. For example, in the late 1980s to early 1990s, about 45,000 Oriental Pratincoles *Glareola maldivarum* were caught every year (Johnston et al, 1990). Resident and endangered birds were also being

Table 6.1 *Study visits to Indramayu, Central Javal, 2006–2007*

Year	*Month*	*Dates of visits*	*Days spent with hunters and middlemen/women*
2006	February	7–17	10
	April–May	9 April–2 May	12
	August	11–20	8
	November	1–11	4
	December	7–16	6
2007	January	6–15	3
	February	4–13	5
	March	5–14	5
	April	3–12	6
	May	1–10	7
	June	2–12	7
	July	1–10	7
	August	1–10	3
	September	3–12	3

Table 6.2 *Sample prices and catches of waterbirds, Krangkeng, Central Java, 1984*

English name	*Species*	*Rupiahs (US$1 approximately = 10,000 rupiahs)*	*Estimated total catches throughout the year*
Whistling-ducks	*Dendrocygna* spp.	8000	
Watercock	*Gallicrex cinerea*	6000	4200
Snipe	*Gallinago* spp.	6000	10,800
Cattle Egret	*Bubulcus ibis*	5000	14,400
White-breasted Waterhen	*Amaurornis phoenicurus*	4000	7560
Common Moorhen	*Gallinula chloropus*	4000	64,800
Spotted Dove	*Streptopelia chinensis*	3000	
Slaty-breasted Rail	*Gallirallus striatus*	3000	32,400
Cinnamon Bittern	*Ixobrychus cinnamomeus*	2000 for 4	25,200
Yellow Bittern	*Ixobrychus sinensis*	2000 for 4	33,600
Ruddy-breasted Crake	*Porzana fusca*	2000 for 4	43,200
Common Sandpiper	*Actitis hypoleucos*	2000 for 4	1800

targeted, including the endangered Milky Stork *Mycteria cinerea*. During the last two years, however, collection of the Milky Stork has not been recorded, possibly due to intensive conservation measures and education programmes initiated in the 1990s (McCarthy and Noor, 1996). The local prices for each bird remained extremely low (see Table 6.2) and prices reflected availability. The Chinese Bittern *Ixobrychus sinensis*, for example, was abundant during the breeding season and relatively easy to catch using nets and call imitations, resulting in very low prices during this period. The Common Moorhen, *Gallinula chloropus* was caught at all times of year, being relatively abundant and widespread, and therefore attracted mid-range prices. In contrast, the whistling-ducks, *Dendrocygna* spp. involved more difficult techniques (see below) and fetched relatively high prices.

Trapping methods

Various traps and techniques are employed to catch live birds and each hunter has a personal preference and tends to specialize in the use of a particular trap type (see below). The traps used at the Indramayu sites can be differentiated into the following types.

Stationary nets

These are elongated snare nets made of strong nylon and set out at night. The species targeted include Chinese Bittern, Oriental Pratincole and snipes. The nets are typically set out in mudflats, brackish water fishponds and rice fields. Nets are either continuously monitored for approximately ten hours per session or checked every one to three hours. Various tools are employed to imitate the calls to lure the birds directly into the snare net.

Clap nets

These target larger waterbirds, such as various Ardeid species. Dimensions of the nets vary, but all are composed of strong, light materials and vary from 4m to 8m × 2m. Using a system of pulleys, the outsides of two rectangular nets are pulled, raising them up, then allowing them to fall and close over a central line (see, for example, Bub et al, 1995, Figure 412). They are used during daylight hours.

Torching (lamping or dazzling)

Working at night, collectors use a kerosene lamp and a small hand-held net to target more secretive species such as the Rallidae or Anatid ducklings.

Gum entrapment

Gum, made of the sap of jackfruit *Artocarpus heterophyllus*, strengthened by cooking and subsequent water immersion, is used to target Anatid ducks. Collectors use recorded bird calls as well as shadow decoys made of discarded sandals or shoes set up in a small pool in post-harvest rice fields adjacent to pre-harvest paddy fields. Gum-covered sticks are erected and arranged in a dense cluster around the pool. Loudspeakers, situated just above the water in the middle of the pool, emit the calls of a flock of birds to attract others. The collector, who has been waiting near the pools, then removes the birds that have become stuck to the sticks. This is the most specialized method of trapping.

Hunting regulations

Despite being an established centre for waterbird hunting in Java, the Indramayu hunters also subscribe to local customs and beliefs that regulate their own hunting activities. These include taboos, for which the collectors consider there is ample evidence if breached, as well as limitation of the hunting method used.

Taboos against catching certain bird species

Several species (e.g. terns of the family Laridae) are considered sacred, and catching these species is believed to bring bad luck.

Taboos against catching birds on certain nights of the month

In the monthly calendar there is a night in which Friday coincides with the '*kliwon*' chronicle of the Javanese calendar (6 days in a week and 35 days in a month); it is called '*Jumat Kliwon*'. The Thursday night prior to the *Jumat Kliwon* is considered sacred and dangerous because mystic forces are believed to be unleashed. Hunting and many other activities are prohibited during this sacred night, once a month, lest mishaps befall violators of this belief.

Specialization in catching method

There is an unwritten agreement that a hunter specializes in only one catching method and, hence, traps only in the season for which the trap and that method is best suited.

Furthermore, local customs also incorporate the idea of prestige. As a hunter's reputation depends on the number of birds that he catches, he would feel ashamed to go home with a meagre catch. There was an instance when a request from the research team for assistance (field guiding) was turned down by a local hunter because the target species at the time, Oriental Pratincole and snipes, were uncommon during the then dry season. The team tried to persuade the hunter to use a different method for catching them (such as 'torching'); but this request was also turned down by the hunter, who claimed that torching was not a method within his range of expertise.

Implications for conservation

In the above situation, because the drive to trap birds is an economic one motivated chiefly by the need to provide food for one's family, it is likely to continue unless there is an alternative method of income generation.

Although not necessarily a panacea, ecotourism might provide a partial solution to the conservation of waders landing in the Krangkeng part of the East Asian–Australasian flyway. Combining conservation with the development of an alternative source of income for local people, ecotourism has the potential to reduce pressure on natural resources. Ecotourism might ease pressure on wildlife and habitat, while also demonstrating the value of the birds to people of other cultures; but the development of such programmes necessitates a better understanding of the importance of hunting and of local perceptions towards wildlife.

Raising the awareness of the value, as a tourist attraction, of diverse species of waders landing on the Krangkeng shore does not necessarily mean that the local villagers understand the connection between conserving these animals and an income. To be successful, ecotourism should not only generate revenue, but the revenue should be distributed among local villagers and more than match the income, both in amount and flow, that is generated through trapping for local use and the commercial market.

From a different perspective, given the impact of bird pathogens in Indonesia and the correspondingly large investment in surveillance, the hunters at Krangkeng are a source of samples and data that are needed nationally. It is not clear whether the decline in the number of hunters has arisen because of the decline in the number of birds available for harvest; but scientists should continue to work with the collectors while they still exist. Hunting of water birds is a seasonal activity influenced by several factors, including harvest yields and the pattern and progression of the migratory season. Indigenous knowledge, including local beliefs, is an important source that can be used to enrich the formally established 'science' and is also of crucial importance in understanding the need for biodiversity conservation in the region.

Throughout Indonesia, the socio-economic dimensions of bird hunting must be realized: conservation needs to be integrated with sustainable development (McCarthy and Noor, 1996). Direct change of local mindsets cannot be achieved overnight; but neither is it economically realistic to suggest returning to a subsistence level of hunting. Sustainable development measures need collaboration with government and non-governmental organizations, local government and communities. Multipronged measures should include development of microfinance (credits), participatory land use and planning, increased agricultural training combined with community organizing and, above all, improvement of overall levels of education.

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7

Wildlife Hunting and Bird Trade in Northern Papua (Irian Jaya), Indonesia

Margaretha Pangau-Adam and Richard Noske

Birds have always played a significant role in the livelihoods and culture of the indigenous peoples of New Guinea, one of the last remaining areas of tropical rainforest wilderness. However, little is known about the hunting practices of these peoples, especially in the Indonesian province of Papua (formerly Irian Jaya), which occupies the western half of the island. The hunting regime in two districts within the Jayapura region of northern Papua was quantified through hunting surveys and interviews; local markets were monitored to assess the extent of wild meat trade; and meal surveys determined the level of wild meat consumption. In view of reports of a thriving live bird trade in Papua, interviews were conducted with bird trappers and keepers. Seven species of birds were hunted for meat; but the Northern Cassowary *Casuarius unappendiculatus* accounted for 48 per cent of the estimated annual off-take, followed by the Victoria Crowned-pigeon *Goura victoria* (14 per cent) and two megapode species (33 per cent). Both the cassowary and crowned-pigeon are restricted to the northern lowlands of New Guinea and are categorized by the World Conservation Union (IUCN) as Vulnerable to extinction. Few indigenous hunters were involved in the live bird trade compared with transmigrant bird trappers. Over half of the individuals trapped belonged to 11 species nominally protected by Indonesian law, with 'zero' quotas, including Salvadori's Fig-parrot *Psittaculirostris salvadorii*, which is listed by the IUCN as a Vulnerable species. For a further six species, mostly parrots, estimated annual harvest rates far exceeded annual national quotas. The study suggests that hunting in this region has shifted from a purely subsistence form towards a more commercial form and, thus, the maintenance of populations of threatened species will require sensitive management by local communities, combined with effective education and monitoring programmes. The largely illegal live bird trade and logging pose far more serious problems than hunting to the conservation of Papua's avian diversity, a problem that can only be addressed by effective law enforcement.

The largest and highest tropical island on earth, New Guinea, is home to about 800 species of birds, including most of the birds of paradise (Paradisaidae) and mound nest-builders (Megapodiidae), as well as all of the cassowary species (Casuariidae) and the world's largest pigeons (crowned-pigeons, *Goura* spp). The hunting of wild game by indigenous peoples of the island has always been an important livelihood activity, not only because it provided a significant proportion of the dietary protein, but because it also served religious and cultural purposes (Majnep and Bulmer, 1977; Dwyer and Minnegal, 1991; Jenkins and Milton, 1993).

While humans have lived and hunted in tropical forests for many thousands of years, recent studies indicate that hunting by indigenous peoples is no longer sustainable in many regions (Robinson and Redford, 1991; Bennett and Dahaban, 1995; Robinson and Bennett, 2000). In New Guinea, too, social changes over the last two decades are altering hunting pressure and market demand for animal products. Guns are increasing hunting efficiency, better roads facilitate transportation and marketing of wildlife, and a resettlement scheme, which brought non-indigenous people to the island, is threatening the traditional lifestyles of indigenous populations, resulting in weakening or loss of traditional laws and taboos (Kwapena, 1984). In Papua, Indonesian immigrants from other islands, such as Java, who migrated to Papua under Indonesia's transmigration programme have also created a market demand for regional, national and even international exploitation of wild birds. Hunting is thus gradually moving away from a purely subsistence form towards a commercial form. As a result, local populations of endemic New Guinea birds such as the Northern and Dwarf Cassowaries and the three species of crowned-pigeons are declining due to hunting pressure (Beehler et al, 1986; King and Nijboer, 1994; Johnson et al, 2004), and these species are now classified as Vulnerable or Near Threatened (IUCN, 2009), with the latter listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (BirdLife International, 2000).

Despite widespread awareness of the potential threat that increasing hunting pressure poses to certain large species of animals, there have been relatively few studies of hunting patterns in New Guinea and, to date, all have focused on the eastern half of the island (Papua New Guinea). This study attempted to partly redress this knowledge gap by characterizing wildlife hunting practices and bird trade in two districts of northern Papua (former Irian Jaya).

Study area and general methods

The study was conducted in two districts (Nimboran and Kemtukgresi) of the Jayapura region, in north-east Papua (Irian Jaya). Although forests around the villages had been cleared for agriculture, large primary forest areas remained. At an elevation ranging from 50m to 200m above sea level, the vegetation of the study area was humid (lowland) tropical forest subject to inundation.

Ethnically, most of the local people in this area belong to the Genyem group. They are divided into several clans, each of which owns one or more forest blocks. In addition, the Nimboran district supported two transmigrant communities, consisting of people translocated from Java to Papua during the 1980s by the Indonesian government. Within these communities a small proportion (<5 per cent) of men were engaged in the trade of wild animals, most specializing in collecting birds for the pet market. The region is home to many New Guinea endemic bird species, including six species of birds of paradise, and the forest near the transmigration settlement of Nimbokrang I is a popular destination for birdwatchers from overseas (Jepson, 1997).

Hunting data were collected each month from July 2005 to June 2006 through interviews, structured questionnaires and hunting surveys in 21 villages (Nimboran: 13; Kemtukgresi: 8). Village or community leaders were first approached and interviewed to obtain general information on the number of households engaged in hunting practices. Semi-structured interviews were then conducted with the hunters at, or on their way home from, hunting sites. In total, 147 hunters (Nimboran: 84, Kemtukgresi: 63) were asked about hunting areas, distance travelled, hunting methods used, targeted species and their importance, reasons for hunting (subsistence, trade, pets, recreation) and the number of individuals of each species killed each month. Recently killed animals were weighed and identified using field guides (Beehler et al, 1986; Coates and Peckover, 2001). The annual off-take for each village was calculated by adding the monthly animal kills reported by hunters for the entire year. Wild meat off-take by weight was calculated by multiplying the number of animals reportedly killed each year by the average body weight for each species concerned (based on carcasses weighed in the field, or from the literature).

Two local markets in Genyem and Nimbokrang were monitored each week to measure the regularity and extent of wild meat trade. Informal discussions were conducted with 33 vendors to identify the species being sold and demand from buyers. Household meal surveys were conducted to determine the level of consumption of wild meat and other food items during a one-week period. These surveys consisted of interviews with housewives in 93 households among four villages in Nimboran and three in Kemtukgresi. All respondents identified themselves as belonging to the Genyem ethnic group.

Adult or juvenile birds were often trapped alive and reared by both local villagers and transmigrants to be sold in the pet trade. In May 2006, 18 bird trappers from the transmigrant settlements Nimbokrang I and Nimbokrang II were interviewed about their trapping sites and methods, the number of birds captured per trapping session, and the species involved to provide an estimate of the number of birds trapped per month. In addition, bird-keeping was surveyed in one transmigrant settlement and one local village. 300 (70 per cent) of the 428 households in Nimbokrang I and all households in the adjacent village of Bunyom (n = 76) were surveyed. In order to verify the information supplied by owners about the species and numbers of birds kept, the birds held in their backyard cages were identified and counted when permitted.

Hunting practices and wild meat trade in the Jayapura region, north-east Papua

Of the 19 species identified as hunting targets, 7 (37 per cent) were birds while the remainder comprised mammals (10 species) and reptiles (2 species). Among the seven targeted bird species, the Northern Cassowary *Casuarius unappendiculatus* was the most frequently hunted in both districts, accounting for 48 per cent of the estimated total number of birds hunted annually (n = 18,320 birds) and 97 per cent of the total biomass in both districts combined (see Table 7.1). Victoria Crowned-pigeons and two megapode species (Brown-collared Brush-turkey *Talegalla jobiensis* and Common Scrubfowl *Megapodius freycinet*) accounted for another 14 and 33 per cent, respectively, of the estimated annual off-take. Of these four species, all but the last are largely restricted to the northern lowlands of New Guinea. Six of the seven hunted species are nominally protected by Indonesian law (see Table 7.1).

Although almost twice as many cassowaries were killed in Nimboran district than in Kemtukgresi district (see Table 7.1) and a higher proportion of hunters targeted them in the former than the latter district (64 versus 40 per cent), hunters in Kemtukgresi killed significantly more cassowaries than those in Nimboran on a per capita basis (see Table 7.2). Differences in off-take rates for the crowned-pigeon and two megapode species did not differ; three additional species (Lesser Bird of Paradise, Blyth's Hornbill and Cinnamon Ground-dove) were hunted only in Kemtukgresi district (see Tables 7.1 and

Table 7.1 *Bird species hunted by Genyem people of northern Papua, with estimated annual total harvest in Nimboran (NIM) and Kemtukgresi (KGS) districts*

English name	*Scientific name*	*Mean weight (kg)*[a]	*Estimated total number of individuals*		*Total biomass (nearest kg)*	
			NIM	*KGS*	*NIM*	*KGS*
All animals			1887	1693	51,373	36,506
Northern Cassowary*	*Casuarius unappendiculatus*	60.0	192	105	11,520	6300
Victoria Crowned-pigeon*	*Goura victoria*	2.5	42	45	105	113
Brown-collared Brush-turkey*	*Talegalla jobiensis*	1.5	66	36	99	54
Common Scrubfowl*	*Megapodius freycinet*	1.0	76	29	76	29
Cinnamon Ground-dove	*Gallicolumba rufigula*	0.5	–	12	–	6
Blyth's Hornbill*	*Rhyticeros plicatus*	2.5	–	7	–	18
Lesser Bird of Paradise*	*Paradisaea minor*	–	–	13	–	–

Notes: * nominally protected by Indonesian law (Peraturan Pemerintah RI, 1999).

a) Weights based on carcasses weighed at market and villages, or from literature (Petocz, 1989; Coates and Peckover, 2001; Pangkali, pers comm, 2006)

Table 7.2 *Comparison of number of birds hunted in Nimboran (total, 376) and Kemtukgresi (total, 247) districts of northern Papua: Value in parentheses indicates the number of hunters*

Common name	*Mean ± SE number of animals killed annually per hunter (n)*		
	Nimboran	*Kemtukgresi*	*p*[*]
Northern Cassowary	3.56 ± 0.16 (54)	4.20 ± 0.35 (25)	0.03
Victoria Crowned-pigeon	4.67 ± 0.50 (9)	5.00 ± 0.58 (9)	0.50
Brown-collared Brush-turkey	6.00 ± 0.8 (11)	5.14 ± 0.51 (7)	0.68
Common Scrubfowl	3.20 ± 0.33 (10)	2.6 ± 0.24 (5)	0.40
Cinnamon Ground-dove	0	3.0 ± 0.41 (4)	–
Blyth's Hornbill	0	3.5 ± 0.50 (2)	–
Lesser Bird of Paradise	0	6.50 ± 2.50 (2)	–

Notes: * Based on Mann-Whitney test.
SE = standard error.

7.2). The proportion of sampled hunters involved in hunting a particular species varied between species: but across all species the average number of individuals killed was 4.5 and 3.9 in Nimboran and Kemtukgresi, respectively.

Large snares were used to capture cassowaries, while smaller ones were set to trap crowned-pigeons and other ground-dwelling doves and megapodes. Most hunters checked their snare lines every other day, some only twice a week. Hunters reported that snared cassowaries could not survive more than three days without food. Birds of paradise were killed or wounded and captured using catapults or air rifles.

Of the 33 vendors selling wild meat at the markets, 21 (64 per cent) sold carcasses of birds. However, birds accounted for only 12 per cent of all animals sold. Northern Cassowaries constituted 71 per cent of the total number (68) of individual birds, while Victoria Crowned-pigeons and Brown-collared Brush-turkeys comprised the remainder. Vendors reported that megapodes and ground-doves were rarely traded at the market because their meat was typically consumed within the hunter's family.

Cassowary meat fetched the highest price among birds at the market, ranging from US$40 to $50 per carcass (US$2.50 to $3.50 per kilogram). Crowned-pigeon carcasses fetched US$4.50 to $6.00, while megapodes fetched slightly less (US$3.00 to $4.50). About 46 per cent of the birds offered for sale in the markets were brought from the closer district (Nimboran), with the remainder (54 per cent) from Kemtukgresi and other districts further away. All of the vendors were women, most (28) of whom were members of hunter households selling the harvest of their husbands or their fathers, while the remainder (5) purchased the wild meat from hunters and sold it at the market. Wild meat was also sold directly within the villages, especially in villages located far from the markets. If cassowary meat was not sold quickly within the village, the meat would be smoked, then taken to the market over the following few days.

In addition to meat, other bird products were sold, such as cassowary and megapode eggs. Hunters offered stuffed skins of birds of paradise as ornaments, for sale at local markets or villages. The price of a stuffed bird ranged from US$45 to $50. Due to their beautiful plumes, older males of these species were the preferred target of hunters with air rifles.

Live trade and keeping of pet birds

Of the 18 identified pet bird trappers from the transmigrant settlements, ten (55 per cent) were full-time trappers, while the remaining eight trapped on a part-time basis. Most birds were captured with nets modified from fishing nets provided by bird handlers. They were strung between two trees or bamboo poles. The trappers hunted in groups of two to four and spent three to five days in the forest, capturing as many birds as possible. All but two trappers sold the birds they captured to middlemen who worked for bird handlers in the city of Jayapura. The remaining two trappers worked independently, filling orders from private dealers. The trappers captured birds in Nimbokran, Berap, Nimbontong and Boasom clan forests and, in 65 per cent of trapping excursions, were required to make an entry payment to the clan members. On the remaining trips, clan members accompanied the trappers and obtained some payment if the trip was successful.

Transmigrant trappers captured a total of 445 individual birds of 20 species (11 parrot species, 3 pigeons, 2 cockatoos, 2 birds of paradise, and 2 mynas) during the one-month survey in Nimbokrang transmigration settlements (see Table 7.3). Over half of the individuals trapped (n = 257) belonged to 11 'protected' species with 'zero' quotas. For a further six species, estimated annual harvest rates exceeded annual national quotas, assuming that the sample month is typical and that trapping rates are constant over 12 months (see Table 7.3). Parrots (excluding cockatoos) and mynas were the most frequently captured birds, accounting for 66 and 23 per cent of all birds, respectively. The high demand for these birds was apparently due to their well-known abilities to mimic human voices and other sounds. The captured birds were held in cages until the middlemen visited the homes.

The price of birds sold in the pet trade ranged from US$1 to $105, depending on the species and its condition. Birds were then transported once or twice a month by planes and ships out of Papua to the large markets in Java and Bali, and many thence to Europe and the US. Several middlemen indicated that 10 to 15 per cent of the birds did not survive the journey to the large markets.

A small number of indigenous villagers had also started selling live birds after learning of the profits gained by transmigrant trappers. 11 (7 per cent) of the 147 sampled indigenous hunters reared birds for the pet trade in their backyards, including cassowaries (six), crowned-pigeons (four), Lesser Birds of Paradise (two), and Western Black-capped Lories *Lorius lory* (two). One hunter household reared four cassowary chicks captured after the male parent was killed.

Table 7.3 *Birds trapped by transmigrant bird trappers during a one-month survey in northern Papua (May 2006)*

English name	*Scientific name*	*Individuals captured/month*	*Annual national quota value*
Western Black-capped Lory	*Lorius lory*	65	0
Rainbow Lorikeet	*Trichoglossus haematodus*	48	0
Dusky Lory	*Pseudeos fuscata*	47	100
Salvadori's Fig-parrot*	*Psittaculirostris salvadorii*	37	0
Brown Lory*	*Chalcopsitta duivenbodei*	29	50
Eclectus Parrot	*Eclectus roratus*	18	0
Red-cheeked Parrot	*Geoffroyus geoffroyi*	18	0
Red-flanked Lorikeet	*Charmosyna placentis*	11	75
Little Red Lorikeet	*Charmosyna pulchella*	11	75
Papuan King-Parrot	*Alisterus chloropterus*	6	75
Buff-faced Pygmy-parrot	*Micropsitta pusio*	2	0
Sulphur-crested Cockatoo	*Cacatua galerita*	12	0
Palm Cockatoo	*Probosciger aterimus*	8	0
Purple-tailed Imperial-pigeon	*Ducula rufigaster*	9	100
Zoe Imperial-pigeon	*Ducula zoeae*	5	100
White-breasted Fruit-dove	*Ptilinopus rivoli*	4	0
Yellow-faced Myna	*Mino dumontii*	67	500
Golden Myna	*Mino anais*	37	0
Lesser Bird of Paradise	*Paradisaea minor*	8	0
Twelve-wired Bird of Paradise	*Seleucidis melanoleuca*	3	75
Total		445	

Notes: Values for quotas from Forest Protection and Nature Conservation, Ministry of Forestry, Jakarta.
* Restricted to the north Papuan lowlands (Endemic Bird Area 176) (Stattersfield et al, 1998).

In 59 of the 300 households at Nimbokrang I, 91 individuals of 14 bird species were kept as pets (see Table 7.4). The most popular bird species was the Western Black-capped Lory, which accounted for 64 per cent of all kept birds. Transmigrant families mainly purchased birds from trappers, whereas indigenous villagers kept birds that they had captured by themselves or had been given by their relatives. At the 11 households (including 2 of the hunter households sampled for bird trade) in the village adjacent to Nimbokrang I, there were 27 captive individuals of six species, including one species (Brahminy Kite) that was not encountered in the transmigrant settlement (see Table 7.4). The two most popular species were the Northern Cassowary and Victoria Crowned-pigeon, which together accounted for 63 per cent of the pet birds encountered.

The sustainability of hunting

In most of rural and highland New Guinea indigenous people obtain a significant proportion of their dietary protein from wild game. Consistent with the findings of this study, Mack and Dumbacher (2007) concluded that the birds most threatened by subsistence hunting across the island were cassowaries (three species), crowned-pigeons (three species), hornbills (one species) and megapodes (nine

Table 7.4 *Birds found as captives in 59 households in one transmigrant settlement and at 11 households in one local village, Nimbokrang region: Except those marked with an asterisk, all species are nominally protected by Indonesian law*

Species name	*Number of individuals*		*Purpose of keeping birds*
	MIC[a]	*INC*	
Western Black-capped Lory	58	5	P
Sulphur-crested Cockatoo	8	1	P
Eclectus Parrot	6	–	P
Rainbow Lorikeet	4	–	P
Dusky Lory	2	–	P
Northern Cassowary	3	10	P, R
Victoria Crowned-pigeon	1	7	P, R
Blue-black Kingfisher* *Halcyon nigrocyanea*	1	–	P
Lesser Bird of Paradise	5[b]	3	P, B
Buff-tailed Sicklebill *Ephimachus albertisi*	2	–	P
Golden Myna	1	–	P
Yellow-faced Myna*	1	–	P
Long-tailed Buzzard *Henicopernis longicauda*	1	–	P
Brahminy Kite *Haliastur indus*	–	1	R
Brown-collared Brush-turkey	1	–	B (eggs)
Total individuals	91	27	
Total species	14	6	

Notes: Scientific names for most species are given in Table 7.3.
MIC = transmigrant communities; INC = indigenous communities.
P = pet; R = reared for sale; B = breeding.
a) Birds in cages of bird hunters are excluded. b) Two live birds and three stuffed birds.

species). For example, at the small village of Gwaimasi in the lowlands of south-west Papua New Guinea, Kubo people ate no fewer than 83 vertebrate species, including cassowaries, hornbills, crowned-pigeons and megapodes, and 14 other species of birds (Dwyer and Minnegal, 1991). In the seven villages sampled (household surveys) in the present study, wild meat was the most prevalent source of animal protein. Subsistence hunters generally hunted to satisfy the protein needs of their families, while commercial hunters captured and sold wild animals for cash. Only 26 per cent of interviewed hunters declared that they hunted mainly for subsistence purposes, suggesting that there has been a dramatic shift away from local-level subsistence hunting towards more intensive commercial hunting, both for the wild meat trade and live bird trade.

In the past, cultural factors have had a major influence on hunting practices in New Guinea, such as the time to hunt and who could hunt; but there is little evidence that such traditions persist. In the study region, three clans believed that their ancestors originated from species such as birds of paradise and cassowaries and, in the past, hunting of these species was prohibited. This traditional belief is gradually breaking down and these clans now hunt these species. Another factor contributing to the selection of animals hunted is the ease with which a species can be captured or killed. Cassowaries are relatively easy to hunt because they leave clear trails in the forest along which snares can be set. According to one hunter, cassowary chicks make distinctive loud calls when fighting for food. This behaviour makes both the males that normally care for the chicks and the chicks themselves more vulnerable to hunters. The behaviour of crowned-pigeons makes them susceptible to hunting (King and Nijboer, 1994): if disturbed, they walk or run away; if forced, they will fly noisily to high branches where they 'balance themselves clumsily and gawk at the intruder, making easy targets of themselves' (Rand and Gilliard, 1967).

The most important factor explaining current hunting preferences appears to be the anticipated economic benefits of the killed animal for the hunter. The harvest rates of the main target species also appear to correlate with the market demand for their wild meat. The price of cassowary meat at the markets was almost ten times that of the crowned-pigeons and megapodes, and the estimated biomass of cassowaries killed annually at Nimboran was about ten times that of the latter species (see Table 7.1).

Three of the four most hunted bird species in the study area are largely confined to the northern lowlands of New Guinea and two of the target species (Northern Cassowary and Victoria Crowned-pigeon) are classified as Vulnerable by the IUCN (2009). All cassowary species are heavily hunted close to populated areas and the Northern Cassowary may be particularly vulnerable due to its preference for the highly populated river floodplains (BirdLife International, 2000). In addition to its importance as a food source, it is of cultural significance, being used as a gift in pay-back ceremonies, with its feathers and bones used as decorations and/or tools (Beehler et al, 1986). Ecologically, cassowaries play a critical role in the dispersal of tree seeds, many of which are too large to be dispersed effectively by other New Guinea frugivores (Mack, 1995), so overhunting could eventually result in a reduction of rainforest plant diversity (Mack and Wright, 2005). Originally considered common over its range, the Victoria Crowned-pigeon is now absent from large areas due to hunting pressure and is numerous only in remote areas (Rand and Gilliard, 1967; King and Nijboer, 1994). It is primarily killed for food, although its feathers are sometimes used for head-dresses (Coates, 1990) and nestlings are taken to be reared for food (BirdLife International, 2000).

Although hunting of wildlife in Papua is not prohibited, the Indonesian government has ratified laws for the protection of a number of species (Government of Indonesia Regulation No 7, 1999). Theoretically, both the trading and ownership of protected species is punishable by up to five years in prison and/or a fine of 100 million rupiahs (US$11,200). Almost all of the species hunted by indigenous peoples are nominally protected by Indonesian law, yet only about 10 per cent of hunters and other villagers interviewed were aware of any legislation governing the protection of wild animals. Thus, existing legislation has little or no effect on hunting practices in the region due to the combination of lack of enforcement of laws governing illegal hunting (and trading) activities (Suryadi et al, 2007) and lack of awareness about such laws.

The significance of the live pet trade

Among the bird-exporting countries of the world, Indonesia ranks fourth after Senegal, Tanzania and Argentina (Soehartono and Mardiastuti, 2002). In 1979, Indonesia became a signatory to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), thereby effectively committing itself to an international campaign to stop the trade in endangered species. Furthermore, the Indonesian government has set annual national quotas in accordance with CITES. All Indonesian psittacines (parrots) have been listed in CITES appendices, either in Appendix I (four species, including the Palm Cockatoo) or Appendix II (73 species) (Soehartono and Mardiastuti, 2002).

In Nimboran alone, 257 individuals of 11 ‘protected’ species (mostly parrots) were trapped for live trade in a single month, and estimated annual harvests of six additional species far exceeded quotas for the whole province (e.g. Brown Lory *Chalcopsitta duivenbodei*, a restricted-range species). Such harvest rates are unsustainable and suggest that some species will become endangered if current trends continue. For example, Salvadori’s Fig-parrot is classified as Vulnerable due to heavy trapping for the cage-bird trade, both for domestic and overseas markets, compounded by localized forest clearance (Beehler, 1985; BirdLife International, 2000). A total of 1582 individuals are known to have been exported from Indonesia between 1985 and 1990, and 1791 from 1990 to 2001, when recorded trade in the species ceased (IUCN, 2009). The rate of capture of this species in Nimboran (37 in one month) is therefore cause for concern.

When interviewed, almost all transmigrant bird trappers admitted knowing about the laws protecting wildlife and had received a list of ‘protected’ Papuan species from forestry officials; however, because there was no enforcement of these laws, they were largely ignored. Most captured ‘protected’ species were sold to bird handlers within transmigrant communities, but some (e.g. lorikeets and pygmy-parrots) were killed and discarded in the forest before returning to the village.

A study conducted by Conservation International and the government conservation agency during 2002/2003 revealed an extensive and lucrative trade in many species, including ‘protected’ species such as the Western Black-capped Lory, Sulphur-crested Cockatoo and Eclectus Parrot, in both Jayapura, and Manokwari, West Papua (Suryadi et al, 2007). The prices fetched varied between markets; for example, vendors paid from 50,000 rupiahs to 100,000 rupiahs (US$5 to $10) for Western Black-capped Lories at six markets, and sold them for up to 200,000 rupiahs (US$20).

This study suggests that relatively few indigenous hunters (7 per cent of those interviewed) were involved in the live bird trade. In Papua New Guinea, however, cassowaries are captured from lowland forests to supply a market in the more densely populated and deforested highlands (Johnson et al, 2004). Cassowary chicks are captured and held in enclosures to use as 'currency' in trade and ceremonies, while dangerous adults are snared, speared or shot and their eggs collected for consumption. At Crater Mountain in the eastern highlands of Papua New Guinea, 74 per cent of the captive animals (including mammals) were cassowaries, 83 per cent of which were the Near Threatened Dwarf Cassowaries *C. bennetti* (Johnson et al, 2004). Live off-take rates in one village catchment, coupled with the harvest of adults and eggs for subsistence, exceeded all estimates for sustainability and were probably unsustainable in another catchment (Johnson et al, 2004).

Concluding remarks

Conservation strategies need to be developed to address the current hunting pressure faced by threatened endemic Papuan bird species. Without estimates of the population densities of Northern Cassowaries or Victoria Crowned-pigeons, it is impossible to gauge whether hunting levels are sustainable. Johnson et al (2004) showed that village-based monitoring programmes are feasible when conducted in collaboration with outside scientists or other trained personnel, and should be encouraged as a means by which landowners and management agencies can evaluate the sustainability of cassowary harvesting rates. In order to maintain wild populations of economically and culturally valuable animal species, such as the cassowary, hunters might also be given incentives to focus their hunting effort on non-indigenous species (wild pig and rusa deer, which are both abundant in the region), and consideration might be given to encouraging long-term husbandry of cassowary chicks to supply local meat demands. Having alternative sources of income, such as cash crops (e.g. cocoa and coffee) may reduce hunting pressure on wildlife, but could also result in increased habitat destruction through the clearing of forests to allow planting of such crops. Whichever strategies are implemented, maintaining sustainable populations of threatened wildlife species will require sensitive management, which can only be effective if supported by education programmes designed to raise awareness amongst both local communities and government at local and regional levels (Riley, 2002).

While concern over unsustainable levels of hunting of cassowaries and crowned-pigeons is justified, these species are also threatened by increasing levels of destruction of their lowland forest habitat (BirdLife International, 2000; Frazier, 2007). Frazier (2007) estimates that at least one third of Papua's forests are slated for logging under one type of concession or other; but this ignores illegal logging, which has been estimated at 600,000 cubic metres of timber per month, and large areas allocated to oil palm companies. In addition to the direct effects of habitat loss or deterioration, logging activities result in the building of roads that provide hunters with access to previously inaccessible forests, as demonstrated for Borneo by Bennett and Dahaban (1995). The presence of timber companies in the Nimbokrang area indirectly supported bird-hunting and trapping through the provision of roads that simplified access to bird habitats. The fact that more cassowaries were killed in Nimboran than Kemtukgresi may be related to a greater degree of logging activities in Nimboran forest than in the Kemtukgresi area. Moreover, although not previously involved in bird trade activities, some timber company workers had begun to trap birds while staying in the forest in order to supplement their income.

This study provides further evidence of a rampant, illegal trade in birds, mainly by transmigrant peoples, which continues unabated. Indeed, the enforcement of laws governing wildlife trade and deforestation may be more urgent than checking unsustainable levels of hunting.

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Part III

Birds and Knowledge

8

Transmutation of Human Knowledge about Birds in 16th-Century Honduras

Mark Bonta

The period of initial contact between Old World and New World cultures in northern Latin America began with Columbus's fourth voyage in 1502 and ended with the epidemic-caused indigenous collapses that left 1 to 2 per cent of the pre-1492 population alive by the early 1600s. In the interim, a brief 'golden age' of natural and cultural historical research and writing was fostered by educated Spaniards intent on understanding the indigenous world, the thirst for knowledge of the official chroniclers for the Spanish crown, a small market in travelogues and the need that the Indians felt to record their own disappearing cultural heritage. Writers such as Herrera, Oviedo, Sahagún and Hernández recorded from direct study, and from anecdotes, the knowledges of indigenous peoples and European and African settlers. Their works reflect the beginnings of melding the distinct traditions of three continents into one diverse but coherent body of knowledge about flora and fauna, best characterized today as 'mestizo', though containing, in many cases, a strong mulatto element as well.

Honduras, peripheral to Spain's vast empire, was the focus of a small number of texts that included brief discussions of the avifauna of the 16th century. This chapter discusses what they reveal about both indigenous and Spanish relationships with each other and with birds, and how these relationships changed with the advent of new cultural, political and agro-ecological regimes. It helps to fill the void in pre-modern ornithological and natural historical knowledge about Latin America.

Transmutation

The first century of Spanish conquest and colonization in the Americas fostered a 'Golden Age' of natural history and ethnology marked by names such as Bernardino de Sahagún, Francisco Hernández de Toledo, González Fernández de Oviedo y Valdes, Antonio de Herrera y Tordesillas, Peter Martyr d'Anghiera and many others of the clergy, in the civil administration, at the Royal court, and among the conquistadors themselves. Spanish and Catholic curiosity and awe, inspired by the new world that Columbus had unexpectedly encountered, engendered a desire to describe, catalogue, analyse and disseminate the vast quantity of new knowledge. For most chroniclers who delved into the available material in detail, or spent time documenting it first hand, it was a labour of love, most often (but not always) framed in the predominant ecclesiastical discourses of the time.

Oviedo's contribution to natural history and ornithology has been considerable. His passage about the migration of raptors (Fernández de Oviedo, 1986 [1526], 1959 [1535]) is cited as the first Western documentation of this phenomenon (Heintzelman, 1986) and is reproduced in an anthology of important writings about birds (Krutch and Eriksson, 1962). Even genocidal Spaniards such as Diego de Landa (1938 [circa 1566]) provided detailed summaries of geography, flora and fauna.

A huge volume of work on 16th-century Spanish America was produced compared with that written in France and England during the same period. Tomes regularly ran to many volumes of thousands of pages with region-by-region descriptions of all aspects of the cultural and physical geography interwoven with the flora and fauna and their uses by indigenous as well as immigrant peoples. Butzer (1992) provides a summary and analysis of these, while Gerbi's (1985) study of the early chroniclers is an unparalleled classic.

Although there is little non-Latin American recognition of the early avian accounts (compare Mayr, 1975), natural historians from within the region have often acknowledged the contribution of their colonial forebears. Escalante et al (1993) rightfully recognize Sahagún, Hernández and others, while Chardon (1949) provides a critical history of naturalists all over Latin America and Furlong (1948) focuses on Argentina and Paraguay. But ignorance of 'Golden Age' sources has not always been the case, as is shown by Franklin's Gull *Larus pipixcan*, which takes its name from the Nahuatl. How did '*pipixcan*' creep into Linnean taxonomy – or, for that matter, how have similarly indigenous names such as *hoatzin*, *urubitinga* and *motmot* become 'standard'? Stresemann (1975) states that Francisco Hernández's great compendium on the flora and fauna of New Spain, which became available in Europe during the early 17th century, was the only major work on Mexican avifauna that budding classifiers of birds could obtain until the early 19th century. Hernández details at least 228 types and some drawings are also preserved. In some cases, descriptions, such as that for the *pipixcan* were good enough to be allowed as 'official' species.

Another major contributor to the knowledge about birds of the period was the Franciscan friar Bernardino de Sahagún. Based in Mexico City, Sahagún set out to document the complete history and culture of the 'Aztec Empire', employing several knowledgeable Nahuatl speakers as informants. The massive tome, with detailed illustrations, a Nahuatl dictionary and 12 books in parallel columns of Spanish and Nahuatl with original illustrations, is known as the *Florentine Codex* or the *General History of the Things of New Spain* and describes 130 types of birds. In addition to Nahuatl names and locations where the birds were found, accounts, grouped by type of bird, often commonly discuss migratory patterns, nesting habits, plumage, and local uses and beliefs. Separate sections describe in detail the important trade and artisanry in feathers. The possibilities for scholarly lines of enquiry into 16th-century bird descriptions are nearly limitless but remain little explored by ornithologists. Hernández is occasionally cited; but most of the rest are ignored, even when they provide important data such as migratory routes and patterns, as well as the presence of aviaries and the trade in live birds. Parrots, macaws and many others were traded over large areas in the 1400s, a possible clue to hard-to-explain distributional patterns. Sahagún, for example, mentions how Moctezuma II had Teuzanatl (Great-tailed Grackles) *Quiscalus mexicanus* released in the Valley of Mexico. Their tail plumes had been much in demand for feather tapestries (a major form of Mexican high art) and they had been a rare and expensive species; but once they became widespread, they became an amusing nuisance (Bonta, 2003).

The example of Honduras, as used in this chapter, is limited, fragmented and data poor, reflecting the colony's status as a backwater of the empire. Nevertheless, the extant accounts serve to illustrate several of the major themes that can be traced throughout the wider literature.

After 1600, as Spain's fortunes declined, the amount and quality of scholarship dwindled to almost nil in places such as Honduras up until the 20th century and, to a lesser extent, in wealthier colonies such as silver-rich Mexico.

In terms of ethno-ornithological significance, it is the overarching theme of knowledge transmutation that will serve as a general interpretative framework. This can be described as the process whereby the knowledges and, thus, the overall worldviews of Old World and New World people were challenged and, ultimately, became something new and different due to the exchange of ideas and products, a constant process from 1492 onward. Prior to 1492, this also occurred in the Americas, during the expansion of the Aztec Empire, whose traders searched out cacao, plumes, gold and other precious materials as far away as Honduras and Nicaragua, and across other imperial dominions such as Tawantinsuyu (the Inca Empire). It could be defined simplistically as a forcing of beliefs by one group on another, with the submissive group jealously guarding and even hiding its own original knowledge and practices, sometimes for centuries. Though much was lost, much has also survived as enclaves of more traditional rural culture – indigenous as well as African-American and European-American, generally in some sort of mixture. Thus, the ethno-ornithological historical record delves into the roots of modern 'folk' ornithological knowledge, where much has been preserved even while some of the most notable practices, Mexican feather tapestries among the foremost, have vanished.

In 1502, Honduras became the first part of the American continent glimpsed by Europeans during Columbus's last ill-starred voyage. It was not until the early 1520s that Europeans are known to have returned to the mainland and first effective settlement began at Trujillo, a port on the north-eastern Honduran coast, in 1524. Rapidly thereafter, conquistadors converged on this mountainous land from all directions, often quarrelling over jurisdiction in bloody battles. Honduras was one of the most difficult of all the lands of the New World to conquer for it had had no centralized state authority and dozens of warring polities held sway over physically difficult terrain. The colony was more or less conquered and the main European towns established by the 1550s; but by the end of the century, warrior societies in eastern Honduras had driven out the Spanish presence and, known collectively as 'la Taguzgalpa' (now, in part, the Moskitia), resisted dominance from the outside until well into the 1800s. Over the rest of the country, as Indian populations collapsed, tiny Spanish outposts and a scattering of ranches and silver mines characterized the human landscape until after independence in 1821. Honduras was always, along with Nicaragua, the most remote and impoverished of the provinces of New Spain, several rungs down from the heavily populated Guatemalan highlands and much of Mexico. Very few chroniclers had visited Honduras; virtually none other than the most intrepid missionaries ventured there after transportation and communication routes began to collapse in the late 1500s and coasts were harried by pirates. Honduras became a land of myriad anarchistic fiefdoms called '*comarcas*', tucked into fertile mountain-rimmed plains known as '*valles*' under the sway of tribute-paying, ranching Indians, towns of free Africans, *mulattos* and *mestizos*, some larger hacienda owners, and a tiny educated Hispanic elite in only a few of the principal settlements. Indian place names were largely retained. Cultural practices came to reflect Spanish Catholicism, indigenous beliefs and African contributions together. Nowhere in the Americas is there any better example of the forging of a new identity and new knowledge out of the ashes of Indian civilization, the holds of the African slave ships, provincial tendencies of low-paid Spanish administrators and a handful of clergy. Little elite knowledge and science ever reached Honduras; what was retained and maintained was 'folk' in every sense of the word. And yet it is as rich, varied and nuanced as anywhere else (Bonta, 2003).

The accounts

The Columbian encounter

Accounts of Columbus's fourth voyage raise more questions than they answer about indigenous culture in north-eastern Honduras. While later accounts discuss the specific avian importance of the Bay Islands and Trujillo, Columbus's visit is important in that it provides the first mention of a domestic bird that later became a mainstay of chroniclers' reports, often compared to the Old World chicken, a bird that eventually came to displace it in Honduras. The name 'Guanaja,' the 'Isle of Pines' off Honduras and encountered by the Europeans, refers to the turkey. Ferdinand Columbus (Carías, 1998) mentions that Indians on the mainland gave the Spaniards 'local hens (*gallinas de la tierra*) that are better than ours' as well as '*anades*', some type of duck. The royal chronicler, Martyr d'Anghiera (1964 [1524]) wrote that the Columbian expedition saw 'diverse birds, and among the edible ones they have those that we have earlier mentioned are similar to *las pavas* in colour, size, flavour and taste'. In this case, Martyr appears to be making a comparison between domestic turkeys and some species of the family Cracidae (guans and curassows), whose members are common on the Caribbean slope of Honduras and are an important (and threatened) food item today for rural people.

Trujillo's Avifauna

Cristobal de Pedraza (1485 to 1553) was a clergyman who became Honduras's first bishop and, at least by his own account, a staunch defender of indigenous rights in one of the most brutal colonial regimes, where Spaniards, though banned from the earlier excesses of slaving, still treated the local Indians as little more than animals as they sought to become wealthy off the latest gold strike or other get-rich-quick venture. Some Spaniards endured, however, and Pedraza's lengthy paragraph on the avifauna of the lowland tropical forests and grasslands of north-eastern Honduras around coastal Trujillo in the early 1540s is the best account of the local avifauna through their eyes. Pedraza makes no attempt to document indigenous names for birds; he is primarily concerned with comparing them to Old World equivalents. This is a common theme. Much in the New World was not entirely new, and chroniclers were constantly searching for ways that their readers, and scientific enquiry in general, could reconcile the two worlds.

Pedraza's account fits a common mould for contact-era Spanish nature-writing, that of the report to officials back home who were most likely to be interested in species of economic value, for the enrichment of the Church and Crown, and also as a lure to new settlers (always a commodity in high demand in Honduras). But another dominant trope – and one that clearly owed much to Indian culture – was the inevitable reference to birds that could be hunted or otherwise utilized for sport:

> *There are many* gallinas de la tierra *[domestic turkeys] that they [the Spaniards] call pavos here [Trujillo], and many* de Castilla *[chickens] which breed in great quantities, as well as* palomas de las torcazas y de las zoritas *[two categories of doves]. Many* codornices *[quail] and* tortolas *[ground-doves] in very great*

> *numbers and many* faisanes *[pheasants] like those of here [Spain] and* patos *[ducks].* Perdices *[partridges] have not been seen. There are many birds of prey of diverse types:* águilas *[eagles],* azores *[goshawks – not a Honduran species] and* halcones *[falcons] and many other beautiful birds of this type that swoop down to take hares and rabbits and* palomas *and* codornices, *much more beautiful than all the other birds that are hunted here, and many other birds that are eaten, tiny ones of diverse colours and habits, red, blue and yellow, black with red collars, in size almost like the finger and even some like the little finger [hummingbirds] and many others painted in diverse colours. There are many beautiful* papagayos *[parrots] of the green type, with one [coloured] like an egg yolk with yellow amber on the head [presumably the Yellow-naped Parrot* Amazona auropalliata*], the best there are in all the Indies and that most easily talk without being taught. And the best of this province are those of an island that is almost eight or ten leagues distant from this city of Trujillo that is called Island of the Guanaja [domestic turkey,* Meleagris gallopavo*] that measures up to two leagues around, such that from many parts of the Indies they send and plead to the citizens of Trujillo to send them* papagayos *from the said island because they are so good. And the Indians of the said island, knowing that there is so much demand, raise them taking them from the nests when they are almost ready to fly, and they* gangrenan *[infect them with gangrene, possibly a method of keeping them flightless] to sell them to the Christians [Spaniards]. There are also many* papagayos *of the tiny ones [parakeets or White-crowned Parrots* Pionus senilis*] almost of the size of* tordos *[thrushes], in such great numbers that they are great pests, eating the corn and wheat crops of the Indians and Christians like* pardales *[sparrows] do here [e.g. in Spain], against which the Indians are armed with traps and other weapons and take them to eat.* (Pedraza, 1898 [1544])

Pedraza also writes (1898 [1544]) that Villa de sanct Pedro (a Spanish town in the Ulua Valley in north-western Honduras, a major locus of indigenous settlement) has all of the birds he describes for Trujillo, except for the raptors. He gives the impression that Trujillo contains both species of the grasslands and brushland (produced by the slashing and burning of Spanish ranching and Indian farming) and a certain component of deep forest birds, something not shared with San Pedro; his descriptions of the landscapes later bear this out.

Pedraza notes one of the ethno-ornithological details that Honduras became famous for and something that continues to this day: the trade in Yellow-naped Parrots (*Amazona auropalliata*). Talking parrots were all the rage in Spanish households, as they had been among Indian peoples. Herrera

(1991 [1601–1615]) also mentions that 'Guanaje' (Guanaja) has 'excellent' parrots. The Spaniards, then, engaged in the bird trade as readily as the Indians. Other indigenous practices noted by Pedraza are hunting, something common to both Indians and Spaniards, and trapping, where we see that Psittacids that became pests were captured and eaten. An analogous situation occurs today.

Spanish hunting practices in Honduras are later referred to by Antonio Vázquez de Espinosa, who visited Honduras during the early 1600s. He mentions that the Tegucigalpa region of south-central Honduras was good for hunting, and cites '*pavos*, *pauxies*, *faisanes*, *palomas*, *tortolas y otras*' (Vázquez de Espinosa, 1969). In this case, *pavos* probably means guans (Crested Guan *Penelope purpurascens*, or Highland Guan *Penelopina nigra*) while *pauxies* are Great Curassows *Crax rubra*; *faisanes* are pheasants, which are not found in Honduras. The reference is unclear, but it does serve to demonstrate the way in which the Spanish misapplied Old World names to New World birds rather than adopt local terms. Today, birds have common names derived from Spain as well as from local indigenous languages and from local Spanish language terminology. These vary from family to family, town to town, and region to region: the Three-wattled Bellbird (*Procnias tricarunculatum*), for example, has at least ten names across its small range in eastern Honduras. In some cases, the Spanish were applying names correctly, as with the members of the Columbidae, a family also found in Europe. Thus, the transmutation of knowledge produced a riotous jumble of terminology.

Oviedo's raptors

Paralleling Pedraza's account, eastern Honduras's raptors are the source of Oviedo's only Honduras-specific ornithological description. This is unfortunate, for Oviedo was one of the most prolific of all the chroniclers of New World natural history:

> *There is a bird [Black Hawk-Eagle* Spizaetus tyrannus*, or dark phase of Crested Eagle* Morphnus guianensis*] that is larger or about the size of a peacock, with yellow bill, yellow talons, and on the upper breast its plumage is very black, like velvet, and on the lower breast striped, one white and one black, in such beautiful harmony that it is the most beautiful plumage that can ever be seen; and the legs down to the talons are feathered, and the eyes very beautiful, and on the head a crest as long as a finger, and straight, of feathers, black and very shiny; and if it looks at the ground, it declines the crest towards the ground, and raising its head, it flattens it back behind. The tail is short, of the same black colour, and slightly longer than a dove's, and the wings are tucked back. It is a bird of prey and if it can't find any other thing to eat, it feeds on some long-tailed monkey, since there are many*

> *of those. There are other birds of very beautiful plumage and each has two crests pointing upward, like an owl, but larger [Harpy Eagle* Harpia harpyja*]; and they move those plumes or crests very easily and often hold them flattened behind and, when they gaze at the ground, they point them towards the ground as well and it is something to see; and they are also birds of prey with fierce talons. There are black eagles [Solitary Eagles* Harpyhaliaetus solitarius*; Great Black-Hawks* Buteogallus urubitinga*; or Common Black-Hawks* B. anthracinus*], like very fine and highly polished jet, large and with large talons, and they eat many of those* guabiquinajes *[meaning unknown: possibly crabs] of which there are many in that land.* (Fernández de Oviedo, 1959 [1535])

Oviedo is unlikely to have seen these birds himself; he probably received the account from local Spaniards or Indians during his stay in Leon, Nicaragua; at the time he visited, eastern Honduras was weakly controlled by Nicaragua-based conquistadors. The account jibes with the common awe and apparent respect that both Indians and Spaniards felt for this group of birds.

Quetzals

If any bird could be considered emblematic, even totemic, of the Honduran highlands, it is the Resplendent Quetzal *Pharomachrus mocinno*. As one of the most sacred and important birds of the highland Maya of Chiapas and Guatemala and the Lenca of western Honduras, the quetzal attracted the attention of the Spanish in Mexico City because the Nahuatl feather merchants had depended on quetzal plumes from these regions to sell to the feather-workers in the Mexican capital of Tenochtitlan. Sahagún (1950 to 1969 [1540–1585]) describes how the feather traders would go undercover in enemy Mayan lands and wait for the quetzals and Lovely Cotingas (*Cotinga amabilis*) to descend the mountain slopes in certain seasons, when fruits were available, and how they would lay in wait to grab the birds, being careful to use leaves as gloves so as not to get oils from their hands on the precious iridescent feathers. They would then release the birds – an early example of sustainable harvesting. Sahagún and Hernández produced nearly identical accounts of the species; but the two accounts are distinct in several ways:

> *Chapter II: Of the Quetzaltótotl or bird of fine plumes*
> *It is a bird with* penacho *and the most part of it covered by feathers like the peacock; it is of medium size, with a sharp yellow bill, and tail like that of the* tzánatl *[Great-tailed Grackle,* Quiscalus mexicanus*] dressed with very long plumes, green, brilliant, like a peacock's, with the form of lily flowers, and covered by others that are darkish on top, but that distribute the green below where*

> *they touch the peacock feathers, as if nature had wanted in this way to protect the beauty of the central plumes. The crest is formed by brilliant-coloured and very beautiful feathers, the breast and the lower throat are dressed in red and brilliant feathers, and the back and rump covered by peacock feathers, as well as the parts that are found under the wings and between the legs, though there are found intermixed small and soft feathers. The wing feathers are very large, of a light green colour and ending in points; those that cover the shoulders are green above but black below, and those that are between the wings are somewhat recurved and of the colour of fingernails. The feathers of these birds are highly esteemed among the indigenous peoples and at times preferred to gold itself; the longest are employed in the fabrication of headdresses and other ornaments for the head or the body, for times of war or peace, and the rest of the feathers in textile works to represent all sorts of things, but principally the gods, for which they used to mix also the feathers of the little birds called* hoitzitzillin *[hummingbirds, Trochilidae]. They live in the province of Tecolotlan, beyond Quauhtemallan [Guatemala], extending to the so-called Honduras, and where care is taken that no one kills these birds, only permitting that the plumes are removed, later letting them free, and this only permitted of the lords, since they are considered one of the most sought after prey and [right of] possession is passed down from father to son.* (Hernández, 1957 [1567–1587])

Hernández's physical description is copied from Sahagún; but it is unclear whether either actually saw the bird. The description is accurate enough to suggest that at least Sahagún examined a live specimen. In any case, Sahagún provides further details on indigenous terminology – the head plume is called *tzinitzcan*, while tail plumes are *quetzalli* and primaries are *quetzalhuitzli*. These same terms are used for feather types on other species. Even though the quetzal is the very first bird of the 130 types described in his chapter on Mexican avifauna, Sahagún writes only that they live in forests and make their nests in the trees where they raise their young, vaguely indicating that they live in a province called Tecolotlan, near 'Unduras' (Honduras), or nearby. In his account of the feather trade, he specifies what is now Chiapas and also provides, possibly, the first Western account of altitudinal migration; the location of Tecolotlan ('land of owls') remains unclear. Hernández appears to be drawing from a parallel source (perhaps the latter consulted the same local informants as Sahagún) that specifies Tecolotlan as being farther away from Mexico than Guatemala, which would mean somewhere in or very close to Honduras.

Hernández's main point of difference from Sahagún is his description of the importance of quetzals to indigenous peoples. This is still the case among highland Maya and Lenca; but Hernández's account bears out the somewhat romanticized modern embellishment that unfailingly paints the Resplendent Quetzal as the very spirit of the 'mystical' cloud forests of Central America (e.g. von Hagen, 1945), symbol of all that is sacred to urban conservationists and, at least ideally, to rural people. Hernández provides an early point of reference for later accounts that eventually wind up making the quetzal the symbol of Guatemala itself (the name of its currency, and an icon in numerous brands in that country).

What Hernández records is the economic value of the feathers tied into their religious significance, something that Sahagún also describes (hummingbird feathers were used for the finest details in tapestries that are said to have been finer than anything found in Europe; feather-working has remained a living art in the Americas, but the grand tapestries last made in the 1500s have long ago been claimed by the elements). Unique to Hernández is the revelation that quetzals were protected as well as harvested sustainably, something he suggested was practised locally (e.g. by Maya and Lenca), not just by covert Nahuatl feather traders, as Sahagún recounts. In this local context, rights to quetzal plume harvesting are heritable.

The continuing importance of the quetzal in Maya and Lenca culture, and, by extension, in the national identities of Central America, can be traced through later centuries, as it is reflected in folklore, mythology and place names (the second largest city in Guatemala is Quetzaltenango). The quetzal is also supposed, by some, to be the only bird with the potential to become one's *nagual* in Lenca culture (Chapman, 1978):

> *There are infinite birds of gorgeous plumes and for these highly esteemed in the Indies, and particularly in New Spain [Mexico], whose natives (as has already been said) were very dedicated to this finery and adornment. Among all the most highly appreciated was the Totolquetzal, and so much that the death penalty was applied to him who killed one. It is something smaller than a pigeon, with iridescent green feathers, and those of the tail long, and beautiful, which are those that the Indians use in their* mitotes *[spiritual trance sessions] and dances, and they are traded for through various provinces; to get the feathers they put traps in the trees where the birds are, then leave them, and that is the way they harvest without killing them, as Herrera says, and Padre Eusebio. Where there are most are Honduras, Guatemala and Chiapas.* (León Pinelo, 1943 [1656])

As have other authors before him, León Pinelo emphasizes the use of quetzal plumes in a religious context as well as the sustainable harvesting of the feathers. Such repetition of facts like these among authors indicates a European (or Creole, in León Pinelo's case) fascination and, sometimes, even muted respect for Indian practices, if not beliefs. These repeated passages speak to the transmutation whereby all that was correct and important in the European mindset came to be swayed by what made sense in American context.

Herrera and the Nagual

Antonio de Herrera y Tordesillas (1559 to 1625), a royal chronicler, never visited the Americas but had unparalleled access to archival sources, compiling one of the longest and most influential encyclopaedic works on the New World, chiefly comprising its history up to 1554. Herrera has been accused of fabrication, but though he copied others' work without attribution (a hallmark of scholarship at the time), it appears more likely that he had access to archival material that has subsequently been lost or has simply not been examined since.

Herrera's is the most influential and oft-cited description of Honduran indigenous beliefs and practices in existence. It is commonly taken to refer to the Lenca-speaking peoples of the western Honduran highlands near the early capital of Gracias a Dios (now Gracias, department of Lempira), though several points correlate with a parallel set of archival accounts from northeastern Honduras involving the 'Taicones' and related groups (Bonta, 2001). But one way or the other, Herrera is the only author to reveal the true importance of birds in the fabric of Honduran indigenous life, and, in some cases, the cultural beliefs and practices of the 1500s have carried through to the present and have even become widespread across the country as a whole.

In speaking of the Honduran Indians, Herrera mentions that their stockbreeding, before the Spanish came, consisted in raising birds (Herrera, 1991 [1601–1615]). The primary species was the domestic turkey, though the Muscovy Duck (*Cairina moschata*), certain Cracids and others (doves, parrots, songbirds, etc.) may have been raised in limited numbers for a variety of purposes. The turkey's wild relative is found nowhere in Central America.

Herrera (1991 [1601–1615]) states that Honduran Indians traded their own cotton cloth, feathers and other things for cacao by seagoing canoe with the people of the Yucatan (crossing the Gulf of Honduras, as intimated by the chroniclers of the fourth Columbian expedition, who encountered just such a canoe off Guanaja). In addition to this long-distance trade, Honduran Indians traded birds, cotton cloth, feathers, salt, cacao and *achiote* (annatto *Bixa orellana*) among themselves.

Herrera (1991 [1601–1615]) continues his discussion of Indian ways by recounting that prior to making war, they sacrificed '*gallos de papada*' (another term for turkeys) and dogs that didn't bark, while the warriors went into battle dressed in the skins of eagles and other birds, as well as jaguars and mountain lions. Herrera (1991 [1601–1615]) describes the Lenca tradition of Coamiçagual, a queen who eventually turned into a flying bird and was commemorated in an annual feast day; the bird is not named and in more recent versions appears to have been a flying serpent or dragon.

Birds are mentioned as possibilities for the totemic *naguales*. Although Chapman (1978) claims that only quetzals made appropriate avian *naguales*, Herrera indicates that raptors may also have been involved. He writes:

> *The 'Demonio' appeared in their dreams as a puma, jaguar, coyote, crocodile, snake or bird because, [of] these animals and raptors, there are many in the province: they are Naguales, that is to say Guardians, or* Compañeros*; and when the Bird died, the Indian also died, that was enchanted by it; and this was seen many times and was believed to be true; and the way they made the alliance was like this: the Indian went to the river, forest, mountain or place most hidden, invoked the Demons, by whatever names seemed appropriate to him, he talked with the rivers, rocks and forests, saying that he was going to cry, so as to have what his ancestors had had, and he brought some dog, or turkey, which he sacrificed, and with that sadness he slept, and in his dreams, or awake, he saw some of the above-mentioned animals or birds, and then he asked them that he could be enriched with Salt, Cacao, or any other thing: and he shed blood from his tongue, ears and from other parts of the body, and later made his pact with the animal: which said to him, in dreams or awake: on a certain day you will go hunting, and the first bird or animal that you see, will be Me, and I will be your Nagual, and Compañero for all time; and it was so, that they established between them friendship, that when one died, the other died: and it was so, and it seemed to them, that he who did not have a Nagual could not become wealthy.* (Herrera, 1991 [1601–1615])

The theme of turkey as an important sacrificial bird is echoed in a further comment by Herrera, intending to illustrate a character trait of the Indians:

> *… to say to an Indian woman, that she should kill a turkey for her sick husband, responded, that if she were to kill the turkey, and the husband died anyway, then she would be left without either.* (Herrera, 1991 [1601–1615])

Two further snippets of bird-related beliefs are notable in that they are still believed among more traditional sectors of the Honduran population:

> *… and [if] a* lechuza *[Barn Owl* Tyto alba*] perched on the house of a sick person, certain death would result, or someone in that house would die, even though all were healthy… When it thundered, they burned cotton seeds: they kept the eggshells of the* 'pollos' *[chickens* Gallus gallus*] that hatched, and also the* 'Pabos' *[domestic turkeys* Meleagris gallopavo*]: because they said, if these were thrown away, then the chicks would die.* (Herrera, 1991 [1601–1615])

Conclusions

The ethno-ornithological data in the few and fragmentary Honduran records discussed above are intended to function here as a teaser in the hopes that researchers will become more aware of their potential wherever they may be applicable. No definitive sweeping conclusions about birds and people in 16th-century Honduras can be reached with so little evidence; but at least we have a skeletal outline of the beginning of the transmutation. The result of the process is the heterodox knowledge encountered today across the country, though with the understanding that virtually all of the knowledge both lost and retained was solely recorded orally. In the case of the African contribution, nothing was ever published at all.

More recent sources for Honduran ethno-ornithology (and this applies widely elsewhere as well) include the small corpus of 20th-century folklore anthologies, as well as the more rigorous accounts of anthropologists (Bonta, 2003), though the vast bulk of data can only be found in the form of oral traditions, gleaned through labour-intensive ethnographic fieldwork.

There is one other important source that remains a topic for another discussion – the evidence for bird use and knowledge in pre-Columbian Honduras found in the archaeological record of stone, clay and settlement. As throughout the New World, birds figure heavily in the pre-Columbian iconographic record – one has only to think of the massive stone Scarlet Macaw (*Ara macao*) heads carved on the temples at the classic Mayan centre of Copán. There are also avian figures on ceramics, and representations of birds are found in endless transmutation of form and meaning throughout millennia of human contact. At some point it all blurs together into a timeless vision of people's gods and divine leaders becoming birds, while their birds become gods, and the very archetypes of winged divinity are materialized in quetzals, owls, raptors and myriad others.

Note

All quotations have been translated by the author; all bracketed commentary within quotes is also by author. Works from the 16th and 17th centuries referenced in this chapter include the *original* publication date or range of dates, or date of completion of the manuscript in cases where the original remained unpublished, in brackets following the date or range of dates of publication of the edition used by the author.

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9

Sound, Sight, Stories and Science: Avoiding Methodological Pitfalls in Ethno-ornithological Research, with Examples from Kenya

Fleur Ng'weno

Birds are part of the daily life, culture and knowledge of local communities of Kenya in Eastern Africa, and local names were given to nearly every species. These observations, understandings and names constitute specific local knowledge about birds, worthy of recognition and preservation. When local knowledge about birds meets the knowledge held by scientists and birdwatchers in ethno-ornithological research, however, a disconnect may occur. Researchers often do not have the depth of knowledge about birds that local people possess and may not be able to interpret the stories they are told, while local communities are often unfamiliar with printed materials. This chapter explores the different ways of knowing, and highlights the need for researchers in ethno-ornithology to be well informed about birds in order to match the right bird with its local name and associated indigenous knowledge, and suggests methods to avoid possible methodological pitfalls.

Introduction

In Kenya, as elsewhere, diverse communities have observed and understood the complex lives of the birds around them, giving local names to nearly every bird. These observations, understandings and names constitute specific local knowledge about birds, worthy of recognition and preservation. Scientists, too, have developed sets of knowledge about birds, including internationally agreed scientific names. Birdwatchers, in turn, have built a body of knowledge to support their popular hobby, including internationally agreed common names (at least in English) and field guides for almost every region on Earth. And today, ethno-ornithology tries to present local knowledge about birds and ways of knowing about birds in a form understandable to a wider audience.

When current scientific and popular knowledge meets local or indigenous knowledge about birds in ethno-ornithological research, however, a disconnect sometimes occurs. This disconnect is an indication of methodological problems that arise from the different ways in which people come to knowledge in local indigenous communities and in scientific communities. One important result (among several) of these methodological problems in ethno-ornithological research is that birds are often misidentified (in other words, there is an incorrect matching of the local indigenous knowledge to the common or scientific bird name) in publications. Focused on examples in Kenya, this chapter looks at the different ways in which we come to knowledge about birds and how birds may be misidentified when two sets of knowledge do not connect. It makes suggestions on how to avoid these methodological pitfalls and build a body of local knowledge to which future generations can still refer.

Birds in our lives

Birds are part of our daily lives, across cultures and continents (Collar, 2007). Birds sing and are usually active by day, thus accompanying farmers, herders and fisher folk in their daily tasks. Birds in flight represent freedom and the soaring of one's spirit.

People in Kenya have related to birds in many ways, tangible and intangible. Birds are a source of food: Africa's domesticated bird is the guineafowl *Numida* spp., and many other species, such as quail *Coturnix* spp., francolin *Francolinus* spp. and Ostrich *Struthio camelus*, are hunted for their meat or eggs. Feathers are intrinsic to dances and ceremonies; for instance, in parts of northern Kenya, some ceremonies cannot be performed without an Ostrich feather (Kassagam, 1997; Hussein Isack, pers comm, 1989). Some birds, such as the Eurasian Bee-eater *Merops apiaster*, are indicators of the seasons (Beatrice Maloba, pers comm, 1978), while others, such as the Augur Buzzard *Buteo augur* and Nubian Woodpecker *Campethera nubica*, are omens of success on a journey (Edwin Selempo, pers comm, 2008; Henry Saitabau, pers comm, 2008). In stories, bird songs often communicate messages (Theresa Aloo, pers comm, 1980). Seed-eating birds such as Red-billed Quelea *Quelea*

Source: drawing by P. Mboya

Figure 9.1 *Ostrich-plume head-dress*

quelea demand constant surveillance of millet fields, while migrating storks *Ciconia* spp. destroy outbreaks of destructive insects. The dance and calls of the Grey Crowned Crane *Balearica regulorum* are imitated by children at play (Theresa Aloo, pers comm, 2008). Feathers and eggs are used to make ornaments, containers and other objects, including prized ostrich-egg containers and jewellery. Birds are also ever-present observers, able to reveal crimes or inflict punishment themselves, such as setting fire to thatched roofs if provoked (Theresa Aloo, pers comm, 2008). In many communities, 'they occupy an interstitial role, separate from yet in certain respects part of human society, familiar beings yet evocative of divinity, diversely arrayed between earth and sky' (Galaty, 1998). These examples indicate just some of the many forms of local knowledge about birds. They relate to attributes such as edibility, feather quality, song, cultural meaning, impact upon livelihood, or time of day or year in which the bird is observed. Local knowledge seldom relates to what the bird looks like – the exception being the Augur Buzzard, which is a good omen when showing its white front (Kassagam, 1997; Edwin Selempo, pers comm, 2008; Henry Saitabau, pers comm, 2008).

In contrast, field researchers and birdwatchers rely, in the first instance, on appearance when identifying birds. Birdwatching is an increasingly popular hobby across the world and encompasses a cross-section of Kenyans in terms of ethnic origin, age and gender. As in many areas of the post-colonial world, this new interest has increased the audience and participation in ethno-ornithological research because local people want to understand how their cultures and cultural knowledge relate to the birds they watch. Good field-guide books are essential and Kenya has several, including Zimmerman et al (1996) and Stevenson and Fanshawe (2002). Most birdwatchers and ornithologists learn to recognize different birds from pictures in books, and only gradually learn the birds' songs or habits, in contrast to local people who grow up with the songs, habits and stories about birds.

Nature Kenya and other BirdLife International partners in Africa have found that birdwatching is a good entry point for conservation (Omolo, 2004). Nature Kenya has focused conservation efforts on Important Bird Areas (IBAs) – key sites for the conservation of birds and other biodiversity, identified according to international criteria set by BirdLife International. Working with local communities living near IBAs, Nature Kenya finds that young people with an interest in the environment readily take up birdwatching as a hobby. After developing their birding skills, they find that they can earn a living by guiding the growing number of birdwatching tourists, or use their knowledge to help monitor and raise awareness about their local IBA.

Ethno-ornithology can have a direct impact upon conservation (Muchai Muchane, pers comm, 2008). The highland grassland of the Kinangop Plateau, home to the endemic and endangered Sharpe's Longclaw *Macronyx sharpei*, is in private ownership and rapidly being converted to wheat fields, market gardens, 'improved' pasture and other uses, destroying the tussock grassland habitat (Lens et al, 2001; Muchai et al, 2002). Sharpe's Longclaw is an unobtrusive small bird; most of the people on the plateau had not paid any attention to it until the local Kikuyu name *Gathonjo ka weru-ini* was used. Many people then began to see it as their bird and became interested in its conservation, with several farmers leaving parts of their farms as tussock grassland to protect the bird.

Ethno-ornithology in Kenya

The linking of indigenous and scientific knowledge in Kenya has mostly been practised during the last 30 years. Earlier than that, some information had been published (Hull, 1941, 1942) and some had made its way into current folklore, such as the Red-chested Cuckoo *Cuculus solitarius* singing 'It will rain!' (in English). The first coordinated effort at collecting ethno-ornithological information in Kenya began at the National Museums of Kenya by Aneesa Kassam in 1985. During the following years, two books on indigenous bird knowledge were published (Barrett, 1988; Kassagam, 1997). The first ethno-ornithological meeting in Kenya was held in 2007 (Njeri and Maundu, 2008).

Gaining and sharing knowledge

Knowledge about birds, acquired from sight and sound, is transmitted to others in the form of oral tales, sayings, songs, names or life histories printed in books, field guides, magazines and scholarly journals. Stories or science might emphasize one way of knowing over the other, depending on the form of the transmission. Most birds are heard before they are seen and many birds sing all year long in the tropics, although more often around the breeding season. As a result, in folklore and local communities, the bird's name, the 'meaning' of birds or stories using birds may be more closely associated with bird songs than with what a bird looks like. For example, the chatter of birds in the morning signifies that it is time to get up; the hooting of an owl (Strigidae) in the night predicts that someone will die; the bubbling song of coucals *Centropus* spp. indicates the coming of the rainy season (Beidelman, 1963; Sagita et al, 1998); and the woodpecker's call predicts a journey's outcome. Some birds 'say' their names, others tell part of a story.

An example is the story from the Samia people of western Kenya:

> *Once there was a woman (in a polygamous marriage) who denied her co-wife food during a famine. The co-wife died. She came back as a bird and sings:*
> Namukuba fua fua fua.
> Unanga nanganga nise warera injala, nise warera injala, nise warera injala.
> *(Namukuba, I'm dying, dying, dying.*
> *You keep calling me, am I the one who brought famine? You keep calling me, am I the one who brought famine? You keep calling me, am I the one who brought famine?)*
> (Theresa Aloo, pers comm, 2008)

When the story is sung in traditional fashion, someone familiar with the song of the Black Cuckoo *Cuculus clamosus* will recognize it as the dying co-wife. Cuckoos are more often heard than seen and people living within the range of Black Cuckoos, on hearing the story, associate it with the bird they heard as they worked or played. Every time the Black Cuckoo calls, the person is reminded of the story. Thus, for many rural communities, sound is the most widespread way of interacting with birds and lends itself to incorporation within oral tradition, becoming part of songs, stories and sayings.

Sight as a way of knowing about birds can be thought of in three ways: habits (what birds are doing), habitats (where birds occur), as well as what they look like. Birds 'convey associations of place and behaviour: the Turaco is the Go-away-bird; the Paradise Flycatcher is the One-of-the-Meat-Camp, the Starling is the One-of-Cattle' (Galaty, 1998) (these probably refer to the White-bellied or Bare-faced Go-away-birds *Corythaixoides leucogaster* or *C. personatus*; the African Paradise-flycatcher *Terpsiphone viridis*; and the Wattled Starling *Creatophora cinerea*.) Birds are associated with the place in which they are most often observed. This is also true of some English names of birds – Cattle Egret *Bubulcus ibis*; Mountain Buzzard *Buteo oreophilus*; Swamp Flycatcher *Muscicapa aquatica*.

When confronted with a new bird, most birdwatchers and ornithological researchers first look it up in a book. Even if they hear the bird's song and are told the name of the bird, they resort to books to confirm the information and to see what the bird *looks* like. Modern field guides have good colour illustrations of every bird in the country, arranged according to taxonomic order, plus short descriptions of voice, habits, habitat and distribution. Kenyan field guides published since the mid 1990s also include a distribution map. Bird identification using sound is more easily communicated through oral traditions of stories and songs, while bird identification through sight is more easily communicated through printed illustrations. Printed materials have some difficulty expressing sound – for instance, field guides include a section on 'voice'; but these are generally the weakest part of the description and quite often only have meaning once one has heard the bird.

In countries with large populations of birdwatchers, recordings of bird songs and calls are available as tapes and CDs, some of them accessible online. This reduces the reliance on sight, alone, for identification. Videos are also made with photos of birds matched to their songs. Sound recordings have their own drawbacks; they need to be played one song at a time, making comparisons more difficult than with a page of pictures. Although there are bird guide books for almost every country, recordings of bird songs are rare in most of the developing world.

The two forms of knowledge (that of researchers and birdwatchers gained through sight; and local people gained through observations of sound, habits, habitat, stories, sayings and naming practices) may fail to match when a researcher asks a local informant to identify the bird in a story or a song from an illustration in a field guide. Even the best-designed books may be intimidating if the informants are not trained to use them. Unless they have attended school for several years, people may find printed materials difficult to interpret.

Methodological pitfalls in ethno-ornithological research

Field-guide books are often the source of misidentification of birds in ethno-ornithological research. If a poster is used, or the guide book does not include all of the local birds, or includes birds from a very large geographical area, the chance of misidentification is compounded. Some examples are given below.

During the Ethno-Ornithology Project of the National Museums of Kenya, an informant from the Kikuyu people of the central highlands was recorded as saying that 'the African Goshawk [*Accipiter tachiro*] was the child of the robin-chat [*Cossypha* sp.]'. One of the researchers queried this statement, considering that an African Goshawk was more likely to eat a robin-chat. Through consultation, it was realized that an identification mistake had been made based on the field guide: the 'goshawk' was really the Red-chested Cuckoo. The local people had correctly observed that Cape (*Cossypha caffra*) and Rüppell's (*Cossypha semirufa*) Robin-Chats raise young Red-chested Cuckoos as their own. They had noted brood parasitism. The slippage in identification had occurred when the informant was asked to identify the bird raised by the robin-chats by looking through a field-guide book. A Red-chested Cuckoo looks like a small bird of prey when it flies and, in the field guide (Williams, 1980), the illustrations of the two birds also looked alike. Thus, the method of using the field guide as a means of identification introduced an error.

Another example is of a black-and-white bird whose call announces the coming of visitors, in several communities in Kenya. However, there are many other black-and-white birds in Kenya. Even narrowing the possible options of bird identification down by size, shape and black-and-white pattern gave a choice of Common Fiscal (*Lanius collaris*), Tropical Boubou (*Laniarius aethiopicus*), Black-backed Puffback (*Dryscopus cubla*) or Northern Puffback (*Dryoscopus gambensis*). It is the characteristic musical song, not the black-and-white coloration, that identifies the bird that announces visitors as a Tropical Boubou.

Akiyar A Ngiturkana – A Turkana Way of Life (Barrett, 1988) recorded bird names and the cultural meaning of birds as told by the Turkana people who live in the deserts, thornbush and arid lakeshores of north-western Kenya. The book is illustrated with line drawings, and it appears that Guggisberg's (1980) *Birds of East Africa* served as the template; in most cases, the illustrator for Barrett simply redrew the illustrations in black and white. The birds resident in north-western Kenya are given the appropriate English and scientific names in addition to the Turkana names; but since Guggisberg had not illustrated the Gull-billed Tern *Gelochelidon nilotica*, a migrant very common on Lake Turkana for part of the year, it was not included by Barrett. Guggisberg had included oceanic birds such as Sooty Tern *Sterna fuscata*, Bridled Tern *S. anaethetus* and White-cheeked Tern *S. repressa* in his book, and Barrett had tried to match the Turkana names for Gull-billed and other terns to the oceanic species. This not only introduced errors, but reduced the usefulness of the book in keeping the language and traditions alive for new generations of Turkana people.

What Is this Bird Saying? (Kassagam, 1997) recorded bird names and cultural meaning among the Marakwet people, who live in the steep hills and valleys a little to the south of the Turkana people. This study contains similar misidentifications: the bee-eater associated by the Marakwet people with the power of rainbow and thunder is identified as Blue-breasted Bee-eater *Merops variegatus* by Kassagam; but the Blue-breasted Bee-eater is confined to the shore of Lake Victoria in Kenya and is not found in Marakwet country. It looks like the much more widespread Little Bee-eater *Merops pusillus*: the mistake could have been avoided by noting the distribution of the two bee-eaters. In the same book there is an account about a woodpecker, *Kilaiket*, whose call carries powerful messages and omens; but the name is given as Buff-spotted Woodpecker *Campethera nivosa*, a small, inconspicuous bird, known from Kakamega rainforest and adjacent forests of western Kenya, and whose call is a trill rather than the repeated single notes described by Kassagam.

Furthermore, in many other communities, the woodpecker associated with omens is the Nubian Woodpecker, *Campethera nubica*, which is also spotted below, but black on white rather than buff on brown. It is not clear why there is confusion between the Nubian and Buff-spotted Woodpeckers in Kassagam's book; but in the first unpublished draft of *What Is this Bird Saying?* from 1991 (available in the Library of the National Museums of Kenya), *Kilaiket* is simply identified as 'woodpecker', with a line drawing of a woodpecker with black-spotted under-parts. It is possible that errors in the English names occurred in the production of the published booklet many years after the initial fieldwork.

Another example of erroneous identification in ethno-ornithological literature occurs in a discussion of eagles as messengers among the Boran people of northern Kenya. Aguilar (1996) says that 'eagles' (a broad term since 57 species of birds of prey are found in Kenya) are called *riisa* and states that 'Two types of *riisa* are notorious for their supernatural powers and their involvement with God and the world of the spirits: the red tail eagle [*Bateleur terathopius*] and the Augur or jackal buzzard [*Buteo rufofuscus*]'. The Bateleur is *Terathopius ecaudatus*, and the Augur Buzzard, *Buteo augur*, which is also a bird of prey with a red tail, but not an eagle, is unlikely to be found in the dry country where the Boran people live. He notes that 'Those two types of *riisa* were identified by informants and by Rachi – a ritual specialist – through the visual aid of a large poster of birds of East Africa, available at the Catholic Mission in Garba Tulla [a small town in the area]'. Other parts of the study go into great detail, in contrast to the apparently casual attempt at identifying the central figure in the story.

Accurate identification adds value

In misidentifying a bird, researchers are doing a local community a disservice, compromising their research and providing incorrect information to future generations; moreover, the local stories and concepts are not really being collected because these stories and concepts depend on a specific bird. Accurate identification is a sign of recognition and respect for local cultures and peoples. If the identification, or the scientific name, is incorrect, it is like an incorrect translation: it devalues all the information and it devalues indigenous knowledge. In the future, scientists, birdwatchers and community members will have difficulty in matching what they read in books to what they observe in the field – in particular, why people ascribed certain attributes to a bird or whether certain birds have the same attributes across cultures. Through misidentification, even larger mistakes might arise: actions may be taken to control birds that need conservation or protect birds that do not need protection. It is essential in ethno-ornithological research that a bird, its presence, movements, habits and associated local knowledge, are recorded correctly and in a way that all people can access the information.

Avoiding methodological pitfalls

With enough background knowledge, discussions between researcher and informant, and using all the information available in field-guide books, accurate information can be gathered. For example, an informant told of a bird that, according to the Samia people, calls out its name in the early mornings: *Ndi-herekete, Ndi-herekete* (Theresa Aloo, pers comm, 2008). The informant added that it was an edible bird, larger than a quail *Coturnix* but smaller than a guineafowl *Numida*. That description indicated a francolin or spurfowl *Francolinus* sp.; but francolins and spurfowl all looked similar in the field-guide illustrations. The distribution maps narrowed down the choice to three species found in the area. Reading the 'Voice' section, there was only one that matched *Ndi-herekete* – the Crested Francolin *Francolinus sephaena*, whose call is described in Zimmerman et al (1996) as 'an antiphonal *kee, kek-kerra* … repeated frequently' and in Stevenson and Fanshawe (2002) as 'descending scratchy notes *kik-kera'ra*, *kik-kera'ra*, *kik-kera'ra*'. The combination of field-guide voice descriptions and distribution maps, knowledge of bird families, the time during which the bird sings, the bird's size, knowledge of where in the country the bird's name comes from, knowledge about the use of the bird in comparison with other edible birds and, finally, the sound, identified the bird. The illustrations would have been insufficient.

Ethnographic researchers are trained to record local and indigenous knowledge carefully and accurately, without imposing their own bias and worldview on the knowledge, and by asking open-ended questions so that other people, including the people who own the knowledge, can access it in future. Some guidelines are as follows:

- Birds are sometimes difficult to identify and therefore require in-depth knowledge on the part of the researcher, or consultation with an ornithologist.
- Local people are more likely to know birds by their songs, uses or impacts, cultural meaning, the time of year when they appear or breed, or type of place in which they occur.
- Up-to-date field guides are useful for the researcher because of the details on habits, habitat, voice and migration, the distribution maps as well as the illustrations. All should be studied before making an identification. It is also necessary to become familiar with the birds' songs and habits.
- Don't ask local informants to identify a bird from its picture. The usefulness of field-guide books is not transferable to people who have not been trained to use them. In addition, local people may find printed materials such as books and charts intimidating and difficult to interpret.
- Don't ask local informants to identify a bird from a museum specimen. Although more lifelike than a picture, a museum specimen cannot convey song, flight, edibility, habitat or seasonality.

- In the field, record all the information known about a bird: what it looks like, what it sounds like, where it lives, when it is observed, how it interacts with people and so on. There are times when a bird cannot be conclusively identified in the field; thus, information needs to be recorded as fully as possible.
- Recording, and making available, information on which book(s), or sound recording(s), or field experience, and so on were used to identify the bird will help future readers to follow the paper trail.
- Researchers have the opportunity to find out how people providing information came to their knowledge about birds, and learn from that, rather than asking local communities to learn from the researchers' form of knowledge acquisition.

In the recording of cultural knowledge, the responsibility lies with the recorder to ensure that it is recorded accurately and, if not recorded by the owner of the knowledge, without the bias of a 'dominant' culture. In the case of ethno-ornithology, this includes understanding the meaning of birds from different perspectives and consulting with local ornithologists. It must also be available in a form that is accessible to the owners of the knowledge. Done well, the combining of Western and local or indigenous knowledge will create a powerful ethno-ornithological product in which the combination will be richer than either is on its own. As more and more people take to observing and appreciating birds, birds will also lead to a greater understanding of human cultures.

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10

What the Locals Know: Comparing Traditional and Scientific Knowledge of Megapodes in Melanesia

J. Ross Sinclair, Lorima Tuke and Muse Opiang

Many conservation projects occur where the local people have extensive traditional ecological knowledge (TEK); yet most rely solely on scientific ecological knowledge (SEK). In many cases, a more constructive approach would be to integrate the two knowledge systems to gain reliable knowledge for better management. In order to promote this, the TEK of two peoples in Melanesia regarding four species of megapodes (Megapodiidae) was surveyed and compared with SEK. Results show TEK from observations of megapodes is reliable knowledge, being consistent with SEK, varying little within and among social groups and enabling people to answer most of the questions asked. TEK from interpreting observations was less reliable. Reliability of TEK varied according to the way in which the sexes and peoples interact with megapodes: for areas where groups interact most with megapodes, their knowledge is most reliable and vice versa. Successful integration of the two knowledge systems may improve the conservation of both biological and cultural diversity, while empowering indigenous peoples.

Introduction

Conservation biologists in Melanesia often work on a poorly known biota without time for long-term research projects. The indigenous peoples at project sites invariably have long histories and extensive traditional ecological knowledge (TEK). In this context, for conservation purposes, it would make sense to integrate the TEK of indigenous peoples and the scientific ecological knowledge (SEK) of the outsiders who work with them on conservation projects.

It is surprising that few attempts have been made to integrate TEK and SEK in Melanesia, where 97 per cent of land is under customary land tenure that precludes the establishment of large state-owned national parks (King, 1989), and where most decisions on land-use practices are made at the family level (Marat, 1991). Furthermore, despite the wealth of TEK that has underpinned indigenous peoples' interactions with nature for millennia, well-funded science-based conservation projects in Melanesia do not incorporate TEK and fail to protect 'critical' species (e.g. Johnson et al, 2004), fail to meet the expectations of indigenous peoples (e.g. West, 2006) or simply fail completely (e.g. McCallum and Sekhran, 1997).

Understanding of what parts of TEK are reliable is needed for two reasons. First, if indigenous peoples are to continue to benefit from their interactions with nature, they need to base their decisions on reliable knowledge (Moller et al, 2004) and some TEK is unreliable. For example, tinoni Simbo (people from Simbo Island, Solomon Islands; Hocart, 1922) believe that megapodes lay 700 to 1000 eggs per year (see Table 10.2), an overestimate of one to two orders of magnitude (Jones et al, 1995). This TEK may have been adequate to ensure sustainable harvests with a small human population on Simbo Island; but with rapid population growth and increasing harvests of eggs (Sinclair, 1999), it may promote unsustainable harvesting and extirpation of megapodes, as has occurred on numerous other Pacific Islands (Steadman, 2006). Second, understanding what parts of TEK are reliable is needed to promote its integration with SEK by sceptical or ill-informed conservation biologists. Indentifying where TEK is reliable will help conservation biologists do a better job in a more cost-effective way, and identifying where it is unreliable will suggest areas where their methods and SEK can be of most assistance to indigenous peoples for resource management. Although informal methods for 'screening' informants for reliability have been used (e.g. Johannes, 1989), few studies formally test the reliability of TEK, and this is a shortcoming of much literature on TEK (Johannes, 1993). This chapter aims to promote the integration of the two knowledge systems and was undertaken by testing the reliability of TEK for four species of megapodes (Megapodiidae) at two sites in Melanesia.

Defining reliability of traditional ecological knowledge

Two events led to the present chapter. The first occurred while explaining a research proposal to local Pawaia (people from the Pio-Tura region of Papua New Guinea; Ellis, 2002) assistants. Whenever a research question was explained (e.g. 'How many eggs does a megapode lay in a year?'), the assistants immediately gave a seemingly definitive answer (e.g. '12 to 14 eggs per year'). Two things were notable: first, the men were confident about their answers; second, their answers were consistent with SEK at that time.

The second event occurred when a Pawaia assistant explained how Superb Fruit-doves *Ptilinopus superbus* abandon their nests when repeatedly disturbed, build another nest nearby and then carry their eggs to the new nest. When asked where he had seen this behaviour, the assistant replied he had never actually seen it, but this was the best explanation for what he had observed. Again, two things were notable: first, this knowledge was unreliable, although it may have been true; second, it was promoted with the same certitude as a direct observation. In the authors' subsequent work with indigenous peoples, different weights were placed on the reliability of TEK derived from direct observations and that derived from interpreting such observations, as has been done by other researchers (e.g. Ferguson and Messier, 1997; Usher, 2000; Newman and Moller, 2004). This 'field filter' applied to TEK led the authors to develop hypotheses and generate predictions about the reliability of the TEK of megapodes and then test these once some reliable SEK had been gained for the same birds.

It is difficult to define a metric that gauges the comparative reliability of knowledge (Scranton, 2000) because reliability itself is subjective. For conservation and management, an operationally relevant measure of reliability is required that is sufficient to base decisions about resource management now and in the future. In this chapter, reliability of TEK is defined in terms of certainty (i.e. proportion of answers other than 'I do not know'), precision (i.e. proportion of similar answers within and among sex and age groups) and accuracy (i.e. level of consistency between TEK and SEK).

Indigenous peoples and megapodes in Melanesia

Megapodes are a socio-culturally, historically and economically important family of birds for many peoples in the Indo-Pacific. Their eggs are an abundant and predictable resource and are heavily harvested (e.g. Hide et al, 1984; Argeloo and Dekker, 1996; Sinclair, 2001a). On Simbo Island, Melanesian Megapodes *Megapodius eremita* lay eggs in burrows at geothermal nesting fields (Sibley, 1946). In the Crater Mountain Wildlife Management Area, Papua New Guinea, three species of megapodes are sympatric in lower montane rainforest: New Guinea Megapodes *Megapodius decollatus*, Brown-collared Talegallas *Talegalla jobiensis* and Wattled Brush-turkeys *Aepypodius arfakianus* (Sinclair, 2001b). These species lay eggs in incubation mounds that they build by raking together organic material on the forest floor (Sinclair, 2002). Brush-turkeys are sexually dimorphic and uncommon (Jones et al, 1995); the male alone builds and maintains the mound, while the female visits it only to copulate and lay (Sinclair, 2000). Talegallas are sexually monomorphic and are known to share mounds with other species (Dwyer, 1981; Hide et al, 1984; Sinclair, 2002). *Megapodius* species are sexually monomorphic and socially monogamous, occur throughout the range of the family and use all of the heat sources and types of incubation sites described for the family (Jones et al, 1995): more than one pair of New Guinea Megapodes use some mounds (Sinclair, 2000) and hundreds or thousands of Melanesian Megapodes may lay in colonial-nesting fields (Broome et al, 1984).

The Pawaia people have influences and relations with groups from both the highlands and southern coast of Papua New Guinea (Ellis and West, 2004) and did not receive regular visits from outsiders until the 1960s and 1970s (Warrillow, 1983). There were 1086 Pawaia people in 1999 (Ellis, 2002), with 760 people in 130 households in Haia village (Johnson et al, 2004), although family groups generally move regularly to dwellings dispersed around the forest (Ellis, 2002). Pawaia people practise diverse subsistence activities, with sago palm *Metroxylon sagu* being their staple food together with plantains *Musa* spp., sweet potato *Ipomoea batatas* and aibika *Abelmoschus manihot* (Toft, 1983). They also harvest a wide variety of animals from the forest (Toft, 1983; Hide et al, 1984; Mack and West, 2005). Pawaia people were paid assistants and porters in this work, so were informers and not partners in this research, and the work with them on TEK was retrospective, undertaken after research into megapodes had been completed.

Tinoni Simbo of the Solomon Islands have had over 200 years of sustained contact with Europeans (Bennett, 1986) and over the past 100 years have undertaken dramatic and repeated socio-cultural and economic changes (Dureau, 1998). The island had a resident population of 1560 people in 273 households grouped in about 40 hamlets in 1997 (unpublished data). The most common subsistence crops are cassava (*Manihot esculenta*), sweet potato and plantains. Tinoni Simbo regularly consume fish and megapode eggs, with wildlife, domestic chickens and pigs consumed only occasionally. Both land and sea resources are considered by tinoni Simbo to be overharvested (Sinclair, 1999). The work on Simbo Island was prospective in being at the start of a research project, and tinoni Simbo were partners rather than informers in this research; tinoni Simbo requested help to develop a sustainable harvesting plan for megapode eggs, a problem that their TEK alone had not been able to address to their satisfaction.

In this chapter, the TEK of the Pawaia people and tinoni Simbo regarding megapodes was used to test predictions from two hypotheses:

1. TEK from direct observations is reliable knowledge.
2. TEK from interpreting observations is unreliable knowledge.

The first hypothesis predicts that TEK from direct observations will be:

- widely known among indigenous people;
- consistent within and among sex and age groups; and
- similar to SEK.

Table 10.1 *Comparisons between traditional (TEK) and scientific ecological knowledge (SEK) of megapodes in Papua New Guinea*

Questions based on observations	*Answers from scientific ecological knowledge*	*Accuracy*
What colour are the eggs?	NGM and BCT red/brown; WBT white.[1, 2, 3]	92 (8)%
In what months are the eggs laid?	NGM all months; WBT and BCT March–November.[2, 4, 5]	100 (46)%
How many eggs are laid per year?	10–20 for all species.[3, 7, 6]	61 (51)%
Where are mounds located?	WBT steep sites and more shrubs; NGM and BCT by larger trees.[1, 2]	84 (9)%
Are mounds built in the same types of places?	NGM and BCT: yes; BCT and WBT: no; NGM and WBT: no.[1, 2]	68 (33)%
From what materials are mounds built?	WBT leaves and sticks; NGM and BCT: humus, soil, leaves, sticks.[2, 4]	94 (13)%
Do the ♂ & ♀ build mounds together?	NGM: yes; WBT: ♂ only; BCT: ?[2, 6, 8]	53 (52)%
Is there intra-specific sharing of mounds?	NGM: yes; WBT: no; BCT: ?[2,4,9]	53 (58)%
Is there inter-specific sharing of mounds?	NGM and BCT: yes; BCT and WBT: yes; NGM and WBT: no.[2, 4, 5, 10, 11]	58 (17)%
How many ♀♀ does the ♂ have?	NGM: one; WBT >1; BCT: ?[2, 3]	48 (63)%
How many ♂♂ does the ♀ have?	NGM: one; WBT >1; BCT: ?[2, 3]	50 (71)%
Do the ♂ & ♀ look the same?	NGM and BCT: yes; WBT: no.[2, 3]	60 (47)%
If not, how do the ♂ & ♀ differ?	WBT: ♂ larger with larger and brighter wattles.[2, 3, 6]	50 (80)%
	Overall	71 (30)%
Questions based on interpretations	*Interpretations from scientific ecological knowledge:*	*A, P, I*
Why do ♂ and ♀ NGM build mounds, but only ♂ WBT?	NGM socially monogamous; WBT polygyny and polyandry.[2, 3]	20, 20, 60 (83)%
Why do NGM and BCT call in the forest, but WBT do not?	NGM (and BCT?) socially monogamous and territorial; WBT not.[2]	13, 63, 25 (73)%
Why do WBT call from the mound, but NGM and BCT do not?	WBT call ♀♀; NGM (and BCT?) socially monogamous.[1, 2]	82, 0, 18 (63)%
Why do WBT bury eggs shallower than NGM and BCT?	Differences in thermal properties of mounds.[4]	33, 33, 33 (70)%
Why do ♂ & ♀ NGM look similar, but WBT do not?	NGM socially monogamous; WBT polygynous.[2, 3]	50, 50, 0 (93)%
Why are some NGM mounds large, but WBT always small?	NGM mounds used many years, lower organic content.[2, 4, 9]	28, 33, 39 (40)%
	Overall	38, 32, 30 (61)%

Notes: Pawaia people (n = 30) from Papua New Guinea were asked 'observation' questions separately for New Guinea Megapodes, *Megapodius decollatus* (NGM), Brown-collared Talegallas, *Talegalla jobiensis* (BCT) and Wattled Brush-turkeys, *Aepypodius arfakianus* (WBT) and 'interpretation' questions only once, making a total of 51 questions. The last column is the percentage accuracy of responses other than 'I do not know' (with the percentage who answered 'I do not know' in parentheses). Accuracy ('A') is consistency between the TEK of Pawaia people and SEK, while there were also plausible ('P') and implausible (I) alternatives for TEK based on interpretations. There was no significant difference in proportions of A, P and I for interpretations among older men, older women and younger men (G_2 = 4.7; P = 0.32). Sources for SEK are given in footnotes. Answers for the TEK of Pawaia people are given in Table 10.3.

Source: 1 Sinclair (2002); 2 Sinclair (2000); 3 Jones et al (1995, including citations); 4 Sinclair (2001b); 5 Hide et al (1984); 6 Coates (1985 and references therein); 7 J. Ross Sinclair (unpublished data); 8 Kloska and Nicolai (1988); 9 Rand and Gilliard (1967); 10 Dwyer (1981); 11 Gilliard and LeCroy (1966)

The second hypothesis yields predictions that are the inverse of the three points above. To test these predictions the results of oral questionnaires, semi-structured interviews and collaborative fieldwork (following Huntington, 2000; Fraser et al, 2006) were compared within and among social groups and with SEK.

Study sites

The first study site was Haia village (06° 42.5'S, 144° 59.8'E) in the Crater Mountain Wildlife Management Area, a 2600 square kilometre area of lowland and lower montane rainforest in the eastern highland region of Papua New Guinea. Megapode eggs are considered an important food source for Pawaia people (Hide et al, 1984), with the collection of eggs from incubation mounds widespread and megapodes being about 4 per cent of the individual animals killed by hunters in the area (Mack and West, 2005). The second site was Simbo Island (8° 17.5'S; 156° 0.5'E), Western Province, Solomon Islands. Most of the 14 square kilometre island is a matrix of gardens, coconut plantations and secondary regrowth, with isolated patches of lowland rainforest and about 2.5 square kilometres of continuous forest surrounding the largest megapode field. Melanesian Megapodes are important in the history and culture of tinoni Simbo (e.g. Hocart, 1922), and according to them became an important part of the cash economy during the 1960s and 1970s, coinciding with a perception that the harvest of megapode eggs was declining (Sinclair, 1999). Tinoni Simbo harvest megapode eggs from natural burrows and shade houses – expanded burrows with roofs built and managed to maximize their harvest of eggs (Sinclair, 2001a). About 65 per cent of families on the island have rights to harvest megapode eggs (unpublished data).

Recording traditional ecological knowledge (TEK)

In Haia village, a random selection of older women, older men and younger men (ages based on marital status since individuals did not know their birth dates) from 12 clans were given oral questionnaires using a mixture of Tok Pisin, a version of Melanesian Pidgin English, and Tßehõe (by Muse Opiang, a native Tok Pisin speaker with some Tßehõe), the language of Pawaia people (Ellis, 2002). The questions listed in Table 10.1 were designed to elicit answers based on direct observations or interpretations of observations by Pawaia people, and because they could be compared to existing SEK.

On Simbo Island, semi-structured interviews were undertaken with nine local experts (six older men and three older women, aged 47 to 97 years old) chosen because they:

- had rights to collect megapode eggs;
- had more than 30 years of experience collecting megapode eggs; and
- were recognized locally as experts and as honest.

Table 10.2 *Comparisons between traditional (TEK) and scientific ecological knowledge (SEK) of megapodes in the Solomon Islands*

Questions about Melanesian Megapode	*Answers from traditional ecological knowledge of tinoni Simbo*	*Answers from scientific ecological knowledge*	*C*	*P (♀, ♂)*	*A*
Forage together?	In twos (7); groups (2)	Two (socially monogamous)[1, 2, 3]	9/9	3/3, 4/6	7/9
What are their predators?	Dogs (8); raptors (7); cats (3); varanids (2)	Mammals, raptors, varanids[1, 2, 3, 4]	9/9	3/3, 6/6	9/9
When are they vulnerable?	Chicks (4); adults in burrows (3)	At hatching, <4 weeks' old[1, 4]	5/5	1/1, 4/4	4/5
What is eaten?	Nuts (8); worms (6); fruits (2)	Fruits, seeds and arthropods[2, 3]	9/9	3/3, 6/6	9/9
In what areas are they common?	Primary forest (7); secondary forest (1); gardens (1)	Primary and secondary forest[1, 5]	9/9	3/3, 4/6	8/9
In what areas are they uncommon?	Gardens (5); coconuts (3); secondary forest (2); do not know (2)	Gardens and disturbed areas[1, 5]	7/9	3/3, 4/4	7/7
How long lived are they?	Do not know (8)	5–15 years[2]	0/8	–	–
Do ♂ & ♀ differ?	Same (3); ♂ in gardens (2); ♂ more red skin (2)	Monomorphic[2]	9/9	3/3, 3/6	3/9
Do they lay outside the volcano?	In dead roots (6); on ground (5); piles of leaves (2)	Dead roots, piles of leaves[1, 3, 6]	8/8	3/3, 5/5	8/8
Are there egg seasons?	Yes (8): more May–December (7); less December–May (8)	More June–December; less January–May[1]	8/8	2/2, 6/6	8/8
How does one know the age of eggs?	Candling (5); flaking pigment (5); tapping (5)	Size of embryo by candling[7]	7/7	2/2, 5/5	7/7
How long is incubation?	2–4 weeks (3); 3 months (3); do not know (2)	45–70 days[2, 4]	6/8	2/3, 1/3	0/6
Are the eggs buried at the same depth?	In three layers (4); layers (2); bottom of burrow (1)	Layers[2, 3]	9/9	3/3, 6/6	9/9
What eats the eggs?	Varanids (9); pigs (1); snakes and cats (1)	Varanids, snakes, dogs and pigs[2, 3]	9/9	3/3, 6/6	9/9
How many eggs are laid per annum?	700 (1); 1000 (1); do not know (5)	Circa 10–30[2]	2/7	2/2, –	0/2
How many birds dig and lay?	1 (5); 1–2 (2)	1[1, 2, 3, 5]	7/7	1/2, 3/5	5/7
How often are eggs laid?	3 per day (3); 2 per day (2); 1 per day (2)	Circa every 2–15 days[2, 3]	7/7	2/2, 5/5	0/7
		Overall (%)	88	95, 87	78

Notes: Nine megapode experts from Simbo Island, Solomon Islands, were interviewed about their TEK of the Melanesian Megapode *Megapodius eremita*. Certainty ('C') is the number who gave answers other than 'I do not know'; precision ('P') is the number of similar answers within sex groups; and accuracy ('A') is the number of responses consistent with SEK. The figures in parentheses are the number of responses, with some interviewees giving more than one answer. Sources for SEK are given in footnotes.

Source: 1 J. Ross Sinclair (unpublished data); 2 Jones et al (1995, including citations); 3 Kisokau (1976, 1991); 4 Sinclair (2001a); 5 Broome et al (1984); 6 Sibley (1946); 7 Wong (1998)

Table 10.3 *Traditional ecological knowledge (TEK) of Pawaia people regarding megapodes*

	New Guinea Megapode	*Wattled Brush-turkey*	*Brown-collared Talegalla*
TEK based on observations			
Egg colour (red : white)	93% : 4%, n = 27(2)	7% : 93%, n = 28(2)	89% : 11%, n = 28(2)
Months eggs laid	4–12, 100%, n = 19(11)	4–6, 100%, n = 16(14)	6–12, 100%, n = 15(15)
Clutch size:	n = 13(13)	n = 14(13))	n = 14(13)
<10	41%	14%	29%
10–30	58%	79%	57%
>30	1%	1%	14%
Location of mounds:	n = 26(3)	n = 26(2)	n = 25(4)
Beside large trees	73%	19%	80%
On steep slopes	31%	58%	28%
With dense shrubs	4%	12%	4%
Other places	12%	35%	28%
Mounds in similar sites	= WBT, 78%, n = 9(1)	= BCT, 71%, n = 9(1)	= NGM, 71%, n = 7(1)
Materials in mounds:	n = 27(2)	n = 27(2)	n = 27(2)
'Dry' leaves	100%	100%	100%
'New' leaves	4%	37%	4%
Sticks	70%	33%	70%
Soil	19%	15%	19%
Stones	4%	0%	11%
♂ & ♀ build mound	90%, n = 20(0)	78%, n = 23(0)	95%, n = 22(0)
Sex that builds mound	♂ 100%, n = 2(0)	♂ 100%, n = 6(0)	♀ 100%, n = 1(0)
Intra-species mound sharing	63%, n = 19(10)	40%, n = 20(8)	50%, n = 20(8)
Inter-species mound sharing	And WBT, 29%, n = 26(2)	And BCT, 27%, n = 26(4)	And NGM, 76%, n = 25(2)
♂ monogamy : polygyny	50% : 50%, n = 16(13)	53% : 47%, n = 17(12)	58% : 42%, n = 19(10)
♀ monogamy : polyandry	54% : 46%, n = 13(16)	58% : 42%, n = 12(17)	55% : 45%, n = 11(18)
Sexually monomorphic	65%, n = 17	50%, n = 17	59%, n = 14
How the sexes differ:	n = 5	n = 6	n = 8
♀ bigger	20%	60%	25%
♂ bigger	60%	20%	12%
♂ has comb (wattles)	20%	20%	25%
♂ red/featherless neck	0%	0%	38%

TEK based on interpretations

Why do ♂ & ♀ NGM build mounds but only ♂ WBT? No agreement (0%, n = 5).
Why do NGM and BCT call in the forest but WBT do not? NGM and BCT call for assistance from partner (38%, n = 8); WBT only call when breeding (20%).
Why do WBT call from the mound but NGM and BCT do not? WBT male calls female to lay (53%, n = 12); BCT and NGM sexes always together, so ♂ does not call ♀ (27%).
Why do WBT bury eggs shallower than NGM and BCT? WBT shallower as egg shell thinner (20%, n = 10); NGM and BCT mound bigger, so eggs deeper (20%).
Why do ♂ & ♀ NGM look similar, but WBT do not? No agreement (0%, n = 1).
Why are some NGM mounds large, but WBT always small? NGM and BCT build mounds together, so larger, whereas WBT build alone, so smaller (23%, n = 19), NGM mounds used for many years, so larger (18%);
WBT used only one year, so smaller (18%) because WBT are smaller birds (18%).

Notes: NGM = New Guinea Megapodes, *Megapodius decollatus*; BCT = Brown-collared Talegallas, *Talegalla jobiensis*; WBT = Wattled Brush-turkeys, *Aepypodius arfakianus*. Sample size is the number of people who answered the question, with the additional number who said 'I do not know' in parentheses. Values are the percentage of those who answered that gave each answer: higher values mean less variation and therefore higher precision. Percentages do not always sum to 100% as multiple answers were sometimes given. See Table 10.1 for the questions asked and answers according to scientific ecological knowledge.

The questions listed in Table 10.2 were asked in either Pijin, a version of Melanesian Pidgin English, or English (by J. Ross Sinclair) and then translated into Simbo (by native Simbo speaker Lorima Tuke).

TEK of megapodes in Papua New Guinea: Responses to oral questionnaires

The oral questionnaires given to Pawaia people revealed that they have a detailed understanding of many aspects of megapode behaviour and ecology (summarized in Table 10.3). For example, most people stated that Brush-turkey eggs are white, whereas those of the other two species are reddish brown. The three species are said to lay about 12 to 14 eggs per year, with most eggs found during the *Pandanus* spp. fruiting season (April to December). Mounds of New Guinea Megapodes and Talegallas are said to be most often located at the base of large trees and sometimes on steep slopes, whereas those of Brush-turkeys are usually on steep slopes and sometimes at the base of large trees. Despite microhabitat differences, mounds of the three species were said to be found in similar types of habitat and all contain 'dry' leaves, although New Guinea Megapode and Talegalla mounds also contain sticks and soil. Most people say that for all species, both sexes build the mound; New Guinea Megapodes and Talegallas are sexually monomorphic; and intra-specific sharing of mounds occurs in New Guinea Megapodes.

The reliability of Pawaia TEK based on observations

Pawaia people have reliable TEK of the natural history of megapodes; their responses indicated high levels of certainty (78 per cent), precision (74 per cent) and accuracy (71 per cent) (see Table 10.4). Pawaia people were precise and accurate in their answers both within and among sex and age groups, and there were no significant differences in these. There were, however, significant differences in certainty between sex and age groups: older men (87 per cent) answered significantly more questions than did older women (70 per cent) or younger men (75 per cent) (see Table 10.4).

Certainty and precision among Pawaia people, and accuracy between TEK and SEK, were generally highest for knowledge about eggs and mounds and lowest for knowledge about birds and their behaviour (see Tables 10.1 and 10.3). For example, certainty, precision and accuracy were all high for egg colour, the months in which eggs are laid and the location of mounds, but low for the mating systems of species and how the sexes differ.

The reliability of Pawaia TEK based on interpreting observations

In interpreting the observed behaviour and ecology of megapodes, Pawaia people do not have reliable TEK; their responses indicated low levels of certainty (31 per cent), precision (28 per cent) and accuracy (38 per cent) (see

Table 10.4 *The reliability of traditional ecological knowledge (TEK)*

TEK based on observations	*n*	*N*	*Certainty*	*Precision*	*Accuracy*
Pawaia	30	1015	78%	74%	71%
Older ♂	11	368	87 (28–100)%	71%	73 (52–100)%
Older ♀	10	335	70 (0–88)%[1]	76%	70 (0–90)%
Young ♂	9	312	75 (37–82)%[1]	74%	71 (52–83)%
			$G_2 = 53.2^{***}$	$G_2 = 1.3$, ns	$G_2 = 1.7$, ns
Simbo	9	137	88%	72%	78%
Older ♂	6	93	85 (80–94)%	87%	81 (62–92)%
Older ♀	3	44	93 (88–100)%	95%	73 (69–86)%
			$G_1 = 2.0$, ns	$G_1 = 3.2$, ns	$G_1 = 0.3$, ns
TEK based on interpretations	*n*	*N*	*Certainty*	*Precision*	*Accuracy*
Pawaia	30	180	31%	28%	38%
Older ♂	11	66	42 (0–67)%	25%	43 (0–75)%
Older ♀	10	60	20 (0–50)%[1]	35%	50 (0–100)%
Young ♂	9	54	24 (0–67)%[1]	13%	15 (0–33)%
			$G_2 = 8.4^{*}$	$G_2 = 2.3$, ns	$G_2 = 2.1$, ns
TEK in a practical application	*n*	*N*	*Certainty*	*Precision*	*Accuracy*
Pawaia ♂	12	52	100%	95%	90%
Simbo	30	15	100%	77%	80%
♂	20	15	100%	75%	80 (33–93)%
♀	10	15	100%	80%	78 (53–100)%
			–	$G_1 = 1.4$, ns	$G_1 = 1.0$, ns

Notes: Pawaia people of Papua New Guinea and tinoni Simbo of the Solomon Islands were asked about TEK:

- based on direct observations of megapodes;
- requiring interpretation of observations; and
- in a practical application.

Reliability is quantified in terms of certainty, precision and accuracy (see text for definitions). Sample sizes are the number of people interviewed (n) and total number of questions asked (N). Values are medians with the range in parentheses. Log-likelihood G-tests and unplanned tests of homogeneity of replicates ($\alpha = 0.05$ adjusted for the number of tests performed) were used to determine whether differences existed among social groups. There is a significant association between accuracy and type of Pawaia TEK, with that from observations (71%) significantly higher than that from interpretations (38%; $G_1 = 4.6^{*}$).

* $P < 0.05$; *** $P < 0.001$; ns $P > 0.05$.

1 Homogeneous set.

Table 10.4). Pawaia people of different sex and age groups were equally imprecise and inaccurate in interpreting observations (see Table 10.4). As with observational TEK, however, there were significant differences in certainty: older men (42 per cent) answered significantly more questions than did older women (20 per cent) or younger men (25 per cent) (see Table 10.4).

Certainty, precision and accuracy were low for all questions requiring interpretation of observations; no questions elicited responses for which a majority of those surveyed had some TEK, where the majority agreed on what TEK they had or where the majority of that TEK was consistent with SEK (see Tables 10.1 and 10.3). In general, the TEK of Pawaia people based on interpretations was split evenly among answers that were consistent with SEK, provided plausible alternative interpretations and provided implausible or false interpretations, with no significant differences among these (see Table 10.1).

The prediction that the TEK of Pawaia people derived from direct observations (71 per cent accuracy) would be closer to SEK than was TEK involving the interpretation of observations (38 per cent) (see Table 10.4) was supported.

TEK of megapodes on Simbo Island: Responses to semi-structured interviews

The semi-structured interviews with megapode experts on Simbo Island revealed that they have an extensive knowledge of megapode behaviour and ecology (summarized in Table 10.2). For example, according to tinoni Simbo, megapodes occur mostly in pairs, are found in all habitat types, although they are most common in mature forest or places where their food, the *Canarium indicum* and *C. Salomonens* nuts, is found, and are less common in gardens, coconut plantations and ‘dry places’ where there are few big trees. Megapodes are said to scratch in leaf litter for arthropods and fallen seeds, fruit and nuts, spoil gardens by digging in them and roost in trees from which they call throughout the night. They are said to dislike disturbance close to nesting fields, such as the clearing of bush, location of houses or presence of people.

According to tinoni Simbo, megapodes are most vulnerable to predators as chicks but are also vulnerable as adults when they dig burrows. One megapode is said to go to the field daily to lay 1 to 3 eggs in all months and between 300 to 1000 eggs per year. Monitor lizards, *Varanus indicus*, are said to dig into burrows and eat eggs, leaving a largely intact shell with only the top removed. This contrasts with the many small fragments left when an egg has hatched.

Eggs are said to take from two weeks to three months to incubate, and chicks are able to run and fly as soon as they hatch. Tinoni Simbo determine the stage of incubation by shinning a torch beam through the egg (or holding it up to the sun) – the size of the shadow indicating the size of the embryo, observing flaking of reddish pigment from the eggshell as it ages and a ‘heavy’ sound from tapping the egg indicating an embryo is present.

In the past, megapode burrows were said to be plentiful, so little effort was required to find eggs. The first shade house was said to have been built during the 1930s and these are used to mark an individual’s harvesting area, increase the egg harvest, ensure the ground inside stays soft over the ‘poor’ season, concentrate eggs in one place, and increase the number of eggs laid because megapodes are said to like the conditions in shade houses.

The reliability of the TEK of tinoni Simbo based on observations

Tinoni Simbo have reliable TEK of megapodes based on direct observations given their high levels of certainty (88 per cent), precision (72 per cent) and accuracy (78 per cent) (see Tables 10.2 and 10.4). There was no significant difference in these scores between older women and older men (see Table 10.4).

Only four questions elicited responses of 'I do not know', with no one able to answer questions on the longevity of megapodes, and there was disagreement within sex groups for only five questions (see Table 10.2). Accuracy was low for four questions, with no consistency between TEK and SEK for the incubation period of eggs, the number of eggs laid per annum and the interval between laying of eggs (see Table 10.2). Questions for which certainty and accuracy were lower tended to be those for which repeat observations of birds or eggs are needed, whereas there seemed to be no pattern to the types of TEK for which precision was lower. For 7 of the 17 questions asked there was 100 per cent certainty, precision and accuracy, including the predators of megapodes and their eggs, megapode diet, seasonality of laying, where and how eggs are laid, and methods of determining the age of embryos (see Table 10.2).

The reliability of TEK in a practical application

The TEK of Pawaia people and tinoni Simbo was surveyed using oral questionnaires and semi-structured interviews, not the normal methods by which they transmit or express their TEK – TEK is transferred by experiential learning and participation (Huntington, 2000). Because of this, the reliability of TEK was also tested using collaborative fieldwork. We asked Pawaia assistants which species of megapode was using a mound when we first encountered the mound in fieldwork and asked tinoni Simbo whether a selection of eggs contained embryos. The mounds on Pawaia lands were subsequently excavated and assigned to species based on the size and colour of eggs (Jones et al, 1995) and the eggs on Simbo island were cooked and opened to look for embryos. Both cases confirmed observational TEK to be reliable in having high certainty (100 and 100 per cent for Pawaia people and tinoni Simbo, respectively), precision (95 and 77 per cent) and accuracy (90 and 80 per cent), and in the case of tinoni Simbo, where we tested for differences between the sexes, these responses were similar for men and woman (see Table 10.4).

The reliability of TEK based on observations: Comparison between Pawaia and tinoni Simbo

Megapodes and their eggs are widely used by Pawaia people (Hide et al, 1984; Mack and West, 2005) and tinoni Simbo (Hocart, 1922; Sibley, 1946; Sinclair, 1999) and these peoples have an extensive TEK of them.

Older Pawaia men had a broader knowledge of megapodes than did older women (higher certainty; see Table 10.4). Given that TEK is experiential (Moller et al, 2004), this difference is probably due to the different ways in which men and women interact with megapodes. As Pawaia men spend more time hunting than do Pawaia women (Toft, 1983; Ellis, 2002; Mack and West, 2005), they may encounter megapodes more often and learn more about them.

In contrast, tinoni Simbo men and women were equally certain in their answers (see Tables 10.2 and 10.4). On Simbo Island, incubation sites are localized in fields close to villages and both men and women regularly harvest megapode eggs; as a result, they may encounter megapodes equally often and thus have a similar breadth of TEK.

Older Pawaia men also had a broader knowledge of megapodes than did younger men (see Table 10.4); the quality and quantity of TEK has been found to vary in a similar way in other studies (Johnson, 1992; Usher, 2000). Younger Pawaia men are less experienced than their older kinsmen, which may explain why they were less certain in their TEK. In the experience of the authors, the more formal schooling that young men have had in Haia village, the less TEK they seem to know, so time spent in school may also limit the amount of TEK young people learn (Johannes, 1989; Baines and Hviding, 1992).

TEK of a species is likely to be less detailed and less reliable for behaviour and ecology that is rarely encountered. For example, among Pawaia people there was relatively low precision and accuracy in assigning mating systems to Brush-turkeys and New Guinea Megapodes (see Tables 10.1 and 10.3). Pawaia people have few observations of megapode breeding behaviour because they do not set up hides to hunt or trap megapodes at mounds; as a consequence, their TEK regarding breeding behaviour is less reliable than it is for other aspects of the biology of megapodes. Likewise, the TEK of tinoni Simbo was less reliable in areas that required repeat observations of the same bird or egg – questions such as clutch size, incubation time of eggs and longevity of megapodes (see Table 10.2) – because they harvest eggs the first time they encounter them and cannot distinguish between individual birds.

For behaviour and ecology most commonly encountered, TEK is likely to be most reliable (Fraser et al, 2006). Both tinoni Simbo and Pawaia people were 100 per cent certain, precise and accurate in their TEK of the months in which eggs are laid (see Tables 10.1 to 10.3) because they both regularly collect eggs. Pawaia people regularly visit megapode mounds to dig into them to harvest eggs (Hide et al, 1984) and they recognize subtle differences in the composition and location of mounds among the three species (see Table 10.3) that are consistent with SEK (e.g. Sinclair, 2001b, 2002).

Although TEK may be precise, it is not a homogeneous knowledge system (Sillitoe, 1998; Wenzel, 1999; Usher, 2000; Davis and Wagner, 2003; Fraser et al, 2006). For example, some Pawaia women were very certain (maximum 88 per cent of questions answered) and highly accurate (maximum 90 per cent consistency with SEK) (see Table 10.4); but two women answered all questions with 'I do not know'. Such heterogeneity occurs in all knowledge systems (Davis and Wagner, 2003) and is recognized by indigenous peoples, who use informal filters to distinguish reliable from unreliable TEK themselves (Newman and Moller, 2004).

It is possible that some of the TEK of individual Pawaia people scored as unreliable may have been reliable but was based on finer spatial scales than SEK or the TEK of Pawaia people as a whole. For example, one respondent said that Talegallas build mounds away from large trees, whereas 80 per cent of those interviewed stated the opposite (see Table 10.3). In a study of selection of incubation sites at three locations on Pawaia lands, Sinclair (2002) found that at one study site Talegalla mounds had significantly more large trees near the mound than for the other species, whereas at another study site the opposite was true.

By choosing questions for the survey that had answers in SEK, this study was biased towards knowledge where the methods used to generate SEK are strong, whereas the methods used to generate TEK may have other strengths. For example, as there are no long-term scientific data for the species studied, TEK and SEK could not be compared with respect to changes that have occurred through time. As TEK is based on a long time series (Moller et al, 2004; Fraser et al, 2006), it is ideally suited to answer such questions. Furthermore, some of the SEK may be unreliable in comparison with TEK. Although most of the SEK used in this chapter was derived from the scientific method, some are anecdotes and observations without sample sizes, estimates of error or having been subjected to the peer review process. Given these potential biases, the accuracy of the TEK measured against it may be underestimated.

Comparing scientific and traditional ecological knowledge

The three predictions from the hypothesis that TEK from direct observations is reliable knowledge were supported: TEK from direct observations was widely known among Pawaia people and tinoni Simbo (high certainty), it was consistent within and among sex and age groups (high precision), and was similar to SEK (high accuracy) (see Table 10.4). This observational knowledge is common to the two systems and is generally derived from methods where they are most similar: observation and inductive reasoning. For example, Pawaia people visit the same mounds repeatedly to harvest eggs, and the average number of eggs that they say megapodes lay per year (i.e. 12 to 14 eggs) is very similar to estimates made by the authors over a 15-month study. Although induction is much maligned among philosophers of science, it remains an important method of gaining SEK (Guthery, 2007) and TEK, and knowledge gained from induction is an area of overlap in the two knowledge systems.

The three predictions from the second hypothesis that TEK from interpreting observations is unreliable knowledge, which were just the inverse of those for the first hypothesis, were also supported: TEK of Pawaia people from their interpretation of observations had low certainty, precision and accuracy (see Table 10.4). When it comes to interpreting observations, TEK and SEK diverge in their methods and also in the knowledge that these methods generate. What scientists would consider a hypothesis or prediction to be tested, Pawaia people presented in some cases as knowledge. For example, according to both knowledge systems, New Guinea Megapode mounds have lower organic content than those of Brush-turkeys, but are larger (see Table 10.3; Sinclair, 2001b).

Studies of temperature regulation in megapode mounds show that lower organic content results in less heat production, but a larger size means less heat loss, resulting in the same stable incubation temperatures for different-sized mounds with differing organic contents (Seymour and Bradford, 1992; Sinclair, 2001b). The TEK of Pawaia people regarding these differences included alternative interpretations for larger mounds in New Guinea Megapodes, such as larger mounds reduce losses of eggs to predators – a plausible hypothesis but one that needs to be tested before it is accepted as reliable knowledge.

Unreliable TEK is not necessarily useless. Beyond any utility for scientists in generating hypotheses, unreliable TEK may be useful for indigenous people even if it is false. For example, another explanation from TEK for larger mounds for New Guinea Megapodes compared to Brush-turkeys is that more than one pair use New Guinea Megapode mounds. Intra-specific sharing of mounds occurs in *Megapodius*, including on Pawaia lands (Sinclair, 2002), and in one study reporting such sharing, larger mounds contained more eggs (Sankaran and Sivakumar, 1999). If Pawaia harvesters make their decision on whether to harvest eggs or how many to collect based on the size of the mound, this is a sensible decision regardless of whether the informing TEK is reliable.

This study shows that TEK may provide researchers with reliable knowledge that can be gained without using large amounts of precious research time and funds. It also reveals the limits to the methods of TEK in generating reliable knowledge: TEK from interpreting observations of megapodes was unreliable. These limits highlighted where SEK can most usefully complement TEK and where conservation biologists can best assist indigenous peoples: the scientific method can reliably identify causal relationships that the methods of TEK may not reveal (Newman and Moller, 2004). For example, tinoni Simbo observed that after a 61-day closed season during which there was no harvesting, most eggs contained embryos, suggesting that the closed season was too short to allow eggs to hatch. However, neither their TEK nor the methods they use for gaining it were able to suggest the best length of a closed season. The suggestion that a 61-day closed season is too short was used as a research hypothesis to test using the scientific method (Sinclair, 1999). Using existing SEK, TEK and collecting data on variables such as incubation period, it was possible to build a mathematical model and advise tinoni Simbo on how many chicks would be produced by closed seasons of varying lengths (Sinclair 2001a). Tinoni Simbo then balanced this new knowledge against other considerations (e.g. longer closed seasons mean increased economic hardship in the short term) and made a decision to instigate a 91-day closed season (Sinclair, 2001a).

Integrating scientific knowledge and traditional knowledge

Because of the limited resources that developing nations have for conservation and the system of land tenure in places such as Melanesia, much resource management in the foreseeable future will be by indigenous peoples and informed by their TEK. In this context, social as well as biological values need to be taken into account in conservation projects (West and Brockington, 2006) further suggesting that SEK and TEK should be integrated. If conservation biologists are to do this they need evidence that TEK is reliable, as presented in this chapter.

If a knowledge system is to remain resilient it must inform its users satisfactorily (Bradshaw and Bekoff, 2001). TEK has informed the resource use of Pawaia people and tinoni Simbo for millennia and has been reliable enough to ensure some sustainability: daily wild-meat consumption among Pawaia people, for instance, has remained stable for over 20 years (Mack and West, 2005). The challenge for indigenous peoples in a rapidly changing world is to determine what parts of their TEK are reliable enough to ensure sustainable use in the future. When they find that TEK that is not reliable, they must then supplement this with more reliable knowledge or generate new knowledge, just as tinoni Simbo did with the authors for megapodes, and other indigenous harvesters have done for other species (e.g. Māori for seabird harvests in New Zealand; Newman and Moller, 2004).

Both SEK and TEK have their strengths and weaknesses (Johnson, 1992). One role of conservation biologists and community workers is to identify these and find ways in which the two systems can complement each other in solving resource management problems. Surveying TEK and discussing SEK in that context is one way to find common ground and facilitate integration of the two knowledge systems (Becker and Ghimire, 2003; Newman and Moller, 2004; Fraser et al, 2006).

Although many authors point to a role for TEK in supporting or enhancing SEK (e.g. Nabhan, 2000; Donovan and Puri, 2004; Sheil and Lawrence, 2004), the opposite can also be the case: SEK should support and enhance TEK, not replace or supplant it (Baines and Hviding, 1992; Moller et al, 2004; Fraser et al, 2006).

Just as scientists work more successfully in teams that agree on essential tenets of their programme (Hull, 1988), conservation projects will be more successful if indigenous peoples and outside researchers agree on some fundamental knowledge and accept that each have operationally valid methods of generating it. Moreover, indigenous peoples are more likely to incorporate SEK within their TEK if it supports their observations (Moller et al, 2004), just as scientists are more likely to incorporate a finding into their knowledge if it supports their research (Hull, 1988).

The approach advocated for integrating SEK and TEK will benefit from a meta-communication framework where there is an interest-free exchange of information between conservation biologists and indigenous peoples. Openness about respective agendas is also required, or groups should at least attempt to understand their respective agendas and work within that context. Assumptions about agendas and poor communication lead to misunderstandings and conflict that can impact negatively upon conservation projects (for examples from Melanesia, see McCallum and Sekhran, 1997; Filer, 2004; West, 2006).

The scientific study of traditional ecological knowledge

It may appear implicit in the approach used in this chapter that the authors view TEK as a series of disembodied facts. TEK is undoubtedly part of a social and spiritual complex (Berkes, 1999) and is important for its socio-cultural and intrinsic value (Berkes et al, 1994); yet, part of TEK is comprised of facts that do not necessarily lose meaning outside their cultural or historical context (compare Ellis and West, 2004). A full understanding of TEK requires application of the anthropological method (Johannes, 1989; Sillitoe, 1998), and the incorporation of anthropologists as 'knowledge brokers' (Sillitoe, 1998, p247) in conservation projects will produce a richer, more differentiated understanding of TEK. Having said this, there is room for the study of TEK by disciplines other than anthropology and what anthropologists know or can achieve in studying TEK should not be exaggerated (Brokensha, 1998). For example, a researcher who is not biologically literate is not equipped to assess what knowledge is new, important or biologically plausible (Johannes, 1993), or may be given a simplified version of TEK when not considered sufficiently knowledgeable to understand more complex explanations (Diamond, 1989).

In this study science has been used to define 'useful' TEK (Stirrat, 1998) and the analysis was restricted to conservation and biology because these are the areas of interest and expertise of the authors. Viewing TEK in this way is, however, little different from how local partners viewed SEK: when asking about SEK in their decision-making (Sinclair, 2001a), tinoni Simbo were not interested in the social and historical context of this knowledge, but in its reliability and usefulness to them. Furthermore, tests of the reliability of TEK presented here are similar to the self-correcting process used by indigenous people as their knowledge evolves – only the tools differ: each generation tests the reliability of existing TEK against their own observations, experiences and informal experiments (Johnson, 1992).

Recommendations for studies of TEK by biologists

To gain reliable knowledge from TEK, studies should focus on species and processes that local people have commonly encountered over a long time series and on TEK based on direct observations rather than interpretations of observations. Other considerations should be the way in which people interact with the species or process in question, and recording some TEK for which SEK exists and can be compared.

More insight from TEK may be gained from experts (as sampled on Simbo Island) than from using a random sample of local people (as sampled in Haia village; Ferguson and Messier, 1997; Huntington, 2000; Usher, 2000), although this would depend on the purpose of the study. Most publications reporting TEK do not indicate the number of informers from whom the knowledge has been recorded, nor do they state how informers were selected (Davis and Wagner, 2003): what constitutes an 'expert' and how many have been surveyed should be explicitly stated in studies. Heterogeneity in TEK has important implications for sampling, with pilot studies needed to estimate variability to determine adequate samples or whether key informants should be used (Huntington, 2000; Yamada et al, 2003; Fraser et al, 2006).

Several research methodologies have been proposed that either incorporate measures of reliability or that take into account different types of knowledge, and these are a useful basis on which to design projects (e.g. Ferguson and Messier, 1997; Calheiros et al, 2000; Usher, 2000; Davis and Wagner, 2003). Integration of TEK and SEK will best be achieved if biologists recognize the limits of their methods and become involved in interdisciplinary research with social scientists (Ellis and West, 2004), even before projects are initiated (West and Brockington, 2006).

Conclusions

Megapodes were chosen to investigate TEK because the authors study this family of birds and because there are published accounts of their natural history. A subset of the TEK of Pawaia people and tinoni Simbo based on their observations of megapodes was found to be reliable knowledge. It is likely that the observational TEK of these peoples concerning other species and processes will be equally reliable, particularly for those with which they interact closely. For Pawaia, the TEK based on interpreting their observations was less reliable. This TEK does, however, reveal where conservation biologists can assist indigenous peoples, and where SEK could complement TEK by providing insights into natural processes that could be examined using the scientific method (Moller et al, 2004; Newman and Moller, 2004; Fraser et al, 2006).

Where field research has not been undertaken, expert knowledge is especially important (Yamada et al, 2003); TEK is expert knowledge often about a biota that may not have been formally studied and in such cases can be an effective way to learn rapidly and inexpensively about a species or ecological system (Dwyer, 1982; Telfer and Garde, 2006).

TEK alone may not be enough to ensure sustainability in a rapidly changing world (Dwyer, 1982; Berkes et al, 1994; Moller et al, 2004), as is graphically illustrated by the mass extinctions, including many species of megapode, attributed to indigenous peoples in Oceania (Steadman, 2006). In such a context, working with indigenous peoples to integrate SEK within their TEK is a sensible approach for conservation biologists, particularly when working within restrictive project budgets and timeframes. Doing this not only increases the chances of achieving conservation, it may also result in conservation of the cultural diversity that generated the TEK (Gadgil and Berkes, 1991), empowers indigenous peoples (Berkes, 2004) and is consistent with the human rights and ethics that should underpin such work (Alcorn and Royo, 2007; Campese and Guignier, 2007).

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Part IV

Birds: Story and Language

11

Birds and Nature in the Stepwells of Gujarat, Western India

Purnima Mehta Bhatt

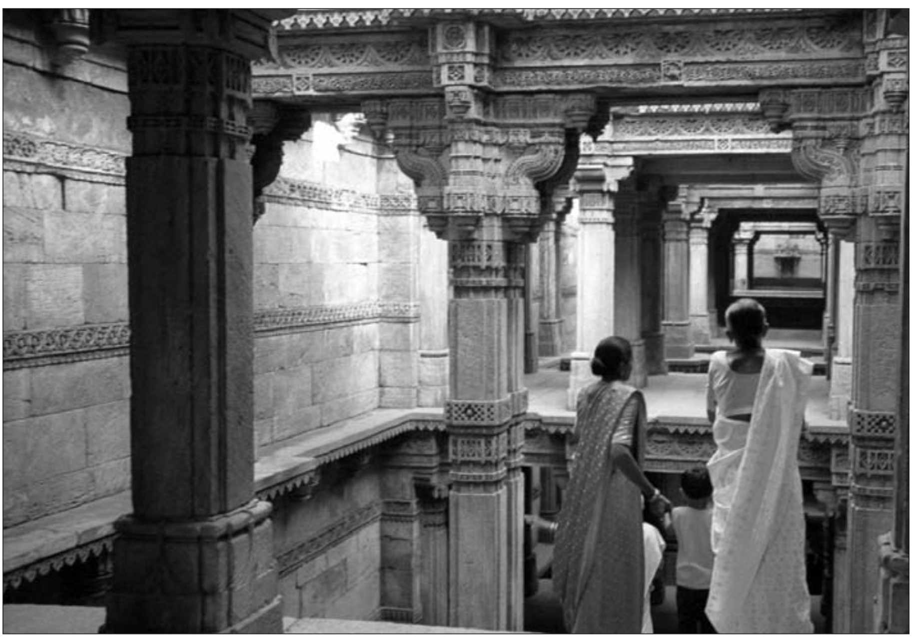
While serving a utilitarian purpose of providing life-giving water for both man and beast in the parched and arid lands of Gujarat, thousands of constructed stepwells also became a site for women's rites and rituals and the focal point for the worship of local goddesses. They provided scope for the expression of artistic and aesthetic beauty. The carvings and images inside the stepwells depict humans, divine beings, mythical creatures, plants, birds and other animals. They portray the sacred universe of the Indians and reveal their unique understanding of the world of nature. Birds are represented widely in the iconography of the stepwells: they are symbolic and significant in water architecture and women's art.

Introduction

Stepwells, built between the 7th and 19th centuries, are a familiar feature in the landscape of Gujarat, a semi-arid region where water is scarce for much of the year. These wells provided much needed water for household needs, irrigation of the land for agriculture, and shade and rest for travellers, itinerant traders, troops on the march and royal hunting parties. This chapter focuses on the representation of nature, specifically the depiction of birds, both real and mythical, in the stepwell art and their symbolic significance.

The *vav*, or stepwell, is a deep well, circular or octagonal in shape, approached by a flight of steps leading down to the water (see Figure 11.1) (Kadikar, 2000). These wells were often 40 to a 100 feet in depth (12m to 30m) and were made of stone, limestone or bricks. At regular intervals, platforms and landing areas were provided to serve as resting places, and these often contained columns and pillared galleries embellished with sculptures and images of divinities (see Figure 11.2). Thousands of these wells were built ranging from the simple and austere to highly elaborate and ornamental structures, which became underground shrines.

In a parched land, the gift of water was regarded as a meritorious act, which conferred fame and immortality on those who commissioned stepwells. According to the ancient text *Agni Purana*: 'one who consecrates a reservoir of water (acquires) in a single day a merit ten score times more than one who



Source: Daniel del Solar

Figure 11.1 *Adalaj stepwell, Gujarat, India*

Source: Daniel del Solar

Figure 11.2 *Queen's stepwell showing sculptures of divinities, Patan, Gujarat*

performs thousands of asvamedha. Such a person goes to heaven in the [celestial] vehicle and rejoices [there]' (Shastri, 1967). Many of these stepwells contain inscriptions that provide details about the name of the donor(s), date and year of construction and the purpose of the well. While many of them were built under the patronage of kings and nobility, it is believed that at least one quarter or more of the stepwells were commissioned by women – queens, members of the royal families, women of the merchant class, widows, and even courtesans, prostitutes, servants and other ordinary women. Thus, women served as patrons, donors and inspirations for many of these stepwells.

While stepwells primarily served a utilitarian purpose of providing water, they became a site for women's rites and rituals and the focal point for the worship of local female deities or mother goddesses. In India, fetching water has always been the responsibility of women, and so wells and stepwells were frequented by women and came to represent 'women's space'. It is here that women came in the early hours of the morning and at dusk, dressed in brightly coloured garments with their shining brass or copper pitchers balanced on their heads. The sound of their anklets and the music of their laughter and chatter filled the air and became a favourite subject of poets and writers. Each flight of steps reverberated with the sound and echoes of these women who came for water, to escape and forget for a few hours their pain and sorrows, to share their loves and joys, to invoke the local goddesses and to pray for fertility, children and the health of their families.

The stepwells provided scope for the expression of artistic and aesthetic beauty, the carvings depicting a variety of subjects, including birds. With a few exceptions, they focus on the female divinities of classical Hinduism, but the female divinities, the local goddesses.

Understanding the cosmos and the significance of nature

An understanding and appreciation of stepwell art is not possible without some familiarity with the Hindu conception of the universe and the place assigned to nature within it. A striking characteristic of the Indian worldview is the awareness and consciousness of the unity of life, the oneness of all creation and the resulting inter-relatedness of all things – human, divine, animals and plants. The man–nature relationship is not conceived in terms of the categories of dominance or separation. Consequently, the world of nature was perceived not as separate or 'apart' from human existence, but rather as an integral part of the cosmos. The law of karma binds all beings and nature in a web of unity. The fundamental principle underlying Hindu philosophy is that the *Brahman* or absolute reality is present in the soul or *atman* of each and every creature.

Thus, from the beginning of Indian civilization, nature was conceived as a vital force. The ancients viewed natural phenomena with awe and reverence. The earliest literary text, the *Rigveda* (circa 1500 to 900 BCE), contains tender descriptions of the beauty and splendours of nature. The forest-dwellers or *Aranyakas*, the holy men and sages, strove to comprehend the meaning of life and unlock the cosmic mystery from their forest dwellings where they lived alongside, and in harmony with, the birds and other beasts, the plants, the sun, rain and stars.

'Thus it was that they could realize their own life by connecting it with the vaster life of nature around them. To them, their environment was not dead or vacuous, detached or insignificant, but the necessary context of their life' (Gangoly, 1963). In ancient Indian philosophical thought, the universe was conceived in terms of two principles: '*Prakriti*' ('female'; undifferentiated nature) and '*Purusha*' ('male'; pure consciousness). These two principles from which the universe emanates were interdependent and coexistent. Thus, the Hindu ideology validated and strongly affirmed the 'feminine' and, consequently, accorded both 'women' and 'nature' a rightful and revered place in its cosmology. Nature, thus, occupies a central place in philosophical thought as well as in the visual and other arts (Miller, 1983).

Representation of nature in Indian art

Nature, in all its forms, is represented in the art of India, which is characterized by energy, vitality and a throbbing, pulsating force; the purpose of art was to convey the spiritual essence that is inherent in the world of nature. This personification of nature, the tendency to endow it with human qualities, is a unique and distinctive aspect of Indian art. Water, the primordial substance from which all life emerges, is viewed as sacred, and water was equated with life itself (Savaliya 2005). It is, therefore, not surprising that aquatic animals figure prominently in art, especially in stepwells. Mountains and oceans abound in art; they symbolize majesty and nobility and are the abode of the gods. Rivers are personified as goddesses; plants are believed to possess tenderness and compassion and, together with animals, mirror human emotions. Art, therefore, was not viewed merely as an aesthetic expression. It served a higher purpose – that of regulating the order of the universe.

Birds and mammals in Hindu religion and literature

Birds occupy a prominent place in religious iconography and the mythological beliefs of ancient cultures, including India. They are seen as symbols of creation; their wings identifying them with the skies and heaven. In the *Rigveda*, *Indra*, the king of the gods who is also the god of rain, assumes the form of an eagle or rides on an eagle and kills the evil serpent *Vrtra* (*Rigveda I*).

There are numerous descriptions of birds in the religious and secular literature, such as the *Ramayana*, *Mahabharata* and the Buddhist *Jataka* stories. The ascetics or holy men are referred to in the *Ramayana* as '*rajahamsa*' or '*paramahamsa*' because the *hamsa* (swan *Cygnus* sp.) is endowed with the ability to separate good from evil. In the *Hamsajatakas*, the swan, which embodies wisdom, expounds the *dharma*, or moral and ethical principles.

In Hindu cosmology, divinities (male as well as female) are associated with a mammal, bird or mythical creature, which constitutes their vehicle '*vahana*', or mount. *Lord Shiva* is always shown with the bull *Nandi*, *Indra* with the elephant *Airavata*, *Brahma* and *Saraswati* with the peacock, *Lakshmi* with the elephant, *Ganesha* with the rat and *Vishnu* with the boar. The animals are perceived often in human form and the boundary between human and animal is blurred or erased.

Many of the birds symbolize the individual soul. This concept goes back to the earliest religious text in India, the *Rigveda*, which uses the metaphor of the bird encaged in its body and soaring in the skies with the individual soul transcending the earthly ties to become one with the *Brahman*, the infinite (Sudhi, 1988). The birds soaring in the skies became the metaphor for spiritual liberation. *Hamsa* (swan) is a mystical word which, when transposed, becomes '*saham*', a reference to the Absolute. The *Rigveda* mentions some 20 species of birds; but it is probable that its anonymous authors were familiar with many more. Different birds are identified with certain qualities and virtues. The Ruddy Shelduck *Tadorna ferruginea* became the symbol of fidelity; the eagle (Accipitridae) with its piercing eyes represented far-sightedness and inner strength; the *chataka* (Jacobin Cuckoo *Clamator jacobinus*) is said to drink only rainwater, no matter how thirsty, and symbolized enduring love; the peacock *Pavo cristatus* was the harbinger of rain and the embodiment of joy and royalty; while birds such as storks (Ciconiidae), egrets (Ardeidae), cranes

(Gruidae) and cormorants *Phalacrocorax* spp., which breed during the monsoon season, became associated with mating and sexuality.

Birds were also symbolic of carnal desires and emotions. Parrots (Psittacidae) were associated with courtesans who kept them as pets, while peacocks were depicted in Sanskrit poetry as passionately amorous, their mating calls reminiscent of the yearning of the lovelorn for the beloved. In classical Sanskrit literature, especially the drama and poetry of Kalidasa and Bilhana, there exists the accepted tradition for lovelorn heroines to beseech the birds for news of their beloved. Birds were viewed as messengers, which carried the message of the lover to the beloved. Birds were portrayed as friends and companions of humans. In literature and fables, they could think and speak like humans. They were possessed of wisdom and, like humans, could be witty or heroic, cunning or noble, sacrificing or selfish, compassionate or cruel. The association of animals with spirituality is a distinctive characteristic of the Hindu conception of the universe and, therefore, it is not surprising that this also occurs in the stepwell art. Animals are endowed with spiritual powers and attributes, with powers of transformation, and they symbolize spiritual development: in at least five of the ten incarnations of *Vishnu*, the creator god is represented in animal form or a composite of a half human, half animal (Sivaramamurti, 1980).

Birds in Indian art

The earliest extant art in India comes from the Indus Valley civilization, which flourished over 4000 years ago (circa 2500 to 1500 BCE). While their writing still remains undeciphered, thousands of artefacts show evidence of birds in their art, specifically in seals, terracotta toys and clay pottery. From Lothal in Gujarat (circa 2300 to 1750 BCE), an important Harappan site, a large earthenware jar painted with designs of birds with stylized trees and leaves in the background was unearthed. The peacock is also represented in the pottery, and other excavations revealed miniature toys and whistles in the shape of birds.

This tradition of bird representation in art runs like a thread through thousands of years of Indian civilization from the Indus Valley civilization to the present day. Birds are a dominant theme in sculpture as early as the Mauryan period (circa 321 to 185 BCE). On the Buddhist *stupas* of Sanchi and Bharhut are depictions of various birds such as geese *Anser* spp., while parrots and peacocks appear in the temple carvings and in votive tanks. Ring stones found at Taxila, Mathura, Rupar, Varanasi and Kausambi contain nude female figures flanked by trees, birds, snakes, horses and lions, both single and paired. Birds are also found in abundance in the tribal and everyday art of India in the form of whistles, toys, toy carts, lamps, pipes and utilitarian objects, as well as in ritual art. 'Bird-Mother' figurines abound in the art of Assam and West Bengal. These terracotta theriomorphic figures or '*brata*' dolls are associated with Bengali bird ancestors, such as duck mothers and other ancestral totem mothers (Raja Dinkar Kelkar Museum, 1988).

Emperors and members of the nobility (especially during the Mughal dynasty, circa 1526 to 1858) maintained royal menageries and were intrepid observers of wildlife, resulting in their commissioning artists to paint birds for their collections. Thus, Mughal miniature paintings and Rajput art contain beautiful depictions of myriad birds, such as cranes and geese, to highlight the lovers' tryst on a dark night.

Birds in the art of stepwells

There are numerous depictions of birds in the stepwells of Gujarat, such as the representative examples from the Queen's stepwell, or *Rani ni vav* from Patan, built by Queen Udaymati in 1063 CE, the largest and most majestic of all the stepwells in Gujarat. It was completely inundated by the floodwaters of the river Saraswati. During the 1980s the stepwell was excavated and restored after nearly nine centuries of oblivion. The stepwell is monumental in size and comprises seven storeys. More than 800 large sculptures decorate the seven terraces, whose pillars, columns and niches are intricately carved with celestial maidens, Hindu divinities, mythological scenes, plants and animals (Jain-Neubauer, 1981; Snead, 1989; Mankodi, 1991).

Serpents, peacocks and owls

In the Queen's stepwell at Patan, there are several depictions of the *Naga Kanya*, or snake princess. One depicts a serpent queen holding a fishbowl in her right hand (see Figure 11.3). A snake is coiling around her left leg as if to reach the fishbowl. Her left hand is raised as if attempting to prevent the snake from advancing further. Of particular interest is the pedestal, on the top of which are three owls in a sitting position. A peacock sits between her two legs with its gaze directed towards the snake. The three owls depicted on the panel above the snake princess may be indicative of night time because owls are associated with darkness and night. The owl is also associated with wisdom. Known to hide in the deep recesses of trees, it personifies supreme indifference to the world. The peacock between the legs of the maiden is the natural enemy of the snake and represents non-attachment and control over passion, as well as an antidote to the serpent's poison or demonic energy (Sadani, 1998).

The *Garuda*, or the eagle, appears frequently in stepwell art. In Sanskrit, the term '*gri*' (to swallow) has given rise to the word '*garuda*'. The Rigvedic hymn describes the celestial bird as endowed with wings (Banerjea, 1956). The eagle represents the celestial bird and symbolizes 'the unbound spirit, freely roaming as a bird disentangled from the fetters of Earth' (Zimmer, 1946). It is said that the eagle is the natural enemy of serpents and destroys them. They stand for the fundamental opposition between the sun and the Earth – the *garuda* identified with the former, while the snake represents the earth and the dark forces of the underworld (Coormaraswamy, 1995). Zimmer (1946) also states that in Puri (Orissa), people suffering from snakebites were taken to the

Figure 11.3 *Serpent queen with a peacock gazing at a snake and owls above*

Source: Sadani (1998)

temple where they encircled and embraced the *garuda* pillar. Thus, the magical powers of the eagle served to counter the poisonous effects of the snakebite.

In mythology, the *Garuda*, or the 'fair feathered one' *Suparna* (or golden-winged bird) became the vehicle of *Lord Vishnu*. The motif of the bird dating back to antiquity was probably borrowed from ancient Mesopotamian art and suggests early contact and borrowing between India and Mesopotamia. In both of these ancient civilizations, there existed the antagonism and battle between the Heaven bird and the Earth serpent. They are natural enemies – the former dwells in the sky and is identified with the sun while the snakes living in the womb of the Earth are the guardians of the underworld (Zimmer, 1946).

According to Hindu mythology, *Garuda* is said to be the son of the sage *Kashyapa* and of *Vinata*. He was born from an egg and has the body of a human, but the talons, wings and beak of an eagle. A rivalry between his mother and her sister *Kadri*, the mother of the snake, accounts for the animosity between *Garuda* and snakes (Dallapiccola and Verghese, 2005).

Geese

There are several representations of geese in stepwell art. The wild goose in mythology is associated with *Brahma*, the lord of creation. It represents in animal form the creative principle of the cosmos and is regarded as a symbol of absolute freedom attained through spirituality. In *Song of the Immortal Gander* revealed to sage Markandeya, it states: 'Many forms do I assume. And when the sun and the moon have disappeared, I float and swim with slow movements on the boundless expanse of waters. I am the Gander. I am the lord.

I bring forth the universe from my essence and I abide in the cycle of time that dissolves it' (Zimmer, 1946). The relationship between the gander and the state of spiritual freedom is because of the effortlessness with which it moves from the Earth to the skies above, the ease with which it navigates from the terrestrial to the celestial realm, and its ability to swim on the surface of the water and glide and soar into the sky. Holy men and ascetics who successfully emancipate themselves from the bondage and cycle of rebirth are equated with the gander. Like the homeless wanderer who has no ties to the material world, the gander is a symbol of unbound freedom.

Parrots

Many of the sculptural images in stepwell art depict parrots, which are favourite pets from times immemorial. According to texts such as *Shilpa Prakasa*, the heroine or beautiful maiden should be portrayed as smelling a lotus, garlanding herself, adorning herself with jewellery, adjusting her anklet or playing with a parrot.

Suka-Kanya, or the damsel with a pet parrot, is another exquisite panel in the stepwell at Patan. It depicts a slim and graceful maiden standing between two ornamental pillars in what appears to be a classical dance position. Her right raised hand holds onto a branch from which hang three mangoes surrounded by foliage. Seated on her left arm is a parrot gazing at the maiden, while the maiden, too, reciprocates with a fond look at her pet. The tenderness between the maiden and her pet parrot may symbolize the emotion of '*vatsalya*', or fond love towards a child (Sadani, 1998).

Another panel (see Figure 11.4) depicts a maiden standing between two beautifully carved pillars decorated with vines, creepers, other foliage and

Figure 11.4 *A young swan, mistaking them for pearls, captures drops of water from a maiden's hair*

Source: Daniel del Solar

possibly hanging fruit such as mangoes. The sculptor shows the maiden who has just come from her bath. She has draped her sari, which clings to her still wet body revealing the contours of her sensuous form. She is shown squeezing the water from her wet hair, from which droplets of water fall to the ground. Near her right leg, sitting on a pedestal, is a young swan which, mistaking the drops of water for pearls, is attempting to catch them. It is said that pearls are a favourite food of swans. The expression on the face of the maiden is serene and the artist has captured and conveyed not just the sensuality and seductiveness of the maiden, but also the world of nature and the harmonious coexistence of all forms of life – human, bird and plants.

Stepwells today

Stepwells, which represent the finest examples of water architecture, ceased to be built after the establishment of British rule in India during the 19th century. After nearly 1000 years, the stepwells became obsolete and were replaced by taps, pumps and tube wells. Many were sealed off and others crumbled to the ground, victims of neglect and disuse. Those that survived are silent reminders of the past when they were alive with the sound and laughter of women who came daily to fetch water and the voices of others who spent a few hours here to rest and drink the cooling waters and escape from the scorching sun. The world of nature with birds and mammals, as well as human and divine figures, carved on the walls and pillars are a reminder of a time and worldview in which birds and other animals were companions and equals in the spirit world, a world in which anything was possible, one in which mystical transformations took place between the human, animal and divine worlds.

Some of these wells are once again being reclaimed, mostly by women, and have been transformed into 'embryonic shrines' for the worship of local goddesses and feminine deities (Livingston, 2002, 2003). Women are once again claiming these structures as their unique spaces for the performance of rituals and worship centred on fertility, abundance, health and prosperity. Furthermore, they are also being reclaimed by the birds and other creatures that have returned to stake their claim over these buildings. Many of these wells, some neglected, crumbling and dangerous, teem with all forms of life. Plants and creepers grow defiantly from the crevices of the stone structures, cooing pigeons and flying bats shatter the silence with the arrival of an uninvited stranger in their midst, parrots the colour of spring green share the space with snakes and squirrels, and, in the waters, there are frogs, fish and turtles. These new inhabitants of the stepwells are replacing the birds and other carved creatures of the walls.

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12

Aboriginal Stories: The Riches and Colour of Australian Birds

Sonia Tidemann and Tim Whiteside

Australian Aboriginal stories abound with depictions of birds. In more than 400 stories across 106 language groups, 116 species of birds could be identified, some more easily than others depending on the ornithological awareness of the recorder. The information in some of these stories reveals that Aborigines had knowledge of bird behaviour long before it was 'discovered' by ornithologists. Stories are a part of the fabric of Aboriginal culture, often indicating expected cultural behaviour, but also account for plumage characteristics, calls, habitat, food, the relationships between Earth and extraterrestrial objects, and inter-specific behaviour of birds. Rarely is the Aboriginal knowledge linked with 'scientific' studies that would be the richer for embracing the ecological inter-relationships that are a natural part of the holism of Aboriginal stories.

Introduction

Stories make up the fabric of the lives of Australian Aborigines and are portrayed in dance, painting and song, as well as being handed down as oral history. The relationship between Northern Territory Aborigines and Macassan traders who once visited Australia from Indonesia, the importance of water in Aboriginal life and how it is depicted in stories, and stories about fire have been discussed elsewhere (Tidemann, 2001, 2003, 2009; Tidemann and Whiteside, 2007). More than 400 stories have been documented about birds alone, and, in keeping with the oral traditions of Aborigines, undoubtedly many more exist that have not yet been written in public documents and more again may have been lost to time without being handed down or recorded. Those stories in the public realm, and that have been written down, form the basis of this chapter. Using the term 'stories' suggests that they are tales of fiction or fantasy, but nothing could be further from the truth. They tell about social proprieties, morals, relationships, the landscape and law. In the past, they have been referred to as myths, folklore and legends, sometimes with a suggestion that they have no cultural value and the owners of the stories are simpletons. For example:

> *Under the heading of 'Aboriginal mythology and folklore' will be recounted a few of the fabulous or romantic stories current among the aborigines of New South Wales and Victoria, which have been written down by me from the mouths of the old men and women from time to time.*
>
> *The folklore of any primitive people is always valuable, as showing the bent of the human mind in its earliest development, in accordance with the different surroundings and conditions of life. Many native stories are a mixture of legend, folklore and superstitious belief, and could perhaps be classed under one or other of these designations.* (Mathews 1904)

Because, contemporarily, the Aboriginal owners of the stories refer to them as such, that term will be used in this chapter. In addition, some of the stories summarized below demonstrate that knowledge about certain birds preceded that 'discovered' by Western scientists. Ornithologists may have benefited (and may still benefit) from making themselves familiar with the indigenous body of knowledge in preparation for their own studies. If this chapter does nothing else, it will have succeeded if it stimulates Western ornithologists, even a little, to inform their own studies by delving into that older body of knowledge. The stories change a little over time but the recorders rarely acknowledge the person/people from whom they've collected the story, and so, without this and the relationship between the storytellers, it is not valid to try to measure change over time.

Story owners and birds of importance

The distribution of the bird stories, collected by a variety of people for over a century, reflect the many language groups that existed in Australia before the coming of the white man. The shape of the mainland of the Australian continent can almost be depicted by the tribal and language contributions of the bird stories: 447 stories in total; but because some groups have more than one bird story, fewer dots appear on the map (see Figure 12.1). Some stories appear in language groups separated widely in a geographic sense; in other cases, more than one story about a particular species can exist in more than one language group (Tidemann and Whiteside, 2007).

Opportunities to collect the stories arose from the generosity of their Aboriginal owners to share them with missionaries, anthropologists, naturalists and ornithologists. The number of stories collected for a language group is a reflection of time spent learning about them rather than the number that may exist or have existed. Not all stories are public knowledge and some exist only for certain people within a group. The number of language groups and tribes who shared their bird stories is immense, numbering at least 106 (see Table 12.1). Sometimes a locality was identifiable rather than a language group, and

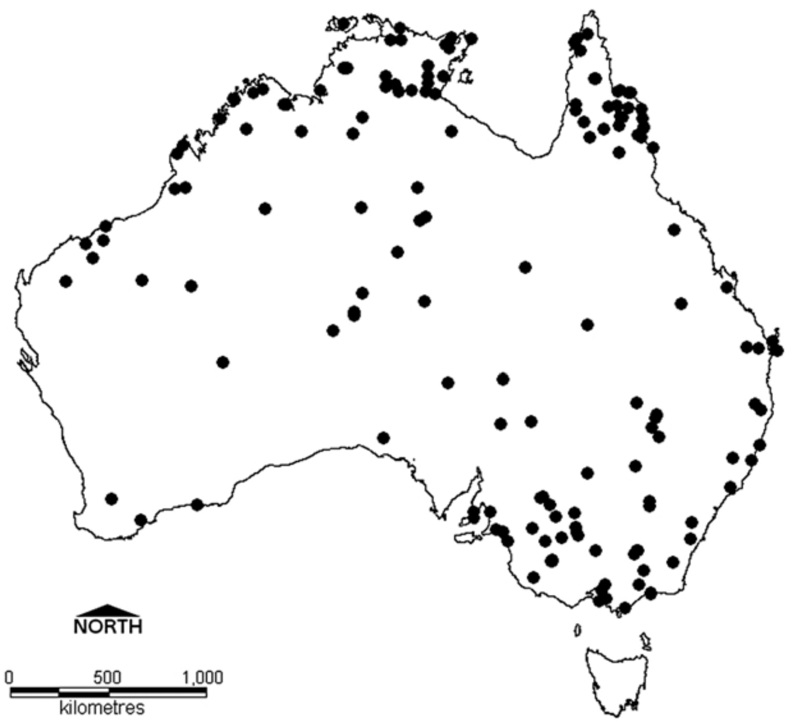


Figure 12.1 *Distribution of the tribes and language groups who have contributed a total of 447 bird stories*

Table 12.1 *Representation of language groups, tribes and geographic regions from which bird stories have been collected*

Number of stories	*Language group, tribe or geographic region from which stories were drawn*
1 (n = 30)	Banbinja, Bilingara, Binbinga, Binigura, Bunurong, Daingatti, Darambal, Djaberadjabera, Djiriganj, Duwal, Gumbaynggir, Jaitmathang, Jitajita, Kariara, Kaurna, Kukatja, Mangarai, Mardu, Milingimbi, Mornington I, Ngadadjara, Ngarinjin, Njulnnjul, Niabali, Pibelman, Tanganekeld, Wakaman, Weilwan, Wunambal, Yir-yiront
2 (n = 22)	Anangu, Anmatjera, Arabana, Brabiralung, Bunganditj, Carson R, Dalabon, Duwala, Gandangara; Kaititja, Kokominni, L Tyers, Muthimuthi, Narangga, Ngalakan, Ngarinman, Thangatti, Ualarai, Wailpi, Wandandian, Warkawarka, Worimi
3 (n = 10)	Esperance B, Forest R, Fraser I, Gandju, Gidabal, Gwini, Jupagalk, Maung, Murngin, Watiwati
4 (n = 13)	Drysdale R, Indjibandi, Kabikabi, Kulin, Mapoon, Maraura, Ngarluma, Ngologwangga, Ngarluma, Ngolokwangga, Tiwi, Waramanga, Wiradjuri
5 (n=5)	Boulia, Nunggubuju, Princess Charlotte B, Wikmunkan, Wongaibon
6 (n = 10)	Bagu, Bloomfield R, Dieri, Kokojawa, Kokowara, Miriwung, Murinbata, Murray R, Wakawaka, Wurundjeri
7 (n = 2)	Gunwinggu (= Kunwinjku), Pitjandjara
8	Mara
9	Jarildekald
10 (n= 3)	Djauan (= Jawoyn), Kamilaroi, Kokokulunggur
11	Kurnai
13 (n= 3)	Karadjari, Walpiri, Wotjobaluk
15 (n = 2)	Adnymathanha, Aranda
17	Wiilman
25	Worora
28	Narran R

Notes: R = river; B = bay; I = island; L = lake.
Source: Spelling of names is taken from Tindale (1974) and Berndt and Berndt (1988)

so, on a few occasions, localities are given. Often, people identify themselves as coming from a certain place, so place names, indicative of 'country', are used respectfully here rather than the disrespect often associated with the 'dominant' 'white fella' culture.

Recorders of Aboriginal stories varied in their expertise at recognizing birds. For example, Robert Love, a missionary, was also a skilled linguist and a highly respected naturalist who, in the world of mainstream ornithology, even had a bird species named after him – Gibberbird, *Ashbyia lovensis*. At the other extreme, some descriptions were of 'brown birds' and so cannot be included in the data. Combining common names, known distributions of species and descriptions given in the stories enabled some species to be delineated. In all the stories considered, 116 species of Australian mainland birds could be identified to species level. Some groupings were made – for example, 'crows' were only classed as one and appeared in 84 stories, only two of which were identifiably Torresian Crows (see Table 12.2 for scientific names). Similarly, raptors appeared in 138 stories, in 36 of which they could be identified to species level and 102 to categories such as eaglehawk and fish hawk.

Table 12.2 *Prevalence of bird species occurring in Australian mainland Aboriginal stories*

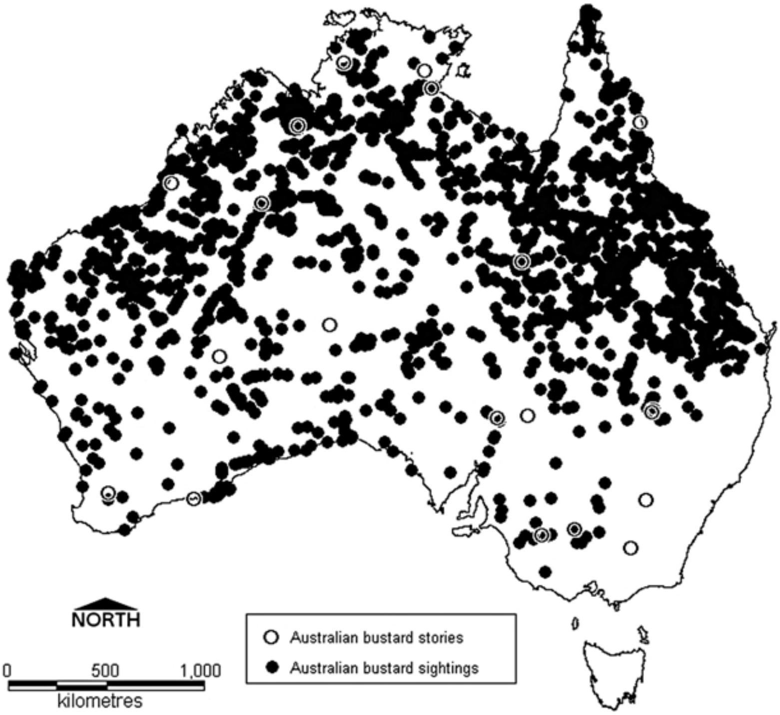
Number of mentions of species (spp.)	*Species or species 'groups'*
1 (n = 51 spp.)	Australian Brush-turkey (*Alectura lathami*); Australasian Grebe (*Tachybaptus novaehollandiae*); Australian Raven (*Corvus coronoides*); Australian Shelduck (*Tadorna tadornoides*); Australian Wood Duck (*Chenonetta jubata*); Barking Owl (*Ninox connivens*); Black-shouldered Kite (*Elanus axillaris*); Blue-faced Honeyeater (*Entomyzon cyanotis*); Brown Goshawk (*Accipter fasciatus*); Brown Falcon (*Falco berigora*); Cockatiel (*Nymphicus hollandicus*); cockatoo; Comb-crested Jacana (*Irediparra gallinacea*); Crimson Chat (*Epthianura tricolor*); cuckoo; Diamond Dove (*Geopelia cuneata*); Dollarbird (*Eurystomus orientalis*); Double-barred Finch (*Taeniopygia bichenovii*); Dusky Moorhen (*Gallinula tenebrosa*); Eurasian Coot (*Fulica atra*); falcon; finch; fishhawk; Great Cormorant (*Phalacrocorax carbo*); Great Frigatebird (*Fregata minor*); Ground Parrot (*Pezoporus occidentalis*); honeyeater; King Quail (*Coturnix chinensis*); Lewin's Honeyeater (*Meliphaga lewinii*); Little Corella (*Cacatua sanguinea*); Little Eagle (*Hireaaetus morphnoides*); Little Egret (*Egretta garzetta*); Magpie-lark (*Grallina cyanoleuca*); Malleefowl (*Leipoa ocellata*); Mulga Parrot (*Psephotus varius*); Painted Finch (*Emblema pictum*); Pale-headed Rosella (*Platycercus adscitus*); Pallid Cuckoo (*Cuculus pallidus*); Pied Cormorant (*Phalacrocorax varius*); Plumed Whistling-Duck (*Dendrocygna eytoni*); Purple Swamphen (*Porphyrio porphyri*); quail; Rainbow Lorikeet (*Trichoglossus haematodus*); Red Wattlebird (*Anthochaera carunculata*); Richard's Pipit (*Anthus novaeseelandiae*); Rufous Whistler (*Pachycephala rufiventris*); Silver-crowned Friarbird (*Philemon argenticeps*); Spinifex Pigeon (*Geophaps plumifera*); Spotted Bowerbird (*Chlamydera guttata*); Swamp Harrier (*Circus approximans*); Scarlet Robin (*Petroica multicolor*); Welcome Swallow (*Hirundo neoxena*); Western Rosella (*Platycercus icterotis*); Western Yellow Robin (*Eopsaltria griseogularis*); White-gaped Honeyeater (*Lichenostomus unicolor*); White-winged Fairy-wren (*Malurus leucopterus*); Wonga Pigeon (*Leucosarcia melanoleuca*); Zebra Finch (*Taeniopygia guttata*)
2 (n = 23 spp.)	Barn Owl (*Tyto alba*); Beach Stone-curlew (*Esacus neglectus*); Black Swan (*Cygnus atratus*); blue wren (*Malurus* sp.), bowerbird; butcherbird; Channel-billed Cuckoo (*Scythrops novaehollandiae*); Great Bowerbird (*Chlamydera nuchalis*); Grey Fantail (*Rhipidura fuliginosa*); Little Wattlebird (*Anthochaera chrysoptera*); Magpie Goose (*Anseranas semipalmata*); Major Mitchell's Cockatoo (*Cacatua leadbeateri*); Mistletoebird (*Dicaeum hirundinaceum*); Musk Duck (*Biziura lobata*); Nankeen Night-Heron (*Nycticorax caledonicus*); Osprey (*Pandion haliaetus*); Peaceful Dove (*Geopelia striata*); Pied Imperial-pigeon (*Ducula bicolor*); rosella parrot; sandpiper; Scarlet Robin; seahawk; seagull; Short-billed Black-Cockatoo (*Calyptorhynchus latirostris*); Spangled Drongo; Superb Lyrebird (*Menura novaehollandiae*); swallows; Torresian Crow (*Corvus orru*); wattlebird; Western Ringneck (*Barnardius zonarius*); whistling-duck; White-faced Heron (*Egretta novaehollandiae*)
3 (n = 6 spp.)	Crested Bellbird (*Oreoica gutturalis*); hawk; Budgerigar (*Melopsittacus undulatus*); Collared Sparrowhawk (*Accipiter cirrhocephalus*); duck; eagle-hawk; heron; green parrot; Rainbow Bee-eater (*Merops ornatus*); Rainbow Lorikeet (*Trichoglossus haematodus*); Red-backed Kingfisher (*Todiramphus pyrrhopygia*); robin

Table 12.2 *continued*

Number of mentions of species (spp.)	*Species or species 'groups'*
4 (n = 10 spp.)	Black Kite (*Milvus migrans*); Brown Quail (*Coturnix ypsilophora*); Brown Treecreeper (*Climacteris picumnus*); Crested Pigeon (Ocyphaps lophotes); Darter (*Anhinga melanogaster*); Northern Rosella (*Platycercus venustus*); Masked Lapwing (*Vanellus miles*); Sacred Kingfisher (*Todiramphus sanctus*); Silver Gull (*Larus novaehollandiae*); Tawny Frogmouth (*Podargus strigoides*); treecreeper
5 (n = 6 spp.)	Australian Owlet-Nightjar (Aegotheles cristatus); Blue-winged Kookaburra (*Dacelo leachii*); Pacific Black Duck (*Anas superciliosa*); Red-backed Fairy-wren (*Malurus melanocephalus*); Spotted Nightjar (*Eurostopodus argus*); White-bellied Sea-Eagle (*Haliaeetus leucogaster*)
6 (n = 3 spp.)	Black-faced Cuckoo-shrike (*Coracina novaehollandiae*); Diamond Firetail (*Stagonopleura guttata*); Nankeen Kestrel (*Falco cenchroides*); parrot; pigeon
7 (n = 1 sp.)	Large-tailed Nightjar (*Caprimulgus macrurus*); nightjar
8 (n = 3 spp.)	Bronzewing (*Phaps* sp.); chickenhawk; Galah (*Cacatua roseicapilla*); Laughing Kookaburra (*Dacelo novaeguineae*); Pheasant Coucal (*Centropus phasianinus*)
9 (n = 2 spp.)	Kingfisher; Red-tailed Black-Cockatoo (*Calyptorhynchus banksii*); Red-winged Parrot (*Aprosmictus erythropterus*)
10	Shag
11	Black-necked Stork (*Ephippiorhynchus asiaticus*); grebe; owl
12 (n = 2 spp.)	Bush Stone-curlew (*Burhinus grallarius*); sparrowhawk; Wedge-tailed Eagle (*Aquila audax*)
14	Australian Magpie (*Gymnorhina tibicen*)
15	Southern Boobook (*Ninox novaeseelandiae*)
18	Hawk
21	Australian Pelican (*Pelicanus conspicillatus*)
22 (n = 2 spp.)	Sulphur-crested Cockatoo (*Cacatua galerita*); Willie Wagtail (*Rhipidura leucophrys*)
24	Eagle
27	Brolga (*Grus rubicundus*)
33	Australian Bustard (*Ardeotis australis*); eaglehawk
77	Emu (*Dromaius novaehollandiae*)
82	Crow(s) (*Corvus* sp.)

Note: Prevalence of bird species occurring in Australian mainland Aboriginal stories.

The most common species in stories were Emu (77), Australian Bustard (33), Brolga (27), Sulphur-crested Cockatoo, Willie Wagtail (each 22) and Australian Pelican (21) (see Table 12.2). The groupings of species may have depended on the cultural significance of birds or even their food value because in some language groups there is only a single name for a group – for example, *Nini* for finches across the Kimberley in north-western Australia. Frequently, the names given to birds reflect their calls and so are phonetic or onomatopoeic names – for example, *Wirrihwirrihyak* (Black-faced Cuckoo-shrike) and *Wak wak* (Torresian Crow) in Kunwinjku (Nganjmirra and Tidemann, 2005); *Durrk* (Emu) and *Jikirdijikirditj* (Willie Wagtail) in Jawoyn (Wynjorroc et al,



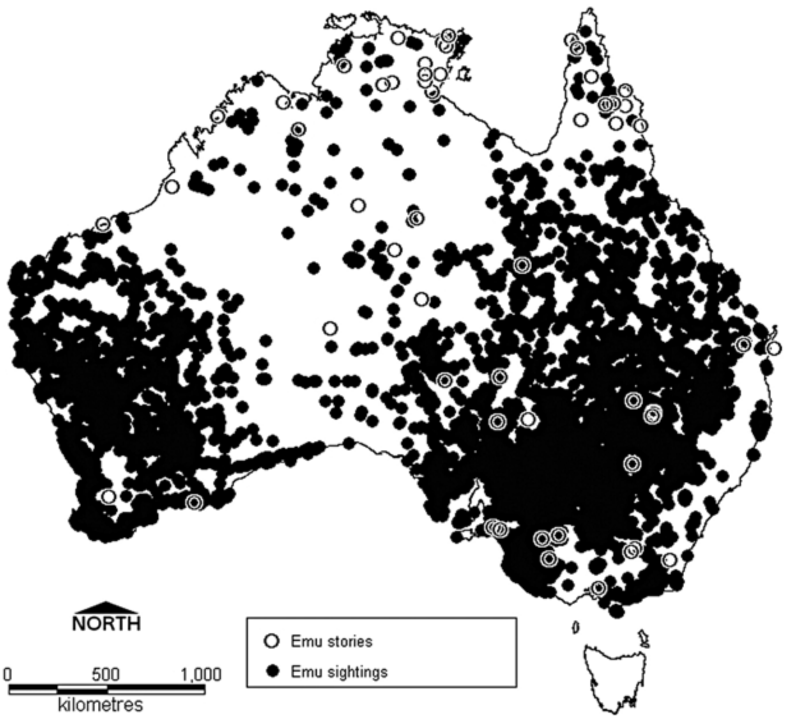
Source: Barrett et al (2003)

Figure 12.2 *Records of the occurrence of the Australian Bustard from* The New Atlas of Australian Birds *(black dots) and Aboriginal stories (white dots)*

2001); and *Panpallala* (Crested Bellbird) to the *Anangu* (Tidemann and Wright, 2005).

The records of bird species in Aboriginal stories can be compared with those collected in *The New Atlas of Australian Birds* (Barrett et al, 2003) and an ongoing project (www.birdata.com.au), although the latter will be far more numerous because current records are reported as latitudes and longitudes, whereas the areas occupied by language groups are far more expansive. With this limitation in mind, it can be seen that the historic distribution of the Australian Bustard is more extensive than that represented by the Atlas data, most notably in the south-eastern portion of the continent.

In contrast, the atlas data for the Emu and the records from Aboriginal stories indicate that the distribution of the Emu has not changed since the origins of the stories. Because these stories were never recorded in written form, it is impossible to know when these stories originated; but, without doubt, they are older than even the oldest atlas data.



Source: Barrett et al (2003)

Figure 12.3 *Records of the occurrence of the Emu from* The New Atlas of Australian Birds *(black dots) and Aboriginal stories (white dots)*

Some Aboriginal stories of ornithological significance

Looking at the stories themselves, there is variety in the information that they convey to biologists, particularly ornithologists, giving certain prowess to species from an Aboriginal perspective – for example, in the formation of landscape, teaching appropriate cultural behaviour, influencing the weather and tool-making. Others are about the timing of egg-laying, plumage coloration, behaviour, habitat separation, cooperative breeding, nest parasitism, species characteristics, visual acuity and morphology. Some of the many stories that abound are summarized below to demonstrate the knowledge and the way in which it is passed on between generations.

> *For Aborigines, there is a close relationship between biological events that they use to inform themselves about the readiness of food resources. For example, 'When spear grass (*Sorghum plumosum/S. laxiflorum*) has ripened, it's time the Magpie Geese laid their eggs'* (Alpher, 1987).

There are a large number of stories that explain the origins of plumage coloration as well as some other behavioural characteristics – for example, food selected, inter-specific interactions and habitat:

> *A crow and a hawk had a fight. The hawk succeeded in knocking his adversary over and rolling him in the ashes, when he acquired his black plumage. Hawk got punished, however, by being made to eat putrid meat.* (Roth, 1903)

> *Brown Falcon and his wife, the crow, were living at a certain place. Every day this husband would go out hunting. He would take all his spears and go out and hunt while the wife took her dogs with her, her basket and her digging sticks, and she would go off to the scrub. One day Brown Falcon thought he would play some tricks with his wife. When he had found a little creek he went and sat there all day on the creek bed. His wife was out digging yams. In the afternoon she came back and started to roast the yams and cook up the meat that her dogs had got. Then she watched out for her husband to come home. At last he happened to come in sight. He was coming home and he was limping too. He had blood all over his head, on his legs. 'I have been fighting with some men who tried to kill me', he said. His wife quickly put urine on his wounds and then covered them with hot ashes. Next day the same thing happened.*
>
> *The next day his wife decided to follow him. She knew if the men were really there they would finish him off. So he went off first, reached the creek bed and began to cut himself. Following his footprints, his wife crept up behind him, making sure she kept very quiet when she neared the creek bed. She could see the bamboos of his spears. Brown Falcon saw one of her dogs. He knew she was around. He saw her peep, and he ran along the creek bed and flew up, and she too. She tried to stop him and she cried: 'Caw, caw, caw.' She couldn't stop him although she knew he wouldn't tell the truth even if she asked him. That is why we see today the crow chasing after the hawks.* (Lucich, 1969)

Cooperative breeding, nest parasitism, groups of hen-plumaged birds in each family group and the hint of extra-pair copulations were described as early as 1934:

> *Long ago there were many Ter ter (blue wrens,* Malurus *sp.) living along the riverbanks and each one had only two wives. The two wives shared their labours in nest building and in hatching and feeding the young and the husband took care of them. Each family knew its boundaries and kept to its own territory. They all*

> *lived happily until one became more venturesome and started to visit his neighbours. Sometimes he took his wives with him, but often he went alone. None of the other Ter ter objected as long as he kept to his own tribe. They said nothing until he began to visit all kinds of other birds. They then remonstrated for he was not content to bring these strangers to his own hut but also began to take them to the huts of others. When he began to fraternize with Woor (cuckoo), the other Ter ter did not like it at all because the Woor could not be rebutted. They came to visit at the most unreasonable times, particularly at nesting time. Their presence was bad enough, but the Woor did not seem to be content with just visiting. They began to lay eggs in the Ter ter nests whenever they got a chance. This was greatly resented, for these eggs could not be turned out; that would be against bird law. But, at the same time, the Ter ter did not want a lot of strange babies to bring up.*
>
> *At last this Ter ter made friends with Cootup (sparrowhawk) and gradually the male Ter ter disappeared one by one. Finally two Ter ter, who had lost their husbands, decided to trail Cootup and saw him eating a little Ter ter. Filled with dismay, they flew home and told the other Ter ter. When Cootup returned to the camp they all set upon him and beat him until he was driven away. By this time, the number of males had been so decimated that it was found that there were five females to each male.*
>
> *Since then, each family stays on its own territory and never intrudes on another's property unless briefly, to tell of the coming of strangers. They have never been able to get rid of the Woor, who seem to have a knack of laying eggs in their nests when they are not looking, so it is not uncommon to find Woor eggs in their nests.* (Hassell, 1934)

Some stories describe the origin of certain unique behavioural characteristics such as laughter in the case of the Laughing Kookaburra:

> *When Yindingie (the messenger of the god in the sky) was making the birds, his task had not been an easy one. The mammals, fish and insects had been very obedient and willing to learn; but the birds seemed to be very hard to please. One of these was Kookaburra. Although he was a good-looking bird with a very strong beak and wonderful eyesight, he was not happy because Yindingie had given him laughter. He said: 'What have I got to laugh about? I would rather have a song like Butcherbird's or Magpie's.'*
>
> *Now this was the time when some of the bush creatures were beginning to misbehave. Snake, for instance, had decided that a*

> *frog would be good to eat and found little green Tree Frog sitting on a log. Tree Frog could not believe it when Snake said he was going to eat him and hopped away as fast as he could. 'Help!' cried Tree Frog. 'Please help me, someone. Snake is going to eat me!' Tree Frog hopped into the clearing where Kookaburra was sitting in a tree. As he watched, Kookaburra could see that Snake really meant to eat the little Tree Frog. Then he saw Tree Frog hop towards a big stump and disappear behind it. Snake saw this and said: 'Ah! Now I've got you.' Stealthily he slid through the grass and circled the base of the stump. Seeing a movement in the grass in front of him, Snake pounced and held on! And that was when Kookaburra burst out laughing! He laughed and laughed and soon the bushland was filled with the merry sound. The rest of his family flew up and when they heard the tale they too burst into laughter. Kookaburra had seen the little Tree Frog hop up on top of the stump and then down a hole in it. All Snake had caught was his own tail.* (Miller, 1994)

The next four stories account for bird behaviour with which we are familiar and that we now associate with particular species, but was known to Aboriginal people long before white settlement of Australia – for example, the fishing prowess of (Australian) pelicans, cormorants and Darters, the aggressive behaviour of magpies, the nocturnal behaviour of owls, the mournful cries of stone-curlews, the delight of the dance of the Brolga and the mound-building of Australian Brush-turkeys with their monitoring of the temperature of the nest chamber:

> *The brothers Tentjanul, two Silver Gulls, reconnoitred for better fishing grounds and the whole flock then migrated towards Lake Alexandrina where they made nets from the reeds growing along the shore. The pelican was in charge of the fishing, the pied cormorants and the Darters went ahead of the main flock, locating fish and heading them off by diving into the water ahead of the shoal. The Silver Gulls and the terns dived into the water and drove the fish inwards towards the shore where they would be within reach of the nets manned by the pelicans. The smaller birds, such as the (Eurasian) coots, assisted at the nets, keeping the fish caught within the mesh.*
>
> *After the first draw of the nets, the groups rested for a while. The catch consisted of perch and bony bream. The birds then continued to fish until the pelicans, whose hands were numb with cold, said to the (Australian) magpie: 'Stop and have a camp and make a fire'; but the magpie refused to build a fire. So angry were the fishermen with the magpie that all the small birds who had been in charge of the fish in the nets would give this man nothing*

but the bony bream they'd rejected. All the rest of the birds taunted the magpie, saying: 'What, carrying a bream. So that's all you have.'

The magpie, becoming angry, began to belabour the other birds with the fish he had been given and so arose the magpie's characteristic action of chasing the smaller birds. He hit the crow's eyes with his firestick and gave him his 'smoky' eyes. The pelicans, previously coal black, became splashed with white where the scales of the bony bream, wielded by the irate magpie, stuck to their bodies.

All the fishing people then turned into birds. The pelican dived into the water carrying his drum nets with him. He is now the greatest fisherman of the lakes and the nets which he carried, he still wears in the shape of the well-defined pouches under the beak. The coots ran into the reeds where they live to this day. The last was the magpie who remained looking out over the lake and, thence, arose his characteristic attitude of perching on a high place. (Harvey, 1943)

In ancestral times there lived an owl who possessed two big dogs. Each day he went hunting with them. One day, Beach Stone-curlews, who lived nearby, went out to hunt, leaving their children playing at home. The owl, seeing that they had gone, came down from the cliffs and, pointing out the young curlews said: 'There is meat for you, my dogs.' Immediately the dogs sprang forward, killed and ate the children.

Arriving back from their hunting expedition, the two parents saw their home deserted and the remains of the children. Dropping what they carried, they both started to cry most bitterly. They collected the remains of their children and buried them. The husband said: 'Never mind. I will have that owl man and his two dogs.' So off he went into the scrub where he came upon a kangaroo and speaking to it said: 'You go and feed in front of owl's cave so that he can see you. He will then send a dog after you but you will be quick and run through the dense scrub. I will be hidden at a certain place and there you will pass me.' The man then showed him where he would stand so that he could kill the dog. The next day, they repeated the plan and killed the second dog.

Stone-curlew went home and told his wife, adding: 'I am now going to kill Winda [owl].' Climbing the cliff, he arrived at the entrance. Standing in front of it he called to him to come out and fight; but the owl would not answer or come out. After waiting some time, the stone-curlew cursed him: 'Nobody will ever like you; you will never go out in the day-time to get food. You will *only get food at night; you will not be able to see at any other time. You will not be able to see the sun; stay there, stay there.'*

So, even to this day, the owl lives in caves and dark places and, to this day, the Beach Stone-curlews still mourn their young. (Berndt, 1940)

A long time ago, the Brolga found a ground chilli and, not knowing that it was hot, ate it, the results being not only that his head took on a scarlet colour, but that he became 'all the same drunk'. It was during this predicament that he learnt his steps and these he taught to all the other animals, each one owing to some physical peculiarity developing a variation in the dance. (Roth, 1903)

One day, Brush-turkey saw turtle make a hole and lay her eggs in it. When the last was laid, she was carefully covering them when she looked up and saw Brush-turkey, who said: 'Why do you cover your eggs up?' 'That the sand and sun may hatch them.' 'But won't you sit on them yourself?' 'No indeed! Why should I do that? They will be warm where they are and come out, even as I came out, in the right time. If I sat on them I might break them. And who would get me food? I should die and them too.'

Brush-turkey went back to where her mate was feeding and told him what she had seen. She said she would like to try that plan instead of sitting on the eggs week after week. They could not dig a hole to lay them in, but scratched up a heap of mixed debris, earth, sand, leaves and sticks. Then the mother Brush-turkey, every second day, laid an egg in the mound until there were 15, all apart from each other, with the thin end downwards. When all this was done the parents waited anxiously for the result.

As time went on the mother bird grew restless. What if she had killed all her young just to save herself? She fussed round the big mound which stood some feet high. She put her head in to feel if it was warm, drew it out quickly, delighted to find the nest was absolutely hot. Then she began to fear it would be too hot. Full of anxiety, she scratched away the earth and leaves. Then she heard a noise, called to her mate and he came and scratched away until, to their joy, out came the finest chicks they had ever seen, quite independent and strong, with feet and wings more advanced than any seen on their chicks before. (Parker, 1898)

In a story about two pigeons, the origin of the red skin around the eyes of the Diamond Dove and of the clattering sound of the Crested Pigeon's wings when it takes flight are described:

> *A long time ago, the Diamond Dove (Kurukuku) had some nice grinding stones. Every day, she would go out to collect seeds and bring them back to grind to make damper. Crested Pigeon (Mulambada) used to watch Diamond Dove grinding her food and often wished he had some stones like that. One day, when the little dove was away looking for seed, Crested Pigeon stole her large stones and flew away with them. Poor Diamond Dove had lost her large grinding stones and she was really unhappy. She cried so much that her eyes are red even to this day.*
>
> *And Crested Pigeon, whenever he starts to fly, he makes a sharp clattering noise with his wings. This is the sound of the grinding stones rattling together – the same stones that he stole from poor little Diamond Dove.* (Tunbridge, 1988)

There are stories that account for the habitat separation of birds – for example, the one about Emus and Australian Pelicans, although in Western science they are not closely related species:

> *In the days when pelican and Emu occupied the same tract of country, the former was being continually worried by the latter always persisting in camping alongside. Pelican was a good worker and used to get plenty of firewood. Emu, on the other hand, was lazy and always burning his companion's timber. From growling they got to quarrelling; but, being the smaller bird, pelican had to exercise all his wits to get the advantage. So he told Emu that if he put his arms (wings) in the fire they would burn much better than the wood. The foolish bird did so, only to find that his wings had become singed, burnt and shortened. His legs, however, being still available, helped to kick his adviser into the water. It thus happens that the Emu does not get interfered with in hunting for berries and nuts on the dry land, while the pelican fishes unmolested in the saltwater. They now have nothing in common, not even firewood.* (Roth, 1903)

All language groups have stories about the formation of features in the landscape, some on a grand scale from the coast line of the Australian continent, coastal islands and desert, to river systems (desert as well as coastal), even features on a particular mountain:

> *In the beginning there was nothing but fresh water everywhere until Marimari, a gigantic Emu man, arose near Whistler's Creek [Western Australia]. He was so large that the sea reached only to his ankles. Some earth came out of his feet and made rocks. Wherever he stepped, islands appeared and, when he sat down, the mainland (which is really a large island) arose. Marimari*

> *went right round this island making the coast, but leaving water in the middle. Having completed his tour he made the latter into desert.* (Piddington, 1932)

> *In the beginning there was only sky and the Earth; and the Earth was formless and empty of life, a void level waste waiting for the awakening of the ancestors from their eternal sleep underneath the sheltering crust… When it was a full-grown hideous monster, the great water serpent of Emiana, was summoned back from the Finke River [central Australia] to its old home by its aunt who had assumed the shape of a Willie Wagtail. The snake moved along slowly; its writhing body cleft deep furrows everywhere in the form of creeks and rocky gutters.* (Strehlow, 1947)

> *As the canoe travelled north, Shivree (Silver Gull) left* wongai *trees: he had left all the black plum* wongai *south of Weipa [Queensland]; after Weipa he left all the red plum* wongai. *Shivree kept on making rivers with his boomerang.* (Trezise, 1965)

> *A long time ago, the blue wren (White-winged Fairy-wren) (Yuduyudulya) set out on a journey and came out on the ridge of a low hill. He went along the ridge for a little way. Standing on the ridge and facing Mount Chambers [South Australia], with his left hand blue wren threw a comeback boomerang… This boomerang went right through the mountain making a big gap in it. It went on southward and blue wren waited for it to turn around and come back to him. It spun around towards the west; but, on the way back, it hit the mountain and stopped there. You can still see it sitting up there on the top.* (Tunbridge, 1988)

There are stories that lead to destruction; but these also have a moral – for example, the first is a warning to children not to stray from camp, while the second is told to girls to depict what may happen if they don't accept their promised husband and is an example of a story demonstrating one of many social customs:

> *Jikirdijikirditj (Willie Wagtail) is cheeky because he calls out to people, including children: 'Follow up, follow up.' If anyone does follow him, he leads the person towards a cave, calling all the way: 'Follow up, follow up.' When the Jikirdijikirditj and the person get close to the cave, Mimis, the spirits of the ancestors who live in the cave, come out and grab the person who is dragged into the cave. The Mimis take the person's memory away from him. He is given food; but all of it must be raw: raw kangaroo, raw goanna, fish,*

> *goose, echidna. The person must stay in the cave forever unless the Gudang (Aboriginal Magic Man) can intervene. He gets some ironwood or other tree and takes it inside the cave and burns it. He tells some stories to the Mimis and the boss Mimi will let the person go. Parents tell their children not to follow that Jikirdijikirditj.* (Wynjorroc et al, 2001)

> *There was a man who was promised to a young girl; but the young girl didn't want to marry him because he was too old. Her parents told her to sleep with him but she wouldn't and cried. Each day the man would go out to get food. He would bring back sugar bag and kangaroo. The girl's parents told her that she should eat the sugar bag the man brought back for her; but she wouldn't and just cried because she was frightened.*
>
> *One day when the man came back from hunting he saw the young girl with a young boy and it was clear that he was her boyfriend. One time when all the clan was asleep in a cave, he went outside and got some kunjak (white clay that has all kinds of sicknesses in it). He put that kunjak on the fire and poisons started coming out of it. With the help of a feather, the man directed the smoke into the cave. All the people started coughing and then all the people died. At that moment, the man turned into a Torresian Crow and started flying south, saying: 'Wak, wak, wak.'* (Nganjmirra and Tidemann, 2005)

Amongst all the stories found so far, there is only one that talks about immortality; but perhaps this was only a concept after the arrival and influence of missionaries:

> *One day, a young cockatoo (Kuthuwarr) fell from a high tree and broke his neck. There he lay, dead. All the animals gathered around him to try and wake him. They touched him with a spear, but he could not feel. They opened his eyes, but he could not see. The animals were completely mystified for they did not understand death. Then all the Medicine Men tried to awaken the cockatoo, but they failed.*
>
> *A great meeting was called to discuss the mystery of the dead cockatoo. First of all, the owl, [who] with his great big eyes was supposed to be very wise, was called upon to explain this mystery; but owl (Kroulthumie) was silent. Then the eagle hawk, the great chief of the birds, was asked to explain this great mystery of death. The eagle hawk took a pebble, threw it out into the river and all the huge gathering saw the pebble strike the water and sink out of sight: 'There is the explanation of the mystery; as that pebble has entered another existence, so has the cockatoo.'*

However, this answer did not satisfy the gathering; so they next asked the wicked but knowledgeable crow to explain. The crow stepped forward, took up a small hunting weapon and threw it out into the river. It sank and then gradually returned to the surface again. 'There', said the crow: 'We all go through another world of experience and then return again.'

This explanation impressed all the tribes and the great eagle hawk asked: 'Who will volunteer to go through this other experience to test it and see if it is possible to return again?' The hibernating animals offered; but when they returned after winter, the eagle hawk said: 'You have all returned in the same form as you went out, although the snake has half changed his skin. You have failed to solve the mystery.'

At last the insect tribes – the moths, grubs and caterpillars – volunteered to solve the experience and mystery of death. All the other tribes, especially the Kookaburra, laughed at this because the insects had always been looked upon as ignorant and inferior. The insects, however, persisted, so the eagle hawk gave them permission to try. The tribes then dispersed until the following spring.

The day before the time fixed for the return of the insects, the eagle hawk sent notice for all the animals to gather. At daybreak, all the animals were out to witness the pageant of new forms arrive. The wattle put forth all its wonderful yellow, the waratah its brilliant red and all the other flowers their glorious shades. Just as the sun rose over the tops of the hills, the dragonflies came, leading an army of gorgeous-coloured butterflies. Each colour and species of butterfly came in order. First the yellow came up and showed themselves to everybody. They flew about and rested upon the trees, the wattle and the flowers. Then came the red, the blue, the green, and right through all the families of butterflies.

The animals were delighted. They gave great cries of praise and admiration. The birds were so pleased that, for the first time, they all broke into song. All nature looked its best. When the last of the butterflies had entered, they asked the great gathering: 'Have we solved the mystery of death? Have we returned in another form?'

All nature answered back: 'You have!' (Unaipon, 1926)

Despite the importance of tools, there is only one account of a bird involved in tool-making. Interestingly, there was no naturally occurring stone suitable for tools where this story originated, nor were the axe heads (that were found on the ground) known to have been acquired by trade:

> *The Large-tailed Nightjar is the maker of stone axe-heads. The bird puts it on the ground and it keeps the axe right there. Then a person finds it and takes it away and puts it into a handle. That bird calls at night time. It calls like chopping a tree. It chops (tok tok tok). At night time one hears it. It's making an axe-head, a stone axe.* (Alpher, 1987)

A number of bird species are known to be messengers – for example:

> *A Grey Fantail came to a man sitting on a log and was saying: 'Guri djugi, guri djugi.' The man took no notice of him, so the Grey Fantail said: 'Ts-ts-ts-ts-ts ... guri djugi, guri djugi.' The man turned around and said: 'A man is coming from the west, a man is coming soon? I understand. I understand what you mean.' The Grey Fantail can talk language and comes with messages if anything special is going to happen and warns of dangers.* (Holmer and Holmer, 1969)

There are many stories from across the continent that describe the origins of morphological features as well as plumage that we recognize as being diagnostic characteristics for the species concerned:

> *A long time ago, there lived an Emu and a little native rat who camped side by side and always travelled around together. Emu had no family and rat had one little baby. One evening a big storm came up just as they were going to camp for the night. Rat quickly made a good waterproof wurley for herself and her baby and they were soon warm and dry. The Emu tried, but she couldn't make a camp that would keep out the rain and couldn't get a good fire going. Just as she was about to have one more go at making herself a good camp she saw rat leave hers, with her baby in her pouch, to go across the creek to pick up some more wood. She waited until rat was out of sight, then went straight into rat's camp, determined to stay there.*
>
> *When rat came back she complained and asked the Emu to move out. But the Emu had no intention of going anywhere. She was bigger than rat so wasn't afraid of her. 'You shouldn't be in my camp', said rat: 'Let me in, my baby's getting wet.' 'Oh, don't worry', said Emu: 'It's not going to rain much.'*
>
> *When the little rat saw how it was, she asked the Emu for her wooden dish. She went away and made a big fire. Then she filled her dish with red hot coals, went back to the Emu, who, by now, was fast asleep, and emptied the coals on Emu's chest. The Emu woke up and chased the rat, who had to run for her life. At last she was saved by crawling into a little cave. Emu was determined*

to get rat. She scratched madly at the rocks to try to reach the rat, but only cut her own feet on the sharp flint stones. Before that, Emus had feet like us, but now they have two large cuts which split their feet into three parts. (Tunbridge, 1988)

In the Dreamtime came a great war. It is said that the brown snake began the war and that there was much fighting. One day, the creatures that were not fighting on the side of the brown snake held a solemn conclave to discover some way of getting rid of him, for they realised that if he were killed, the war would soon come to an end.

'But how are we to be rid of such a great warrior as the brown snake?' said the creatures. 'Who will spear him to death?' 'I will spear him to death', said the (Nankeen) kestrel. He picked up his spear and went out to kill the brown snake. The kestrel could fly very swiftly and could hover over his enemy, as well as fly above his reach.

The war soon became a duel between the brown snake and the kestrel and great was the joy of creatures when the kestrel killed the brown snake. But then the question arose: 'Who will carry the brown snake back to his tribal grounds for burial?' The only one who could do this was the little black wren. To this day, you can see the red feathers on the wings of the Red-backed Fairywren. They were stained with blood from wounds the brown snake received when it was killed. (Norledge, 1968)

The crane (White-faced Heron) was a great fisherman. He used to hunt out the fish, with his feet, from underneath the logs in the creek. One day, when he had a great many on the bank of the creek, a crow, who was white at that time, came up and asked for some fish. 'Wait a while', said the crane, 'until they are cooked.' But the crow was hungry and impatient and would not cease bothering the crane.

Presently the crane turned his back. The crow sneaked up and was going to steal a fish. The crane turned round, seized a fish and hit the crow right across the eyes with it. The crow felt blinded for a few minutes. He fell on the burnt black grass round the fire and rolled over and over in his pain. When he got up to go away his eyes were white and the rest of him black as crows have been every since.

The crow was determined to pay back the crane, so one day, when he saw the crane fast asleep, he crept quietly up to him holding a fish-bone. This he stuck right across the root of the crane's tongue. Then he went off as quietly as he had come, careful, for once, to make no noise.

The crane woke up at last and, when he opened his mouth to yawn, he felt like choking. He tried to get the obstruction out of his throat. In the effort, he made a queer scraping noise, which was all he could give utterance to. The bone stuck fast. And to this day, the only noise a crane can make is 'gah-rah-gah, gah-rah-gah'! (Parker, 1898)

The Ngindyal was a bird-like animal having the shape and feathers of an Emu but of enormous proportions and was, moreover, a great magician. She had a nest containing only one egg on which she sat. She used to kill and eat all the people she could catch. One day a crow came prying about and the Ngindyal ran after him in a furious manner, but the crow escaped.

Shortly afterwards, the crow chanced to meet the Brambambult brothers, whom he told about his adventures with the Ngindyal. They begged him to come and show them the place and the three of them started off. They travelled until they saw what they thought was a bright star shining. The crow said: 'That is her eye. She is there, sitting on her nest.' The brothers left the crow and advanced on the foe. The elder brother was quite close and hurled a spear, which caught the Ngindyal in the breast. She immediately turned round and rushed at him, giving the younger brother an opportunity of throwing a spear. They kept throwing spears alternately until the Ngindyal was considerably subdued by pain and loss of blood. The lark came out, hiding behind a bough he carried in front of himself, and cast a spear with all his force, striking the Ngindyal in the chest and killed her.

The Brambambults then split each feather of the Ngindyal down the middle, casting one half on the left, making two heaps. One of these heaps of feathers was converted into a male and the other heap into a female, of the present race of Emus, which are incomparably smaller than the Ngindyal. It was also arranged by the sorcery of the Brambambults that all future Emus should lay a number of eggs instead of only one. The splitting of the feathers is still easily observable in the feathers of all Emus; they consist of two independent shafts. (Mathews, 1904)

The Emu and the crow were man and wife and lived in a hut. One very wet day, they remained indoors and the Emu, who was addicted to kicking his legs about, lay on his back on the floor to pass the time and kept kicking at the roof. After a while, he struck a weak spot and made a hole through which the rain beat in. He was too lazy to go and repair the damage, but sent the crow out in the wet to patch the breach in the roof. The Emu continued his play of kicking upward and, presently, made *another hole which the crow had likewise to go out and repair. This continued for some time till the crow became exasperated and, taking a piece of bark, scooped up some hot coals from the fire and threw them on Emu's chest as he lay on his back, disporting himself by kicking at the roof. This burnt his breast so severely that even to the present time there is a callous dark patch on the breast of the male Emu. Moreover, Emus continue the old habit of kicking upward with their legs when they are rolling themselves in the sand or elsewhere to clean their feathers.* (Mathews, 1908)

Jawayak-wayak (Black-faced Cuckoo-shrike) had a sore foot because it had a boil on it. Wakwak (Torresian Crow) went and burst the boil and, as he did so, pus flew up and into his eyes so that now Wakwak has white eyes. After that, Jawayak-wayak went and killed a kangaroo; but the other birds carried it because he still had a sore foot. They took it back home and set up a roast to cook it. Jawayak-wayak told Detdet (Rainbow Lorikeet) to take a slice of meat from the kangaroo and then fly away. He put a big slice of meat still hot and a bit raw on his back. Juices from the meat ran around onto his chest which became a reddish colour and is still like that to this day. He also told Weley (Red-winged Parrot) to take a piece and put it on his wing, which became reddish and stayed red until even now.

When old lady Durrk (Emu) came back she was cranky about the kangaroo being eaten. She had collected munmun grass that she was planning to make into soup for everyone. She was so cranky that she made the munmun grass into her feathers and said that from then on she would never fly again. She put the digging stick into her mouth and down her neck: that's how she came to have a long neck. She also swallowed a big stone that got stuck in her throat near her heart and when she fluffs those feathers out you can still see that stone. (Wynjorroc et al, 2001)

An Emu was hatching her eggs in close proximity to Dusky Moorhen. By and by, both birds proceeded to walk along the grass in search of something to eat and, in the evening, returned to their respective nests. But on the following morning, the moorhen got up somewhat earlier than usual and went her way. The Emu, seeing her neighbour's eggs, shifted from her own nest and sat upon them. As the afternoon drew on, the moorhen returned home and saw the Emu appropriating her eggs but, being so much smaller, she could not turn her away. So she built a large fire and threw the ashes over her opponent, who thus got all her feathers browned; in retaliation, the Emu threw the moorhen *into the flames and burned her legs, which resulted in their turning red.* (Roth, 1903)

The Southern Boobook came across a bed of sweet lilies and, being a greedy fellow, ate them all himself. He never said a word about it to his wife, Magpie Goose. She, however, found out about it and set about discovering the place where the lilies grew. She at last succeeded in locating the spot. The boobook happened to be in close vicinity when his wife got there and, picking up a piece of quartz, threw it at her, hitting her on the head and killing her. Where the goose was struck, a bruised swelling developed and persists to this day. Her mates decided to avenge her death and shortly after, came to the camp where the boobook was resting. Close by were some hot ashes on which the lily roots were being roasted. The geese disarmed all suspicion by offering to pick the fleas off his beard. Delighted at this, the boobook sat back calmly with his eyes closed and opened his mouth to receive each flea as it was caught. His demeanour suddenly changed to one of astonishment and rage when the geese put into his mouth a piping hot lily, surreptitiously taken from the ashes. This caused his mouth to burn and swell, and accounts for his appearance today. (Roth, 1903)

Emu saw that two women had fire. He thought he would steal it to warm himself. He came up, stole the fire and returned to the river, the fire hidden beneath his wings, for Emu then had big wings and could fly. Chickenhawk was coming along and saw Emu making fire. Down he flew, snatched the fire and burned the grass. Emu was burned too, which is why Emus now have small wings and are black, brown and grey. (Maddock, 1969)

Old Black Kite was down at the waterhole catching fish. He saw the two young magpie men coming along on a hunting trip. Before the young men came near, old Black Kite hid the fish that he had caught in his paperbark basket. The young magpie men asked kite for some food and he gave them a goanna tail to eat, but did not say anything about the fish. The goanna tail smelled bad, it was rotten; so as soon as old kite looked away, the magpie brothers covered it over with sand. After talking for a while, the young men went on their way hunting.

Kite was preparing to cook his fish in a ground oven when he saw his dog digging something out of the sand. He went over and found the goanna tail that he had given to his grandsons. Kite was very angry with the young men because he could see nothing wrong with the goanna tail, although it smelled a bit. He decided to put a curse on the magpie men who, at that time, were all

> *black and had no white in their hair or beards. 'From now on all men will get white hair and beards as they grow old.' Thus the magpie has now got a lot of white among his feathers and all men grow white hair as they age. Because of his meanness in not sharing his fish with his grandsons, all the other birds said: 'All right, from now on, old kite, you will not be able to catch fish and you will have to find and eat dead flesh that smells.' Since that time, Black Kites have been eaters of dead flesh following bushfires to find it.* (Trezise, 1965)

Australian Aborigines have known of the visual acuity of raptors for a long time. For example:

> *The hawk volunteered to perform the work of procuring fire alone and unaided. He flew up so high into the air that, being small but possessed of extraordinary powers of vision, he could see what was going on down below without being seen himself.* (Cameron, 1903)

Stories about the weather, including earth tremors, thunder, rain as well as forecasting and the roles of birds abound:

> *When Bukbuk's (Pheasant Coucal) mate lays eggs, no one goes and touches her eggs. If anyone touches the eggs, Bukbuk makes rain like a monsoon. If the eggs are taken away, the monsoon continues until the eggs are returned.* (Nganjmira and Tidemann, 2005)

> *Long, long ago Waitch (Emu) was blown up into the sky by a great wind; but when she got there she found no place to rest. She went to the moon and tried to rest between its horns, but in a few days it became fat and round and squeezed her out. She then went to the sun, but the natives in the sun told her that they did not want her because she talked too much. She next went to the stars and asked them to give her a camping place.*
>
> *Now the stars have the duty of holding up the Earth. They have to stay very close together and cannot move about to hunt or play for fear that the Earth may fall. They had become tired of staying in the same positions for so long and decided that if Waitch would assume part of their load they would provide camping space for her. Waitch agreed to this and the stars spread out at the place where they were thickest and gave her a place to settle down between them.*
>
> *After a while, the stars became cunning and moved a little farther apart, thus giving Waitch a greater share of the Earth's*

weight. Waitch was afraid to grumble too much for she had no other place to live. When the stars found that Waitch was able to bear more of the load, they moved farther apart and, little by little, shifted the entire weight of the Earth to her back. Sometimes Waitch becomes so tired that she drops a little bit and it looks like a star falling down, but she is afraid to do this too often. When she becomes very, very tired, she groans and moves a part of her load from one wing to the other. She does that when the weather is hot and that is the time when one hears her groaning. Sometimes when she moves her load, she does it with a jerk and then the whole Earth trembles. She is frightened to move this way too often, so usually she shifts it gently and grumbles and growls while so doing, making thunder. If she makes too much of a fuss the natives in the sun become angry and make everything dark or send out flashes of light to frighten her and to make her quiet. When Waitch becomes scared, she begins to cry because her load is so heavy and her tears come to the Earth in the form of rain. After a crying spell, she usually settles down for a time. Occasionally the stars cluster together and take a little of the load off her back; but they do not do this often for they are afraid that if they get too close together, Waitch might make a jerk and transfer the Earth entirely to them again. (Hassell, 1934)

The arrival of the migratory Gurawuran (Channel-billed Cuckoo), a very noticeable bird with a raucous cry, heralds not only the imminent wet season, but also the time when 'sugar leaf', a type of manna found on the leaves of some species of eucalypt, may be gathered. (Kofod, 1985–1986)

Across cultures, owls are regarded as wise and the following story describes how the owl obtained that wisdom:

The sun was down and Yindingie had finally finished making the animals. He had told them what to eat, how to hunt and in which areas to live. They had gone excitedly off to their new homes and it seemed that they were all satisfied, except the birds, who had squabbled and argued all day. Some were jealous of another's feathers or song or type of nest. Yindingie was very tired, but he noticed a bird sitting quietly just beyond his fire.

'Come over here', he invited. 'Have I forgotten to give you something? I do not remember you', said Yindingie thoughtfully. 'What did I call you?'

'You have not called me anything yet, sire,' replied the bird shyly. 'All the other birds were making such a fuss, I thought I would not bother you', explained the bird.

Yindingie answered: 'You have been so patient; I will fix you up now.'

So Yindingie went over to the tree where he had hung up his dilly bags and brought them back to the fire. He looked through the bags for a time and then he said: 'Well, I'm afraid there does not seem to be much of anything left. Firstly, you will have to be a night bird because all the places for day birds have been taken.'

'Oh that does not matter', said the bird. 'I will not mind being a night bird.'

'I'm afraid that there are no pretty feathers left – just brown and grey and black.' So Yindingie fitted the bird out with what was left in his dilly bags. While he was telling the bird how to build his nest and what kind of food to eat and how many eggs to lay, he suddenly said: 'Wait a minute. There is another bag somewhere.' He returned with another dilly bag, which seemed to have more in it than the others.

'This', he said, 'is the bag of intelligence. Some of the birds were interested in it but most were so anxious to be off they took only a small amount. If you like, because you are the last one, you can have all the intelligence that is left in the bag. And your name is "Goongingore" (owl).' And that is why the owl is the wisest bird in the bush. (Miller, 1994)

These stories show the great importance of birds to Australian Aborigines because stories about them are numerous, so numerous that they outnumber those of any other group of animals. All language groups had stories about birds, and these were used for a variety of purposes, some for entertainment, but many for conveying a message to the listeners. These messages were about social mores such as a girl accepting her promised husband, the respective roles of men and women, or the inter-relationship between birds and food availability, such as the link between the Channel-billed Cuckoo and the availability of manna. The stories contain biological information, albeit in a different form from that expressed in Western bodies of knowledge, which can complement that collected during more formal scientific studies, and it is certainly worth the effort to explore this old knowledge to ascertain what might be revealed to enhance current studies in ornithology. Moreover, it might be well worth the effort for ornithologists to assist in the preservation of such knowledge that may not have yet been recorded before it is lost to the host language groups. It is not known how much of this old knowledge has already disappeared across the continent prior to being handed down or transcribed.

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We wish to acknowledge the generosity of the Aboriginal people who shared their stories with us and to all those who, in the past, were willing for their stories to be recorded and had the faith that they would be afforded the respect that they deserved.

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13

Tlingit Birds: An Annotated List with a Statistical Comparative Analysis

Eugene S. Hunn and Thomas F. Thornton

A list of names for birds in Tlingit (from throughout south-east Alaska) is analysed for their 'descriptive force' and examined to reveal distinctive Tlingit understandings of the non-human world. Measures of correspondence between the categories of birds recognized by the Tlingit, a sample of other folk ornithological inventories, and academic avian taxonomy are applied.

Introduction

Ethno-ornithology is most succinctly defined as the comparative study of the knowledge of birds held by human communities throughout the world. Most often, such studies describe what is more or less common knowledge within an indigenous community – that is, a community deeply rooted in a particular place and intimately engaged with the local natural environment. An ethno-ornithologist may emphasize various aspects of local bird knowledge. A typical foundation is laid by listing native language names for birds with approximate translations of those names with respect to the scientific names in Latin to which they are presumed to correspond most closely. This may require close collaboration of a professional ornithologist (to characterize which species occur), a linguist (to record the local names in a phonemic alphabet), an ethnographer (to record local knowledge of the birds named) and indigenous experts (to point out the birds named, to pronounce their names and to detail in the native language what is known about each bird). Such an inventory could describe dozens of birds (see Table 13.1, page 204), with information about where and when the birds may be found, what they look and sound like, what they eat (and what eats them), accounts of nesting activity, and perhaps mythological and moral accounts of each. Such an ethno-ornithology is *descriptive*. The only analytical component is the correspondence of the local names with modern scientific taxa. A more *analytic* ethno-ornithology would attempt further to compare not only what is known by the local community, but also what is not known and/or disregarded by the community. This may provide a more accurate assessment of local knowledge with respect to the detail recognized by professional ornithologists, and beyond may allow meaningful comparisons of the level of expertise elaborated upon in various communities around the globe. Both approaches are addressed in this chapter.

Who are the Tlingit?

The Tlingit occupy the Pacific north-west coast of North America and the south-east Alaskan Alexander Archipelago, with interior segments of the group, known as Inland Tlingit, inhabiting parts of north-western British Columbia and south-western Yukon Territory. There are approximately 20,000 Tlingits today, with most still living in the region. This chapter focuses on the northern coastal region, from Frederick Sound north to Cape Suckling, encompassing the majority of contemporary speakers of the Tlingit language, of which there are perhaps 500 in total, most over 65 years of age. This region encompasses a significant part of the world's largest temperate rainforest, the Tongass National Forest, dominated by conifers such as Sitka spruce and Western hemlock, glacial forelands and high coastal mountains, and encompasses one of North America's largest protected areas, a World Heritage site: Glacier Bay National Park and Preserve. Central to this region is Xunaa K̲áawu (Hoonah Tlingit Territory), where the bulk of interviews were conducted. Xunaa, 'In the Lee of the North

Wind', is a descriptive name for the main village's location in Port Frederick, where birds and humans alike have long found safe harbour from powerful north winds. Xunaa Káawu is one of more than a dozen kwáans or 'dwelling areas' that comprise south-east Alaska, most being centred around traditional 'winter villages', which became permanent towns after the American purchase of Alaska from Russia in 1867. Oral history relates that the Tlingit settled in Xunaa after being displaced from Glacier Bay by an advancing glacier (Marvin, 1987). According to archaeological sources (Ackerman, 1968; Ackerman et al, 1979), human habitation in the area extends back some 9000 to 10,000 years. Xunaa is rendered in contemporary English as 'Hoonah' and today serves as home to approximately 800 residents, mainly Tlingit. Traditionally, Tlingit communities disbursed from winter settlements to fishing camps in summer, and for many this is still the case. Although engaged in modern industries such as fisheries and tourism, these villagers are still reliant on subsistence or 'country' foods, which are produced and exchanged widely, often through traditional regional trade networks. Their diet includes a portfolio of dozens of plants and animals, especially salmon, halibut, deer, seal, and selected marine invertebrates and berries, but also various birds and bird eggs (de Laguna, 1972; Emmons, 1991; Hunn et al, 2003). Although birds play a comparatively minor role in the Tlingit diet, they are important in lean times and shoulder seasons, such as early spring, when top-ranked prey such as salmon are less accessible. Birds are also critical indicator species for these hunter–fisher–gatherers because they signal the presence and movements of fish, changes in weather and other salient ecological phenomena.

In addition, birds feature prominently in Tlingit social structure, which is built around dozens of matrilineal clans arrayed in two ritually opposed avian moieties, the Ravens and the (Bald) Eagles. These exogamous and matrilineal moieties constitute two reciprocating super clans. Children inherit their clan and moiety affiliations from their mothers, but must marry from the opposite moiety. Similarly, when Ravens host a party or 'potlatch', the pre-eminent ritual of north-west coast indigenous peoples, it is the Eagle clans who are guests and vice-versa. Members of Raven clans may feel a particular loyalty to the Raven and likewise for those of Eagle clans, though it is a friendly rivalry. In totemic fashion, bodily adornment, dances, names and titles may reference one's clan or moietal affiliation (see Figure 13.1 and Plate 13). Furthermore, clans, or their subdivisions, known as house groups (because the sub-lineages typically dwelled together), maintain their own sacred designs (crests) and symbolic property, which may also reference birds. For example, Black-legged Kittiwakes, *Rissa tridactyla*, are an important crest of the T'akdeintaan clan of the Raven moiety, whose female members often imitate their call on ceremonial occasions to symbolize the clan's historical affiliation with these birds. Once, a flock of Kittiwakes called out to a group of T'akdeintaan, temporarily lost at sea, to signal the way ashore; the story is illustrated on a dance blanket and other clan property (Thornton, 2008). In these and other ways birds are intimately and intricately inscribed onto Tlingit identity.

Source: T. Thornton

Figure 13.1 *Photo of Al (left) and John Martin holding the button blanket symbolizing the story of Raven climbing the bull kelp*

Correlative to their prominence in the social structure is the prominence of birds in myth. The central cycle of myths in the Tlingit corpus revolves around Raven, the trickster-demiurge whose mischievous deeds helped to transform the cosmos and organize its inhabitants (including birds) into their present forms, and whose fortunes and misadventures yield innumerable life lessons on livelihood skills, social responsibility and the consequences of selfishness, greed, deceit and violations of natural law (*ligaas*, or 'against nature'). Raven is neither God nor the devil, but rather a cosmic actor who reshapes existing elements of the universe by accident more than design as he pursues his own narrow interests. He outsmarts other beings, but is himself often outsmarted and suffers the consequences. He embodies the full spectrum of human capacities and foibles, both good and bad. His stories illustrate, above all, the animistic moral-ecological world that Tlingits inhabit in which non-human actors, whether they are Cormorant, 'the Old Woman of the Tides' or Brown Bear, respond to other actors according to a covenant of reciprocity and respect, which when violated can produce personal, social and even cosmic repercussions.

An abbreviated version of the story 'Raven climbs down the bull kelp' is illustrative of the genre:

… in Tlingit they refer to the Raven as Geesh Daax Woogoodi Yéil *[Raven that Climbed Down the Bull Kelp]. In the stories about our people near Yakutat, we were one Raven group with the Cohos, L'uknax̲.ádi [clan] and T'ak̲deintaan. We have the same grandfathers. The way we tell about origin about our people is we have similar names on the Raven side that are closely related: the original inhabitants of Southeast Alaska. We had a lot of people that had a difficult time in early years gathering food. Some winters are very bad, especially when our food was limited. When grandpa was telling me the story, there was hardly any food. The people were hovered in the villages and trying to think of ways and trying what kinds of food that they could actually eat [and] put up for the winter. When Raven appeared before our people, that's when the Raven spoke:* Yagéiyi atx̲ á áyá a gookt yeek éen. *That means: 'You folks are sitting at the verge of a great amount of food. Why are you hovered and starving when the table is at your backyard?'… So he told them that he's going to show them the way. He then proceeded to climb down the bull kelp. And he told them that there was a large plug at the bottom underwater that he was going to release so the water would drain out: he was letting them understand the process, how this [tide] works. In those times, our people didn't understand the kinds of food that were edible and the kinds that were poisonous. So he proceeded to have the water drained, and then he proceeded to take inventory with the people… He started to name the different kinds of food: the crab, the black cod, the king crab, the gumboots. They were so numerous, the kinds of food that were just tremendous. He spoke about the sea urchin,* nées', *and the flounders,* dzántí. *Then he told them the kinds of food that were not edible [at] certain times of [the] year. And even today we understand that our people never eat red snapper liver. And he told them that the red snapper and the bullhead had poisonous tentacles. He showed them octopus and how they actually would prepare the food: skin the octopus, and turn the octopus's belly inside out. He showed them many ways to prepare the food … he didn't take one day or one hour. It took an abundance of time. When this was over, the word spread among our people and our people in the village, even though it was Raven village, we had Eagles among us that also spread the word. So our people are notorious. They knew that when this was all said and done, that's the time for celebration of the feast we call* ku.eex' *[potlatch; literally 'invite']. Today we still have the clan crest on our* at.óow, *our blanket [see Figure 13.1 and Plate 13] and also our vests. The raven that climbed down a bull kelp …* Gunalchéesh. *Thank you for listening.* Yei Aawé.

(T'ak̲deintaan elder, John Martin)

So it was Raven that taught the Tlingit people not only to survive but to flourish on their intertidal resources. Tlingits sometimes ask rhetorically: 'Where would we be without Raven?'

A descriptive ethno-ornithological sketch of the Tlingit of south-east Alaska

This sketch is based on published dictionaries and consultations with linguists, as well as informal interviews and participant observation by the authors and others over some 20 years of intermittent fieldwork in several Tlingit communities, notably Hoonah (Hunn et al, 2003). Local experts quoted are credited as follows: Jim Austin (JA), Adam Greenwald (AG), Ken Grant (KG), Sam Hanlon (SH), Charles Jack (CJ), Jumbo James (JJ), Herman Kitka Sr. (HK), George Obert (GO), Frank See (FS) and Hilda See (HS). The correspondence of Tlingit terms to scientific Latin is based on inferences from local English vernacular equivalents and accounts of the appearance and behaviour of the birds named. Unresolved ambiguities are discussed in the descriptive accounts. The bird descriptions follow the American Ornithologists' Union (1998) sequence. The inventory of local Linnaean species and seasonal distributions are based on Armstrong (1990). Tlingit understandings may or may not correspond.

Spellings of Tlingit words follow the popular coastal orthography (Dauenhauer and Dauenhauer, 1987), which employs the English alphabet to approximate Tlingit sounds, with some modifications. Uvular 'back of the throat' consonants are represented by underlines under the letters g, k and x. Apostrophes after consonants represent 'pinched' or glottalized sounds, and a complete glottal stop may be signalled by a full stop within a word. Tlingit also has long and short vowels, the former being symbolized by a doubling of the vowel (e.g. aa, as in 'Saab'). The accent over the vowel indicates a high tone.

Birds and their glosses

át kawdliyeeji át, 'bird'/'fowl', may be used in two senses as a general term for grouse (i.e. 'fowl') and to refer to all birds. This suggests that grouse may be seen as prototypical birds. If a bird enters your house it is a sign that something bad will happen (FS).

1 ***t'aawák̲***, Canada Goose *Branta canadensis*, is probably onomatopoeic and commonly known as the 'Canadian goose', 'honker' or 'goose'. A large, dark-bellied non-migratory race of Canada Goose *Branta canadensis fulva* nests in south-east Alaska. Two additional subspecies of Canada Goose plus three forms of the smaller Cackling Goose *Branta hutchinsii* pass through on migration. There is no evidence that Tlingit differentiate between the various forms of Canada Goose and Cackling Geese, though Tlingit note that some Canada Geese are year-round residents while others are passage migrants. Tlingit harvest eggs of the resident Canadas but

prefer to hunt southbound migrants or wintering birds, which, in the past, might be caught in snares or killed when trapped in ice. Today goose may be served as the main dish for Thanksgiving and Christmas feasts. Some places are defined by the presence or migratory appearance of this bird, including the Taku River, from T'aawák K̲'u, 'Where the Canada Geese Flood', a reference to the rich glacial forelands and shallow lagoons near the mouth of the river corridor between the south-east Alaskan coast and Canadian interior, where Canada Geese used to gather in great numbers (Emmons, undated; Nyman and Leer, 1993).

2 ***k̲ín***, Brant *Branta bernicla*, migrant, most common in spring along saltwater shores; rare at other seasons. Nests in tundra to the north and north-west. ***k̲ín k̲wáani*** refers to a 'flock of migrating ducks', though perhaps it refers to a Brant flock or a flock of scoters ('black ducks' in the local vernacular), which are often found in bays and estuaries. In the local vernacular, 'brant' may refer also to the Greater White-fronted Goose *Anser albifrons*, and 'brant' may have either black (Brant) or yellow (Greater White-fronted Goose) feet. Brant are hunted and eaten, and are said to taste much the same as Canada Geese. Their spring appearance is associated with the return of key fish species, such as herring and spring salmon. Snow Geese *Chen caerulescens* are known by their English name and 'stop by' occasionally.

3 ***gúk̲l'***, Swans *Cygnus* spp. The Trumpeter Swan (*C. buccinator*) nests rarely and is uncommon spring and autumn, rare in winter, though it may be found consistently in some areas as indicated in several Tlingit place names. The Tundra Swan *C. columbianus* nests to the north and is a common autumn migrant, uncommon in spring, rare in winter. There is no evidence that Tlingit distinguish between the two, though the Tlingit name might more closely mimic calls of the Trumpeter Swan. Big flocks of migrating swans sometimes stay a week or two. They are hunted for their meat and feathers, both highly regarded. The name 'swan' is a noble name or title among certain Raven clans, such as the T'ak̲deintaan. Swan, brant and goose are all crests of Tlingit Raven clans.

gáaxw, ducks (28 species occur regularly, 15 common, 7 uncommon, 6 rare; 19 species nest), and includes White-winged Scoters and goldeneyes (see below). Bays, coves and shorelines are often inhabited or frequented by several species of ducks.

4 ***Kindachooneit***, Mallard *Anas platyrhynchos*, means 'going straight up', descriptive of how Mallards leap into the air when flushed, in contrast to the 'airliner'-style take-off of larger waterfowl. This duck is common all year, nests on the ground near fresh water and forages in tidal areas and adjacent shores. The local term 'mallard' may be used to refer more broadly to include Green-winged Teal *Anas crecca*, Northern Pintail *Anas acuta* and/or Canvasbacks *Aythya valisineria*, among others, as targets of

local hunters. Ducks are hunted with shotguns or sometimes caught when frozen in ice, said to have happened more often in years past when winters were colder than they are today (AG). Some local hunters prefer migratory Mallards, complaining that local nesters taste 'fishy' (CJ).

5 ***atsik'íye***, variously identified as a Canvasback *Aythya valisineria* (uncommon), scaup *Aythya marila*, *A. affinis* (both common) or teal *Anas crecca* (common), *A. discors* (uncommon), *A. cyanoptera* (rare). The local term 'bluebill' most probably refers to the scaup, considered to be an important gamebird. Rafts of hundreds might shelter in bays in stormy weather; 20 to 50 birds might be killed by a single shotgun blast when in such rafts.

6 ***s'elasheesh***, a 'flat-headed duck', identified as a teal or perhaps a scaup (Leer, 1995), but a teal is more likely (see above, ***atsik'íye***).

7 ***s'ús'*** or ***hinyík k̲áawu***, Harlequin Duck *Histrionicus histrionicus*, nests in swift-flowing streams but for the rest of the year is common along rocky saltwater shores. The latter name means that it 'lives in a river' (CJ). Not a favourite target, but may be hunted for their meat and colourful plumage. 'This is a species of duck said always to be seen sitting on rock in rivers. It makes a cry, *sus*', when alarmed … not with his mouth, but with his wings when he starts to fly up' (Leer, 1995).

8 ***yaa.aa.uné*** or ***aa.aa.uné***, Long-tailed Duck *Clangula hyemalis*, 'oldsquaw' or 'pintail' locally, probably onomatopoeic, though it may be interpreted in Tlingit as 'This is my country'. Common most of the year, preferring inshore marine waters. Scarce during the nesting season, retreating to tundra habitats. Arrive in late October but thin out in mid winter. Feed in deep water where they may be caught by baiting them as they dive, causing them to drown (CJ).

Scoters *Melanitta* sp., Black Scoter *M. nigra* (uncommon), Surf Scoter *M. perspicillata* and White-winged Scoter *M. fusca* (common at all seasons). None nest locally. All are large, mostly black ducks of inshore marine waters: 'great big ones … like a Mallard [but] black and two times longer … we ate a lot of those … the meat is very dark … in blood duck stew' (FS).

9 ***lak'eech'wú***, Surf Scoter *Melanitta perspicillata*, common in south-east Alaska and frequently observed in the vicinity of Tlingit settlements and fisheries, including at Hoonah. Scoters are associated with the migration and presence of fish, especially Pacific herring, which they follow in great flocks on a 'silver wave' north as various stocks spawn between March and May each spring when they can be observed 'forever splashing', one interpretation of an alternative name ***tlakwch'ísh*** ('forever splashing') (also interpreted as naming the Rhinoceros Auklet; see below). However, 'forever splashing' is probably a folk etymology (though an accurate description of the bird); the literal translation is 'white nape (of neck)' (J. Leer, pers comm, 2009), characteristic of the male Surf Scoter.

10 ***wak̲kals’óox̲’ gáaxw***, White-winged Scoter *Melanitta fusca*, a *binomial* with the general term for duck, or ‘black duck’, as the head element. The name literally means ‘slanty-eyed duck’ (J. Leer, pers comm, 2009).

11 ***hinyik-gáaxu***, ***lingit-gáaxu***, goldeneyes, probably includes both the Common *Bucephala clangula* and Barrow’s *Bucephala islandica* Goldeneyes. Both are common except during summer. The name appears to incorporate a variant of ***gáaxw*** ‘duck’ as the head element, thus ‘river duck’. The Common Goldeneye nests rarely while Barrow’s nests somewhat more frequently; both use tree cavities.

12 ***hintakx’was’gi***, Bufflehead *Bucephala albeola*. Common, though nearly absent in summer. This might be the species known locally as the ‘dipper bottom’, descriptive of how they flash their white bellies when they dive (JJ).

13 ***chaax̲*** or ***k̲aax̲***, Red-breasted Merganser *Mergus serrator*. Common in all seasons; nests on the ground near water; otherwise partial to inshore marine waters. Preys on salmon eggs; came to be seen by some Alaskans as ‘pests’ and were often shot. Some Tlingits believe that they play a constructive role in salmon redds (nests) by culling ‘bad’ eggs which turn white (and are thus more visible to the birds), leaving the healthy more translucent eggs to hatch successfully (HK). The term has been variously translated as ‘hell-diver’ (commonly applies to grebes, Podicipedidae – see below – and to the Marbled Murrelet *Brachyramphus marmoratus*, Alcidae – see below) but may have contrasting meanings in different Tlingit communities.

14 ***salxúts*** or ***shalxwáts***, some kind of duck, perhaps the Common Merganser *Mergus merganser*, which is similar to the Red-breasted Merganser and common throughout the year.

Local observers report that the down of ‘eider ducks’ was valued for quilts. The Common Eider *Somateria mollisima* is the only species of eider that nests in south-eastern Alaska and is the most likely source of eider down. No Tlingit term is known.

The grouse and ptarmigan (six species, of which two are common, two uncommon and two rare; all nest; plus the domestic turkey) are classified precisely, each term naming a category in 1:1 correspondence with a scientific species, with a single exception, the Sooty Grouse, for which male and female are separately named, suggesting the exceptional cultural significance of this family of birds. Huna Tlingit consultants report that local populations of grouse and ptarmigan are much reduced since the introduction of martens *Martes americana* for fur trapping. Traditionally, grouse were an important source of food, especially in autumn and spring when fish are less plentiful. Grouse also figure as important helper species in myths; for example, grouse is said to have bolstered sea lion by putting stones in his belly (grouse also have stones in their gizzards).

15 ***kus'oolgé***, Ruffed Grouse *Bonasa umbellus*, a rare resident. Males strut and 'drum' in spring to attract the female.

16 ***ltaayí***, Spruce Grouse *Falcipennis canadensis*. A rare resident, also known in English as 'fool hen', a reference to its habit of freezing stock still in the presence of danger. This grouse does not 'hoot', but rather rattles its wings and is found further north (JJ).

17 ***x̲'eis'awáa***, Willow Ptarmigan *Lagopus lagopus*. Uncommon but permanent resident, favouring brushy margins of muskeg and tundra (local observers refer to the three species as 'ptarmigan'). They are most often hunted in winter when heavy snows in the mountains drive them down to the vicinity of Tlingit villages. They are readily approached close enough to kill with a club or stick or caught with a long-handled net when they dive into a snow bank. In summer they live on mountaintops. The pure white winter plumage is highly prized, the down used to decorate sea-lion masks for the Blanket Dance. Ptarmigan feet may be rubbed on a newborn's feet so that when they grow up they will run and jump like the nimble ptarmigan (GO).

18 ***shaayadaa x̲'eis'awáayi***, Rock Ptarmigan *Lagopus mutus*. Common all year and favours more barren ground. The name is a binomial with a variant of the name for the Willow Ptarmigan as the head element, literally 'X Willow Ptarmigan', suggesting that the Willow Ptarmigan is thought of as the prototypical species. A third species, the White-tailed Ptarmigan *Lagopus leucurus* is an uncommon permanent resident, favouring more montane conditions. 'Raven said to ptarmigan: "You will be the maker of snow-shoes. You will know how to travel in snow." It was from these birds that Athapascans learned how to make snowshoes, and it was from them that they learned how to put their lacings on' (Swanton, 1909).

19 ***núkt*** and ***káax'***, Sooty Grouse *Dendragapus fuliginosus*, 'blue grouse', male and female, respectively, indicating their cultural significance. Common all year. The name for the male imitates the 'booming' of the males in spring, as they perch high in a dense spruce or hemlock. 'Raven said to grouse: "You are to live in a place where it is wintery, and you will always look out for a place high up so that you can get plenty of breeze." Then he handed the grouse four white pebbles, telling him to swallow them so that they might become his strength [gizzard for digestion]. "You will never starve", he said, "so long as you have these four pebbles"' (Swanton, 1909). Grouse gizzard stones are saved, then woven into the lids of baskets or used in dance rattles. They make a distinctive clinking or ringing sound. The blue-grey feathers and spread tails of the males are favoured for decorating regalia. When the grouse start booming in mid March it is said to be a sign that it is no longer safe to dig clams (because of the 'red tide'). As the season progresses the male grouse gradually descend, even displaying on the ground where they are easily killed with a stick. Expert hunters also call them down by imitating the clucking sounds of the females (AG). The meat is considered choice. Birds are first cleaned

then roasted over an open fire. Some of the meat may be smoked and then stored in oil, to be served at potlatches throughout the year. When chicken meat was introduced to south-east Alaska, it was glossed as 'grouse' ***káax'***.

20 ***lugeitl'***, domestic turkey *Meleagris gallopavo*, subfamily Meleagridinae, the only non-native species that is named. Many Tlingits prefer goose to turkey at Thanksgiving.

Loons (Divers): two common species nest locally on lakes: the Red-throated *Gavia stellata* and Common Loon *Gavia immer*. The Pacific Loon *Gavia pacifica* is common outside the nesting season and the Yellow-billed Loon *Gavia adamsii*, is an uncommon winter visitor. Local observers typically refer to 'loons'. When loons call it is said to forecast impending rain. Some consider the loon to be a 'spirit bird' and, along with American Black Oystercatchers *Haematopus bachmani*, they sometimes appear on shamanic paraphernalia, such as rattles. When loons gathered in the autumn the Russian trading ship would come: these ships were thought to be loon spirits (AG). Not eaten, but could be hunted for their feathers.

21 ***kagit***, Common Loon *Gavia immer*. Silver Bay at Sitka, the centre of Russian America, is named for the species.

22 ***yeekagáaxi***, a second species of loon *Gavia* sp.

Grebes: the Pied-billed *Podilymbus podiceps*, a rare autumn and winter visitor partial to marshy lakes; the Horned *Podiceps auritus*, a common migrant and uncommon winter visitor; the Red-necked *Podiceps grisegena*, common during spring and autumn, uncommon in summer and winter, not known to nest; and the Western *Aechmorphorus occidentalis*, an uncommon visitor, absent in summer. The local term 'hell-diver' might apply to one or another (or all) grebe species, as well as referring to a species of merganser (see above) and the Marbled Murrelet (see below).

Tube-nosed swimmers: Black-footed Albatross *Phoebatria nigripes* is common offshore; the Northern Fulmar *Fulmarus glacialis* and several shearwaters *Puffinus* spp., of which only the Sooty *Puffinus griseus* is common, are rarely seen near shore. Both storm-petrels, the Fork-tailed *Oceanodroma furcata* and Leach's *O. leucorhoa*, are common nesting species, largely absent in winter. Tlingit who have worked offshore on fishing vessels are acquainted with many of these species. PR recognizes albatross, 'whale birds' (i.e. Northern Fulmar), shearwaters and storm-petrels. They are 'outside', not found 'in the inside waters', and thus have no special significance for the Huna Tlingit, except perhaps as signs of distance from their coastal homelands. 'We used to fish up and down the Gulf [of Alaska] and we'd see them [whale birds] out there.' (KG).

23 ***kichyaat***, Black-footed Albatross *Phoebatria nigripes*, 'long wings'. Though it dwells far offshore, it will, on occasion, come to the outer coast, sometimes following fishing boats.

24 ***kichyaat yádi***, Northern Fulmar *Fulmarus glacialis*, 'child of albatross'. It is possible that this term is extended to include the various closely related shearwater species (but see below) that associate with albatrosses and fulmars at feeding congregations over the continental shelf.

25 ***ts'agwáan***, a likely term for shearwater, is associated with marine mammal haul-outs by Tlingit in rocky offshore islands. Swanton (1909) recorded the term from a Wrangell man, who identified it in a Raven myth as a bird that lives far out at sea but follows Raven around all the time and undermines his reputation. So Raven says to the people: 'You may listen to this TsAgwâ'n if you want to, but you will be sorry for it. He is a man from whom no good comes. Hereafter this TsAgwâ'n will live far out at sea.'

26 ***ganook***, storm-petrels, *Oceanodroma* spp., mythically associated with Hazy Islands, the last outpost of land before the open Pacific, far beyond which the Tlingit typically did not venture.

Cormorants: three species occur, though Brandt's *Phalacrocorax penicillatus* is just a rare summer visitor. The Double-crested *P. auritus* and Pelagic Cormorant *P. pelagicus* both breed locally, the Pelagic more common and coastal. Also known locally as 'Norwegian turkeys'. Their eggs were not collected because they would not cook properly; 'they just stayed watery' (CJ). Forecast bad weather. Halibut hooks might be attached to a carved wooden cormorant 'buoy' that bobbed up and down when a halibut struck.

27 ***yook***, Pelagic Cormorant sometimes colloquially referred to as 'Chinese fishhooks'; well known because they inhabit nearly every rocky reef and waterway navigated. Cormorant got his gabbling call, a result of Raven tricking him into opening his mouth, ostensibly so he could place a louse on his tongue, only to rip his tongue out instead so he would not tell how Raven had deceitfully killed Bear. These birds were hunted occasionally for their meat, skin and feathers; but their meat was generally considered too fishy. The term ***x'adaax'aan*** may name a second cormorant species, most likely the Double-crested or the Pigeon Guillemot (*Cepphus columba*, Alcidae; see below).

Of the herons, egrets, bitterns, and their relatives, the Great Blue Heron *Ardea herodias* is uncommon all year round, typically nesting in colonies in tall deciduous trees.

28 ***lax'***, Great Blue Heron, 'blue heron'. The herons are 'always around'; a few remain at river mouths all winter (AG). They are never in large groups and are not eaten.

Diurnal raptors, including Osprey *Pandion haliaetus*, eagles (Bald Eagle *Haliaeetus leucocephalus*, Golden Eagle *Aquila chrysaetos*), hawks *Accipiter* spp., *Buteo* spp., and falcons *Falco* spp.. There is no record of names for the Northern Harrier, Sharp-shinned Hawk *Accipiter striatus*, Red-tailed *Buteo jamaicensis* and Rough-legged B. lagopus Hawks, American Kestrel *F. sparverius* or Merlin *F. columbarius*, though none is rare. It is possible that several of these might be included within ***k'ákw*** (see below).

29 ***ats'áts'***, Osprey, rarely seen around Hoonah, in contrast to Bald Eagles (KG); more common on the mainland and interior areas of Tlingit country.
30 ***ch'áak'***, Bald Eagle. Immature young are distinguished as ***ch'ak'yéis'***; ***gaay*** is an archaic variant. The Bald Eagle is the totemic figure of the Eagle moiety. Eagles are respected for their power and keen sight. Eagle feathers and claws are powerful symbols. An eagle claw attached to a 'talking staff' gave the speaker 'the floor' in councils. Wing feathers used to decorate dance costumes, but an entire eagle (or raven) wing might be employed as a broom to sweep the house. This was no sign of disrespect because it was an honourable use (CJ). KG recalls killing many eagles in his youth to earn cash from the federal government's bounty programme, now a thing of the past. Members of Eagle clans deny killing eagles and often speak to the birds using kinship terms. Eagle clans also derive personal names from characteristics of the Bald Eagle, such as *S'áaxw Shaan* 'Old Hat', a 'high-caste' name or title among the Kaagwaantaan clan which references the mature Bald Eagle's distinguished white head.
31 ***kijook*** or ***gijook***, Golden Eagle, usually considered quite distinct in folk ornithological systems. Golden Eagles are commonly found in Inland Tlingit country, though not around Hoonah (KG), were known to coastal groups through trade trips and travel to the interior, and are occasional visitors to the coast. De Laguna (1972) reports that the Golden Eagle, which became a totemic crest, was originally met on a mountainside above the Ahrnklin River (near Yakutat), and had come from the other (interior) side of the Saint Elias Range to hunt for 'groundhogs' (most likely Arctic Ground Squirrel *Spermophilus parryii*).

Tlingit observers normally speak of Northern Goshawks, Red-tailed Hawks, Peregrine Falcons, and perhaps smaller species such as the Sharp-shinned Hawk and American Kestrel by their English vernacular names. Hawks may be represented in carvings as a face with a hooked beak.

32 ***k'ákw***, Northern Goshawk *Accipiter gentilis*, captures the calls of a goshawk defending its nest. Some say the term refers to a large owl, either the Great Grey Owl *Strix nebulosa* or the Snowy Owl *Bubo scandiacus*, though the onomatopoeic name suggests otherwise. All hawks, grey and black, as well as other kinds, were called by this term (de Laguna, 1972). Thus, it probably would include at least Sharp-shinned, Red-tailed and

Rough-legged Hawks, and the Northern Harrier, if not also the American Kestrel. This bird is said to have procured fire while, in another story, a 'mountain hawk' (***shaa k'ákw***) serves as Raven's foil and gets thrown down a mountain in a box (Swanton, 1909).

33 ***shaayáal***, Peregrine Falcon *Falco peregrinus*, is smaller than the Red-tail: 'It's a pretty popular hawk… It lives in the cliffs. That way it could see the area that it was going to hunt: ***shaaya***, means "the face of the mountain" where it typically nests and circles' (GO).

Sandhill Crane (*Grus canadensis*) (Order Gruiformes, Family Gruidae).

34 **dool**, Sandhill Crane *Grus canadensis*, is well known to local observers and is considered a harbinger of spring, with large, noisy flocks passing overhead in late April or early May. This is a signal for people to get out of the house. Migrating cranes rarely stop near Hoonah and other Tlingit bays and estuaries because they favour extensive flats, although they may stop to wait out a storm. Some state, based on Tlingit legend, that hummingbirds migrate northward in spring with the cranes, hitching a ride on their backs.

Shorebirds, including plovers *Charadrius* spp., the Black Oystercatcher *Haematopus bachmani* and a large number of sandpipers, snipe and their relatives: 11 species breed locally (8 common, 3 uncommon); 21 species are regular migrants (7 common, seven uncommon and seven rare); 7 species winter (1 common, 3 uncommon and 3 rare). Shorebirds are often named indiscriminately as 'snipe', or 'sand snipe', for sandpipers. A general term might be ***at'ak̲éenyu.aa*** (literally: 'birds that live along the shore') or ***daak̲'u*** or ***t'aak̲'u***, alluding to their mass movement, 'flooding up' over a tide flat (JA).

35 ***sedaadak̲'éedaa***, perhaps the Semipalmated Plover *Charadrius semipalmatus*, a common nesting species.

36 ***lugán***, Black Oystercatcher, is an important clan crest 'totem.' Huna Tlingit people harvested oystercatcher eggs and steamed them in seaweed over a driftwood fire. The flesh was also eaten, though considered to taste 'fishy'.

37 ***x'at'daayéejayi***, possibly Black Turnstone *Arenaria melanocephala*, common on migration, uncommon in winter.

38 **hinx̲ukadzéedzi**, a small sandpiper, perhaps the Western Sandpiper *Calidris mauri* or Dunlin *Calidris alpina*, though the similar and equally common Least Sandpiper *Calidris minutilla* has the advantage of nesting locally (but see below). CJ reports that when he was a boy they would hunt them with shotguns in the huge migrating flocks on the tide flats. His mother 'used to make stew out of a whole bunch of them'.

39 ***gus'yadóoli***, perhaps Least Sandpiper *Calidris minutilla*, a common migrant and uncommon breeder, nesting in wet grassy habitats. Raven said

to this sandpiper: 'You will be seen only when the warm weather is coming on. Never come near except when warm weather is coming' (Swanton, 1909).

40 ***ayaheeyáa***, 'whimbrel', 'curlew' or 'sandpiper'. No curlew is of regular occurrence, unless the uncommon migratory Whimbrel *Numenius phaeopus* might be intended.

41 ***séitaa***, perhaps Lesser Yellowlegs *Tringa flavipes*.

42 ***séitaa tlein***, a species related to ***séitaa*** but larger, perhaps the Greater Yellowlegs *Tringa melanoleuca*. The binomial name suggests two similar or closely related species.

43 ***éek lukaḵées'i***, 'snipe' or 'sandpiper', perhaps a dowitcher *Limnodromus* sp.

44 ***lu.áadaa***, Common Snipe *Gallinago gallinago*, common spring, summer and autumn, and uncommon through the winter. CJ recalls that 'We ate a lot of snipe. My dad used to shoot them with a shotgun.' However, by 'snipe' CJ is referring to shorebirds in general.

45 ***ch'eet***, perhaps Red-necked Phalarope *Phalaropus lobatus*, a common migrant, though glossed alternatively as a 'murrelet', a very different species, although both might be encountered in large flocks on inshore marine waters.

Gulls, terns and jaegers (skuas): ten species of gull (five common, one uncommon and four rare); two species of terns (one common, one very rare and local) occur regularly; three species of jaegers occur regularly (two uncommon, one rare). Only the Parasitic Jaeger (*Stercorarius parasiticus*) nests in the region and is regularly observed near shore.

46 ***kéidladi***, Glaucous-winged Gull *Larus glaucescens*. The Huna Tlingit harvested eggs (***k'wát'***) from a large colony on the Marble Islands in what became Glacier Bay National Park and Preserve. The eggs were widely shared in the community and their harvest provided an opportunity for the family to share the experience of gathering a valued food. The community sanctioned a conservative harvest strategy, harvesting eggs from incomplete clutches (Hunn et al, 2003). The closely related Herring Gull *Larus argentatus smithsonianus* breeds sparingly, and occasionally interbreeds, in local Glaucous-winged Gull colonies. Tlingit people apparently do not recognize this distinction. A large nestling of this species is called ***kéidladi yadi***. Mottled brownish immature young are called ***kéidladiyéis'*** or ***kéidladik'í***. A general term for immature gulls is ***lawúxh***, though it is not clear how this term differs in application from the previous terms.

47 ***ḵ'eiḵw'w***, Black-legged Kittiwake *Rissa tridactyla*, a cliff-nesting gull and an important clan symbol or 'totem'. The Tlingit distinctions for 'seagull', 'kittiwake' (or 'kittiwick') and 'tern' are clear (Thornton, 2008). The clan totem and the species that the 'Seagull Girls' of the T'aḵdeintaan clan imitate in their dance is the Black-legged Kittiwake. The bird is described

as a smaller version or relative of the ‘seagull’, a colonial cliff-nesting species that when disturbed forms swirling masses of birds overhead which call ‘gack, gack, gack, gack’. Large colonies are reported for Lituya Bay, origin point for the T’ak̲deintaan clan which takes this bird as its symbolic avatar.

48 ***kootl’éet’aa*** or ***kool’éit’áa***, probably the Arctic Tern *Sterna paradisaea*, a common nesting species on sandy beaches in Glacier Bay. Might include the rare Aleutian Tern *Sterna aleutica* at Yakutat Bay. These are the only terns to be expected in the region. It may also refer to the Mew Gull *Larus canus*, common all year round, which nests in trees. Bonaparte’s Gull *Chroicocephalus philadelphia*, another locally common, small tree-nesting species might be included or perhaps be the primary referent.

49 ***lawúx̲*** jaeger *Stercorarius* spp.

Alcids, including murres *Uria*, two species; the Pigeon Guillemot *Cepphus columba*; murrelets *Brachyramphus*, two species; *Synthliboramphus antiquus*; auklets *Ptychoramphus aleuticus*, *Cyclorrhynchus psittacula*, *Cerorhinca monocerata*; and puffins *Fratercula*, two species.

50 ***keel***, Common Murre *Uria algae*.

51 ***x̲’adaax̲’aan***, Pigeon Guillemot *Cepphus columba*; but this term has also been interpreted as naming a species of cormorant (*Phalacrocorax* sp.; see above).

52 ***cháax̲*** or ***k̲áax̲***, ‘spirits are crying’, is a totemic crest animal. Local accounts of vocalizations and behaviour of this bird suggest that it refers to the Marbled Murrelet *Brachyramphus marmoratus*. Called ‘hell-diver’ or ‘auklet’ locally has led some to gloss the Tlingit term as ‘grebe’ or ‘merganser’. Local observers provide rich, if ambiguous, descriptions of this bird. It is said to fly high overhead calling ‘tee, tee, tee, tee’, which in sunny weather means that rain will come soon (AG); so get your fish in off the drying racks! They are said to nest in trees, to sleep ‘up on the mountainside’ rather than in the water (CJ). They feed on the ‘outer rim of the bay’, sometimes at night, their diving leaving a phosphorescent trail of phytoplankton. In the daytime, they leave a trail of bubbles. These various characteristic behaviours are the basis for several Tlingit personal names – for example, *X̲’ayasún* or *Kik-sún* (‘it’s bubbling’), *Éedaa- k̲utx̲ayanaháx* (‘phosphorescent stars’) and *Shaayataa* (‘sleeps on the mountainside’). It is said to ‘bounce along’, an apt description of murrelets or small auklets taking off with a full crop (CJ, SH). SH’s Wooshkeetaan clan name, *Stuwoo.ilgé* (‘he thought he was big’), is also derived from a story about this bird: Murelet went out to the Gulf of Alaska to feed, and when it came time to return to the inside waters near Hoonah, it was a clear night with a full moon. Murrelet flew up so high that the shadow he cast with his wings seem to cover the entire earth, so ‘he thought he was big’ (W. Howell, pers comm, 2009).

It is also likely that this Tlingit term is generalized to include, in addition to the iconic endangered Marbled Murrelet, the Kittlitz's Murrelet *Brachyramphus brevirostris*, Ancient Murrelet *Synthliboramphus antiquus* and Cassin's Auklet *Ptychoramphus aleuticus*.

53 ***tlakwch'ísh*** or ***lakwch'ísh***, Rhinoceros Auklet *Cerorhinca monocerata*, often interpreted as 'forever splashing'. An alternative interpretation is that this term is a synonym for the Surf Scoter (see above).

54 ***lugwáach'/lugwát***, Horned Puffin *Fratercula corniculata* or, possibly, Rhinocerous Auklet.

55 ***x̲ík***, Tufted Puffin *Fratercula cirrhata*, is the more common of the two puffin species, although local observers know both, commonly 'puffin'. They were hunted at their outer coastal colonies for their plumage as well as for their colourful beaks, incorporated within dance rattles. The eggs, and occasionally the meat, might be eaten.

Of the pigeons and doves, the exotic Rock Pigeon *Columba livia* is now established in urban centres. The larger native Band-tailed Pigeon *Patagioenas fasciatus* is rare, nesting but leaving in winter. The Mourning Dove *Zenaida macroura* is a rare straggler.

56 ***gus'yá kindachooneidí***, perhaps Rock Dove, though more likely derived from a term for the native Band-tailed Pigeon, but literally glossed as 'horizon mallard'. 'When "doves" arrive in spring it is a sign to halt the clam harvest for fear of red-tide poisoning' (GO). 'Dove' here might refer to the Band-tailed Pigeon or the Mourning Dove or both.

Owls and the Common Nighthawk: ten species of owls occur with some regularity (one common, one uncommon and eight rare), seven of these nest; the Common Nighthawk is a rare autumn visitor. De Laguna (1972) notes that linguists Naish and Story call the 'owl with ear tufts' ***tsísk'w*** or ***dzísk'w*** (Great Horned Owl); the owl 'without ear tufts' ***k'úkw*** (Great Grey or Snowy Owls); and a 'small owl' ***tlénx' shx'uneit*** (perhaps includes several smaller species). This suggests that only three contrasting folk generic owl taxa are regularly named, despite the proliferation of terms listed below.

57 ***tsísk'w*** or ***dzísk'w***, owls in general; prototypically the Great Horned Owl *Bubo virginianus*, an uncommon resident. Owls are imagined to be like 'wise old men', and thought of as a 'spirit', and a 'shaman's bird' (AG). Their appearance near a home may presage a death in the family. The bird itself is not bad, just a messenger. Any owl might be a 'messenger', some bringing good luck, a 'future', acquired by killing the bird and using the skin or feathers in one's dancing regalia. The owl is a lineal crest and figures prominently in myth, usually as a messenger. In Sitka, a woman who was a greedy harvester of herring and stingy towards her mother-in-law was transformed into an owl that still calls occasionally, in Tlingit,

from ‘Owl Slide’ above town.

58 ***kéigán***, Snowy Owl *Bubo scandiacus*, rare winter visitor, though common in invasion years. Most local observers can recall having seen few of these owls during their lifetimes. Their rarity and unpredictable appearances may contribute to their reputation as a bird of ill omen. If one should land on your house, it means a death in the family.

59 ***k’ishagwát***, perhaps Northern Pygmy-Owl *Glaucidium gnoma*, a tiny forest owl, rare in south-eastern Alaska.

60 ***k̲’úkw*** or ***oondách***, Great Grey Owl *Strix nebulosa*. The term ***k̲’úkw*** may also be glossed ‘Snowy Owl’ (Boas, 1891). ***Oondách*** is a ‘Tlingitization’ of the phrase ‘Old Dutch’ (J. Leer, pers comm, 2009), a gloss for ‘boogieman’, and may refer to a range of owls beyond the Great Grey. The term ***k’ákw*** is sometimes glossed ‘Great Grey Owl’ or even ‘Snowy Owl’, though it more likely refers to the Northern Goshawk (see above).

61 ***tlénx’ shx̲’aneit*** or ***x̲éex̲***, perhaps Saw-whet *Aegolius acadicus* or Boreal Owl *Aegolius funereus*. The Saw-whet nests; the Boreal is a rare winter visitor. A small owl with ‘tiny ear tufts’ known locally as the ‘screech owl’, because it screeches, might be the Northern Saw-whet Owl – which ‘screeches’ (compare ***x̲éex̲***) but does not have ear tufts – or the Western Screech-Owl *Megascops kennicottii*, which has ear tufts. This ‘screech owl’ might also be the Short-eared Owl *Asio flammeus*, which exhibits both defining characteristics and which is the most common and conspicuous local owl, though not small.

62 ***gutguníksh*** and ***jinakaxwájaa***, said to name two species of owls. If they are not synonyms for any previously named they might refer to the Western Screech-Owl or the Short-eared Owl. The former is a rare forest resident. The latter is a common spring and autumn migrant, rare at other seasons, but conspicuous as it often hunts in late afternoon over coastal marshes. Other candidates include the Northern Hawk-Owl *Surnia ulula*, a rare migrant and winter visitor that has nested, and the Barred Owl *Strix varia*, a recent immigrant, having spread west of the Rockies only since the 1960s.

63 ***yaanashgeigí,*** Common Nighthawk *Chordeiles minor*, a rare autumn straggler, or perhaps the Short-eared Owl, which hunts in a somewhat similar fashion.

Swifts, hummingbirds and the Belted Kingfisher. Two species of hummingbirds might be seen, the common Rufous *Selasphorus rufus* and the rare Anna’s *Calypte anna*, a recent immigrant from California. The Belted Kingfisher is unique.

64 ***dagitgiyáa*** or ***digitgiyáa*** and ***tlak̲wsh’ex̲dak̲ín***, Rufous Hummingbird *Selasphorus rufus* or, most likely, any hummingbird species. The first two names mean something like ‘flies staying still’ or ‘hovers’. Raven said: ‘A

person will enjoy seeing you. If he sees you once, he will want to see you again' (Swanton, 1909). 'The hummingbird is a spirit… It's just like God comes down with a spirit for you' (CJ).

65 ***tlax̲aneis'***, Belted Kingfisher *Ceryle alcyon*, a common year-round resident, fishing along every shoreline. The name is onomatopoeic. The Belted Kingfisher is a clan totem crest whose behaviour is also said to 'foretell the acquisition of wealth' (de Laguna, 1972).

Woodpeckers: six species occur regularly (one common, four uncommon, one rare). The Red-breasted Sapsucker *Sphyrapicus ruber* is common, but rare in winter; Downy *Picoides pubescens*, Hairy *P. villosus* and American Three-toed Woodpeckers *P. tridactylus* are all uncommon permanent residents. The Northern Flicker *Colaptes auratus* is uncommon, absent in winter. The Black-backed Woodpecker *Picoides arcticus* is a rare spring and autumn visitor.

66 ***gandaadagóogu*** or ***gandaagóogu*** or ***gandgóogu*** describe the species' hallmark behaviour: 'striking the wood' or 'picking around the deadwood'. They may refer, prototypically to the Red-breasted Sapsucker, a common resident, but perhaps refer to all woodpeckers, the flicker excepted (see below).

67 ***kóon***, Northern Flicker *Colaptes auratus*, an unusual woodpecker, often feeding on the ground. Shows striking red-shafted wing and tail feathers, which Tlingits value (de Laguna, 1972). Raven said to Flicker: 'You will be head among the birds [small] in size. You will not be found in all places. You will be very seldom seen' (Swanton, 1909). Elsewhere in Tlingit mythology the bird is associated with the wife of the Controller of the Flood (Swanton, 1909). Several Eagle clans have houses named for this bird and use it as a crest.

Corvids, including jays (two species), the Black-billed Magpie *Pica hudsonica*, Northwestern Crow *Corvus caurinus* and the Common Raven *Corvus corax*: all are common permanent residents. The Gray Jay *Perisoreus canadensis* is rare in autumn and winter. All are named.

68 ***kooyéix*** or ***taatl'eeshdéi***, Gray Jay *Perisoreus canadensis*, 'camp robber'. AG states that they are not found at Hoonah, only the 'blue jay'. The term 'camp robber' might be applied locally to the Black-billed Magpie.

69 ***x̲'éishx'w***, Steller's Jay *Cyanocitta stelleri*, 'blue jay'. The name is onomatopoeic. Steller's Jays are permanent residents, but often stay back in the forest in spring and summer and are only conspicuous about town and along beaches in autumn and winter. The appearance of Steller's Jays about town indicated the end of summer (last of August to middle of September). This also indicates that it is now again safe to harvest clams. Local observers are of two minds about jays. For some they are an 'evil spirit

bird', a garden pest and a nuisance for hunters. On the other hand, they may warn people that bears are nearby. Tlingits appreciate their intelligence and fine colours. Raven said to Blue Jay: 'You will have very fine clothes and be a good talker. People will take patterns [probably 'colours'] from your clothes' (Swanton, 1909).

70 ***ts'eigeenéi***, Black-billed Magpie, announces that winter is just around the corner. They come down from the mountains just before the first snowfall. When the magpies arrive you 'better have your larder full for winter' (AG). A totemic animal of the T'ak̲deintaan clan, Magpies are judged to be 'good birds', 'friendly', not messengers, just mimics. They are also given to thievery, attracted to bright objects as well as food.

71 ***ts'axweil***, Northwestern Crow. Common all year along the beaches; but Tlingit people have little to say about crows, pro or con, at least in comparison with the Raven. AG denies that crows and ravens are 'related'. Raven does not treat crows as close relatives but says to them: 'You will make lots of noise. You will be great talkers' (Swanton, 1909). Thus, when you hear one, you often hear many. Neither crow nor raven eggs were eaten; they were too gamey (CJ).

72 ***yéil***, Common Raven. Members of Raven clans may feel a particular loyalty to the Raven and likewise for those of Eagle clans because Raven, as the great Transformer, is known to all. Raven is 'a very spiritual bird' (CJ). Throughout the northern north-west coast of North America, Raven is credited with releasing the sun, moon and stars from their guardian, in the Tlingit case a figure known as the 'Nobleman at the Head of the Nass River' (in present-day British Columbia) and releasing them into the world, making the cosmos possible. Similarly, Raven's mischievous thieving allowed fresh water to be released to the world. However, in stealing water from the mythic adversary (usually conceptualized as *ganook*, the storm-petrel) who guarded its spring-fed source on a rocky island off south-east Alaska, Raven was temporarily caught and permanently blackened in the smoke hole through which he made his escape (CJ). Nevertheless, he endured in his purloining mission and proceeded to distribute fresh water across the land, laying down the myriad rivers and streams (literally driblets from his mouth) that now define the Pacific north-west coast. In another episode, Raven also outwits cormorant, tearing out his tongue and depriving him of speech. For this reason, to this day cormorant says only 'wulewulewule' (Boas, 1916). Although this trickster-demiurge carries the same name as the common Raven, he is a singular mythic being.

Common Raven, the bird, is similarly clever and foolish, and also of assistance. Fisherman lost offshore in a fog count on ravens to lead them to shore because they know ravens can't land on water and must return to land. Though a raven wing might be used as a broom to sweep out the house, KG (a member of a Raven clan) states that 'You never ate them [Raven or Eagle]. They weren't put on there for subsistence. They were put there … to show us our way.' He recalled that when his sister Janet died, 'There were ravens flying over the house, and it gave the rest of the family a real good feeling because that's Janet, you know.'

Swallows: six species occur (two common, two uncommon, two rare: all nesting and all leave for the winter).

73 ***séewkooshdaneit***, 'frequent rain'. The arrival of swallows in spring indicates that 'frost is over with'. The name is perhaps a reference to how they may blanket the sky in transit or pursuit of insect prey.

Larks: Horned Lark *Eremophila alpestris*, the only species, is an uncommon migrant of open areas, a rare alpine breeder, absent in winter.

74 ***x'aa kats'ítsgu***, Horned Lark.

Chickadees (two species) and wrens are permanent fixtures of deep forests, typically hunting bugs on bark and foliage, often flocking together after the nesting season.

75 ***k̲aatoowú***, Chestnut-backed Chickadee *Poecile rufescens*, probably includes the Black-capped Chickadee *P. atricapillus*. Tlingit believe that chickadees announce visitors: 'When you hear them, better start cleaning your house; you're going to have company' (HS). Similar associations are recognized by the Dena'ina Athabaskans (Russell and West, 2003) and the Sahaptins of the Columbia River Plateau (Hunn, 1990).

76 ***woolnáx̲ wooshk̲aak̲***, Winter Wren *Troglodytes troglodytes*, announce as they sing in the evening: 'It's time to go to bed now' (HS). The name means, literally, 'goes through a hole' (Swanton, 1909; HK).

The American Dipper is common year round.

77 ***hinyikl'eix̲í***, American Dipper *Cinclus mexicanus*, suggests its favoured habitat, inside rivers (***hinyík***). It is a 'spirit bird', a 'shaman spirit', a 'spirit watcher' or 'woods doctor' (CJ). It has a similar reputation among Columbia River Plateau Sahaptins (Hunn et al, 1990).

Thrushes include the Mountain Bluebird *Sialia currucoides* and Townsend's Solitaire *Myadestes townsendi*, both rare migrants, though the solitaire is known to breed; three spot-breasted thrushes *Catharus* spp., common or uncommon summer residents; the American Robin *Turdus migratorius* and Varied Thrush *Ixoreus naevius*, both common spring to autumn, rare in winter.

78 ***ts'ats'ée tlein***, 'big songbird', probably includes the three spot-breasted thrushes, the Gray-cheeked Thrush C. *minimus*, Swainson's Thrush C. *ustulatus* and Hermit Thrush C. *guttatus*.

79 ***shoox̲’***, American Robin, signals spring when they begin to sing and autumn when they disappear. Huna people did eat robin’s eggs (CJ). Raven said to Robin: ‘You will make the people happy by letting them hear your whistle. You will be a good whistler’ (Swanton, 1909). De Laguna (1972) recorded the belief in Yakutat, common among Native American tribes, that Robin scorched his front in ancient times and this is the source of its distinguishing red breast.

80 ***sh’ux̲’.uwa’***, probably the Varied Thrush.

Waxwings (*Bombycilla*, two species) have become much more common in recent years, evidence of a warming climate, eating crab-apple blossoms in spring (AG); but there is no record of a Tlingit name for them.

Wood warblers: 11 species occur regularly, 10 nest, though none spends the winter.

81 ***asx’aansháach’i***, a ‘yellow warbler’. Raven said to this ‘small bird with greenish-yellow plumage’, a common summer visitor to coastal south-east Alaska, ‘You will always go in flocks. You will always be on the tops of the trees. That is where your food is’ (Swanton, 1909). ***jimasasée*** is an interior Tlingit synonym and most likely refers to any of four common, arboreal, predominantly yellow species of wood warblers: Orange-crowned *Vermivora celata*, Yellow *Dendroica petechia*, Townsend’s *Dendroica townsendi* and Wilson’s *Wilsonia pusilla*.

The Western Tanager is uncommon between spring and autumn. Sparrows (*Spizella, Passerculus, Passerella, Melospiza* and *Zonotrichia,* nine species. in all), Dark-eyed Junco *Junco hyemalis*, Lapland Longspur *Calcarius lapponicus* and the Snow Bunting *Plectrophenax nivalis* often feed on the ground, nesting on the ground or in low bushes or trees.

82 ***tlagoo ts’ats’éeyee***, possibly White-crowned Sparrow *Z. leucophrys*, but this is suspect given that the White-crowned Sparrow does not nest and is common only as a spring migrant. Other sparrows might seem to be more conspicuous – the Song Sparrow *Melospiza melodia*, for example, which is common year round, the only common species in winter. Certain thrushes are called ***ts’ats’ée tlein*** ‘big ***ts’ats’ée***’, ‘big songbird’. ***ts’ítskw*** or ***ts’ats’ée*** or ***ts’agéegi*** are all glosses for ‘songbird’ (J. Leer, pers comm, 2009), though ***ts’agéegi*** may name a specific kind of bird.

83 ***t’áat’***, Dark-eyed Junco, is common in muskeg, beach fringe and estuary.

The Pine Grosbeak *Pinicola enucleator* and the Pine Siskin *Carduelis pinus*.

84 ***Xunkáa, xunkahaa*** or ***xóon keidlí***, Pine Grosbeak, ‘Northwind Bird’. Raven went to this bird and said: ‘You will never be seen unless the north wind is going to blow’ (Swanton, 1909).

85 ***s'áas'***, Pine Siskin. Swanton (1909) recorded that 'Raven came to the "wild canary" (***s!ās!***), which is found in the Tlingit country all the year round, and said: "You will be had among the very small birds. You are not to live on what human beings eat. Keep away from them."' And so it is rarely seen.

Unidentified birds:

86 ***chée*** 87 ***ch'éeni kwlayáat'*** 88 ***s'awan***	Three different species of birds. ***ch'éeni kwlayáat'*** is 'long-ribbon', probably referring to a duck with long neck feathers that are similar to ribbons. (J. Leer, pers comm, 2009)

A comparative analysis of Tlingit ethno-ornithology

Modern ethnobiological study began with a strong relativistic bias. It was axiomatic that the investigator should seek to discover native (i.e. *emic*) conceptual realities, not to presume or impose an external perspective. However, motivated by efforts in linguistics and psychology inspired by the development of cognitive science (Gardner, 1985), ethnographic studies of kinship terminological systems and basic colour terminologies sought to characterize universal patterns and processes that might underlie the superficial diversity apparent in particular systems. Such cross-linguistic comparisons made use of an *etic grid* or meta-language to characterize the referential meanings of local terms (e.g. kin-type notation for kinship terms and the Munsell colour chart employed by Berlin and Kay, 1969, in their classic analysis of basic colour terms). For comparative ethnobiological studies, the etic grid is the Linnaean system of biological classification and nomenclature.

In response to the objection that the Linnaean system is just one among thousands of biodiversity classifications, it is argued that the Linnaean system has the valuable and unique property of representing a collective and systematic global effort to name and classify every phylogenetically significant distinction amongst populations of living organisms. These 'objective discontinuities in nature' represent a grid to which the emic distinctions drawn in every human language may be seen to correspond. The global reach of the Linnaean system allows for indirect comparisons between emic systems in radically disjunctive regions of the world, regions with little or no overlap in terms of local bird species (e.g. the highlands of Papua New Guinea, the highlands of Mexico and south-eastern Alaska). By comparing these disjunctive local systems separately with the Linnaean global etic grid, one may compare degrees and patterns of correspondence of each to the common Linnaean reference point.

The Tlingit bird names listed above include several apparent synonyms, terms that differentiate male and female, adult and immature, as well as superordinate terms for 'bird'/'fowl' and 'duck'. 88 named categories of Tlingit birds may be considered 'basic' or 'folk generic' categories (compare Berlin, 1992), comparable in many respects to the species taxa of academic ornithologists.

Table 13.1 *SSRR comparisons for 12 indigenous communities of North America and Australasia*

	Folk generic taxa	*Terminal taxa*	*Avian diversity*	*SSRR*
Koyukuk (North America) (Nelson, 1983)	87	87	163 <99>	0.53 <0.88>
Dena'ina (Russell and West, 2003)	109	117	163 <129>	0.67 <0.84>
Tlingit	89	89	236	0.38
Sahaptin (Columbia Basin) (Hunn with Selam, 1990; Hunn, 1991)	73	73	260	0.28
Tohono O'odham (Rea, 1983, 2007)	63	71	249	0.25
San Juan Zapotec (Hunn et al, 2001; Hunn, 2008)	69	103	190	0.36 [0.54]
Tzeltal Mayan (Hunn, 1977)	106	137	200	0.53 [0.685]
Yucatec Mayan (Anderson and Medina Tzuc, 2005)	100	106	178	0.56 [0.77]
Nage (Forth, 2004)	69	69	150	0.46
Kalam (Majnep and Bulmer, 1977)	126	157	204	0.62
Fore (Diamond, 1966)	109	109	120	0.92
Groote Eylandt (Waddy, 1988)	75	75	201	0.37

Note: Angle brackets distinguish alternative baseline calculations of avian diversity, as noted in the text. Square brackets set off alternative SSRR scores based on terminal as opposed to folk generic tallies.

By contrast, ornithologists have recorded 291 species of birds from south-eastern Alaska, the homeland of the Tlingit people (Armstrong, 1990). Have the Tlingit noted only 30 per cent (89/291) of the region's bird species? By contrast, the Fore of Papua New Guinea name 92 per cent of the species recorded during a comprehensive ornithological survey (Diamond, 1966). These percentages are what Hunn (1975) has defined as the Scientific Species Recognition Ratio (SSRR; Table 13.1), which is the number of bird categories recognized by the local residents divided by the number of bird species recorded in the same territory by professional biologists (Hunn, 1999). This ratio will include a certain number of folk categories that are in 1:1 correspondence with a single scientific species, but also instances of *under-differentiation* – where the folk system 'lumps' a group of birds that professional scientists consider to represent two or more species – and *over-differentiation* – where the folk system 'splits' a single scientific species into two or more basic categories. The SSRR will decline when local people are selective in their attention, dismissing species of limited cultural salience with a very general term or ignoring them altogether.

A systematic analysis aimed at discovering what kinds of birds are the focus of Tlingit attention may explain this seemingly low Tlingit avian SSRR. First, the 291 species of birds recorded from south-eastern Alaska vary in abundance. Armstrong ranks each on a four-point scale from C (common), through U (uncommon), R (rare), to A (casual or accidental) (Armstrong, 1990) by season: spring, summer, autumn and winter. 'Common' includes what other guides have termed 'abundant', 'common' and 'fairly common'. 'Uncommon' includes some that might be considered 'fairly common' as well as 'uncommon'. 'Rare' includes the 'rare' and 'very rare' of other authors. Finally, 'casual' refers to species that have occurred in the region at a given season 'no more than a few times'; 'irregular observations are likely over a period of years'; while 'accidental' refers to species recorded 'only a time or two', a bird 'so far from its usual range that subsequent observations are considered unlikely' (based on Isleib and Kessel, 1973). 55 of the 291 species recorded in south-eastern Alaska are rated no higher than 'A' at any season. Thus, 236 species occur with some regularity. Another 63 are rated no better than 'R'. That leaves 173 species that are 'uncommon' or 'common' during at least one season. With respect to these species, the Tlingit SSRR rises from 0.28 for the total inventory, to 0.35 for species of regular occurrence, to 0.40 for those rated common or uncommon. With respect to just those that are 'common', the Tlingit SSRR is an impressive 0.68 versus just 0.19 for species judged uncommon or rare.

Singling out species known to nest in the region, such species are more likely to be noticed by long-time local residents than transients, spring or autumn migrants, or winter visitors, regardless of abundance. There are 161 nesting species recorded for south-eastern Alaska. The Tlingit SSRR with respect to these is 0.41 versus 0.21 for those that do not nest (of the regularly occurring species).

The SSRR may also be calculated by bird family. Three groups have exceptionally high SSRR scores: the owls (SSRR = 0.67), corvids (SSRR = 0.71) and grouse (SSRR = 0.83). At the other extreme (excluding groups with very few local species) are the icterids (e.g. blackbirds) (SSRR = 0.00), flycatchers and swallows (SSRR = 0.06) and wood warblers (SSRR = 0.07). The SSRR for owls may be inflated by the independent status of the several owl terms remaining uncertain. The ratings for the corvids and grouse are somewhat unexpected given that these birds are partial to mountain and forest habitats, while the Tlingit people of south-eastern Alaska are strongly oriented towards the sea. However, corvids are by nature hard to miss, while grouse are a preferred prey of Tlingit hunters.

Some cross-cultural comparisons

Cross-cultural comparisons (see Table 13.1) depend first on consistent procedures for determining such basic facts as the number and denotative scope of the emic categories named in each language and the number of Linnaean species present at each locale, as well as key distributional facts about those species. These determinations are by no means routine or unambiguous. For example, with regard to the tally of Linnaean species present in a particular ethnographic locale, and thus presumed to be available for emic recognition, such local bird lists are 'works in progress' given the powers of flight of birds and the often limited adequacy of local ornithological research. For example, comparing Diamond's Fore data (1966) (109 folk generic terms for 120 Linnaean species; SSRR = 0.92) with Majnep and Bulmer's Kalam data (1977) (126 folk generics for 204 Linnaean species; SSRR = 0.62), the relatively high

SSRR for Diamond's data is no doubt due to the fact that his local bird list was based on a relatively brief field season, while by contrast the Kalam ornithological data represent years of close collaboration between a competent ornithological observer and a life-long resident of the region.

For the Tlingit analysis there is the advantage of a current comprehensive account that identifies every species known to have occurred in south-eastern Alaska – essentially coextensive with traditional Tlingit territories – with abundance rated by season, with notes on nesting and habitat preferences. By comparison, the other two central Alaskan cases report significantly smaller species totals, just 129 species are mentioned for the Dena'ina and 99 for the Koyukuk, while Armstrong (1990) rates 163 species occurring regularly in central Alaska. This larger baseline species total reduces the Dena'ina and Koyukuk SSRRs from 0.84 to 0.67 and 0.88 to 0.53, respectively, still high but closer to the Tlingit figure, which is based on the same distributional criterion and authoritative data base. The remaining differential in favour of the central Alaskan communities is probably due to the greater degree of linguistic acculturation among the Tlingit. This factor is also the best explanation for the low SSRR values for Sahaptin (0.28) and Tohono O'odham (0.25), indigenous communities for whom the native language and traditional subsistence practice have been undermined.

Given that folk biological taxonomies tend to exhibit a 'taxonomic' hierarchy, it is essential to define the taxonomic rank or level at which we are counting. The folk generic rank (according to Berlin, 1992) and the terminal taxonomic level are the most useful for comparative purposes. In the majority of comparative cases, the folk generic categories are terminal – that is, no polytypic generics are on record in such cases. Three cases stand out in this respect, with a significantly higher number of terminal versus generic categories: Zapotec and Tzeltal Mayan in Mexico and Kalam of Papua New Guinea. The ratio of the excess of terminal over generic categories to the total number of folk generics can be calculated as an index of polytypy: 0.49, 0.29 and 0.25, respectively. All of these cases are agricultural communities and all have been the subject of long-term ethnozoological investigations. It is likely that this added dimension of taxonomic elaboration is apparent only with particularly intensive study. If terminal taxa are used to calculate the SSRR, the Zapotec, Tzeltal and Kalam score substantially higher than when compared with respect to folk generic taxa: 0.54 versus 0.36; 0.69 versus 0.53; and 0.77 versus 0.56, respectively.

The socio-cultural and linguistic units being compared must be specified. It is preferable to speak of 'communities' – that is, a group of people who share an immediate habitat, a particular language or dialect, and a common ecological orientation. No comparison should be made of bird names culled from an unabridged dictionary of the English language or of Mandarin Chinese because such dictionaries will incorporate knowledge from quite disparate communities. However, it seems valid to consider the Tlingit communities as constituting a single extended community given that the Tlingit homeland is relatively compact and the Tlingit historically occupied that homeland in a broadly consistent fashion.

Conclusions

For Tlingit people, birds are not merely sustenance but also icons, indices and symbols of cultural and environmental knowledge, relations and identity. Tlingit names for birds are potently descriptive and often onomatopoeic. Tlingit tradition credits birds with shaping the world as we know it, signalling the presence of food, danger and fortune, as well as providing good company and amusement.

Raven may have organized the birds in nature, but Tlingits have organized them in their own cognitive systems of classification in ways that are comparable with other linguistic communities around the world. Using Hunn's Scientific Species Recognition Ratio (SSRR), the correspondence of the categories of birds recognized by Tlingit peoples with Linnaean categories of bird species known to occur in their home region can be productively assessed. This analysis shows some distinct patterns of differentiation (both over and under the Linnaean standard) of species based on abundance, size, habitat and cultural interest. One Tlingit elder suggested that Tlingit knowledge of birds is most closely correlated with cultural interest, especially 'the ones we eat'. An unpacking of the SSRR suggests that this is true at one level; however, there are important exceptional and signal birds that receive special nomenclatural recognition, although they play no economic role. As with other ethno-ornithological systems, that of the Tlingit is selective, highlighting certain species or families of birds while letting others recede into the conceptual background. How a culture selects a bird for special recognition instructs us as to the particular cultural genius of the people and illustrates a unique local perspective on the natural environment. For example, Raven and Eagle are highly visible as they make their living in the coastal zone, as are the Tlingit, whose social structure is organized in concept and practice in relation to these two avian hunter–gatherer–fishers.

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14

Raven = Heron in Mayan Language Prehistory: An Ethno-ornithological/ Linguistic Study

Cecil H. Brown

Two very different kinds of bird, ravens and herons, are linguistically linked in the prehistory of Mayan languages of Mesoamerica. Reflexes (descendant words) of Proto-Mayan **jooj* found in Mayan daughter languages spoken in highland areas denote ravens, while reflexes in daughter languages of lowland areas designate herons. In the Mayan language region, the Common Raven is found in the highlands but not in the lowlands, and herons, while occurring in both lowlands and highlands, are found in abundance and typically breed only in the lowlands. Speakers of Proto-Mayan of around 3200 years ago resided in the lowlands, where some of their descendants live today, so that it is probable that **jooj* originally designated heron rather than raven. Other descendants of Proto-Mayan speakers moved to the highlands. When the latter migration took place, reflexes of **jooj* in highland Mayan languages shifted in reference from herons to the Common Raven. This nomenclatural switch was based solely on the superficial similarity of these two very different kinds of bird. The major resemblance motivating this shift probably involved the low guttural croaks and squawks typically produced by both ravens and herons.

Introduction

The 31 (recorded) languages of the Mayan family are all spoken in Mesoamerica (southern Mexico and northern Central America) with the exception of Huastec, an outlier of northern Mexico. The family's parent language, Proto-Mayan (pM), was spoken at the latest some 3200 years ago. A word in the vocabulary of pM, **jooj* (Kaufman, 2003; Brown and Wichmann, 2004), shows reflexes (offspring words in daughter languages) that, curiously, denote two very different kinds of bird: ravens and herons, birds having little in common phylogenetically other than their 'birdness'. Note that words preceded by an asterisk (e.g. **jooj*) are reconstructed hypothetical forms.

Reflexes of **jooj* are found in languages of six of the seven major branches of the Mayan family; the branch in which no member languages show reflexes is Yucatecan. Examples of **jooj* reflexes from a language of each of the six branches are K'iche' *jooj* (K'ichee'an branch), Mam *jooj* (Mamean), Mocho *hooh* (Greater Q'anjob'alan), Tzeltal *hoh* (Tzeltalan), Chol *hoh-* (Cholan), and Huastec *hooh* (Huastecan). All reflexes manifest expected sound correspondences, including regular corresponding syllable nuclei, some of which are complex (Brown and Wichmann, 2004), showing unequivocally that all developed from a single word in the pM lexicon. While the phonological characteristics of the reconstructed pM word might be subject to debate, the fact that there was such a word is not (compare Brown and Wichmann, 2004).

All reflexes of **jooj* in languages of the K'ichee'an, Mamean, Greater Q'anjob'alan and Tzeltalan branches of Mayan refer to ravens, while all reflexes in languages of Cholan and Huastecan branches (with the exception of one dialect of Chol, a Cholan language, to be discussed) designate herons/egrets in general (henceforth, herons) or a single species of heron.

It seems unlikely that pM **jooj* referred to both ravens and herons because these birds are phylogenetically distinct and, hence, morphologically very different from one another: ravens belonging to the order Passeriformes (family Corvidae) and herons to the order Ciconiformes (family Ardeidae). More likely, pM **jooj* designated only one of these, almost certainly heron (see below). At some time, for some Mayan speakers, the original referent of **jooj*, heron, was changed to raven. Such a referential shift is surprising because these birds have nothing morphologically (indeed, even in flight at a distance they are distinct) in common other than their 'birdness' that would promote it. This chapter investigates how and why such an unusual semantic metamorphosis might have occurred.

The data

Sources for contemporary Mayan language reflexes of pM **jooj* are almost entirely bilingual dictionaries for individual languages, most of which entail Spanish as a reference language (Brown and Wichmann, 2004). Reflexes of **jooj* found in sources for languages of K'ichee'an, Mamean, Greater

Q'anjob'alan and Tzeltalan branches (henceforth, the Raven languages), with two exceptions, are all given the Spanish gloss *cuervo*, which refers to ravens and crows, all members of the genus *Corvus*. A non-dictionary source for one of these languages, Hunn's (1977) study of Tzeltal folk zoology, gives 'the Common Raven, *Corvus corax*' as the gloss for the language's reflex, and Laughlin's (1975) exceptionally thorough dictionary of Tzotzil lists the same specific referent. Because the Common Raven is the only member of *Corvus* found in areas in which Raven languages are spoken (the highlands of Chiapas, Mexico and Guatemala) (Howell and Webb, 1995), it can be concluded that their reflexes of pM **jooj* glossed with *cuervo* in bilingual dictionaries designate the Common Raven and only the Common Raven.

Most reflexes of **jooj* found in languages of the Huastecan and Cholan branches (henceforth, the Heron languages) are glossed in sources by Spanish *garza*, which refers to herons and egrets, all members of the family Ardeidae. This, however, is the Mexican Spanish referential range of *garza* (Schoenhals, 1988); in Peninsular Spanish, the term is restricted to herons. Plausibly, reflexes of **jooj* in languages for which only the gloss *garza* is given in lexical sources may actually refer to individual species of Ardeidae, either as free-form words or in compound (binominal) labels. The fact that this detailed information is not conveyed in lexical sources may reflect lack of familiarity of source compilers with birds and/or the degree of thoroughness of such sources.

The Huastec reflex, *hooh*, is glossed by *garza* (Larsen, 1955). Kaufman and Norman (1984) reconstruct **joj* as Proto-Cholan's reflex and gloss it 'garza/heron'. In the Chol of Tumbalá (Chiapas, Mexico) the reflex occurs in a compound construction glossed by *garza* (i.e. *hohmay*). The meaning of the suffixed element, *–may*, is undetermined. The reflex of Proto-Cholan **joj* 'heron' in the Tila (Chiapas) dialect of Chol denotes the Common Raven (discussed below). *Garza* is the gloss assigned to Chorti's reflex (Wisdom, 1950), another Cholan language.

The reflex of Proto-Cholan **joj* found in Chontal (Tabasco, Mexico) is also in a compound, *ahhoh*, in which the initial element, *ah–*, is a frequently occurring zoological prefix. There is only one of the four Cholan languages, Cholti, for which a reflex of pM **jooj* has not been found: Cholti is an extinct Cholan language known primarily from a 17th-century word list. The Chontal word is the only reflex of a Heron language not glossed in sources by *garza*. The gloss assigned to it is *pancuque* (Keller and Plácido Luciano, 1997). The latter is a Mexican Spanish word localized to the state of Tabasco. Santamaría (1942) in his *Diccionario general de Amercanismos* defines it as follows (translated from the Spanish by the author): 'Onomatopoetic name alluding to a sound similar to strident outbursts of laughter that is given to a bird of Tabasco also known by the names *paspaque* and *cucharón*.' Elsewhere in his dictionary, Santamaría (1942) identifies *paspaque* and *cucharón* as names in the Spanish of Tabasco for the Boat-billed Heron *Cancroma cochlearia*.

The Chontal word glossed by *garza* is *aht'o'*. The latter word is found in compounds for other species of heron: *säsäk aht'o' 'garza blanca' and yäyäs* *aht'o' 'garza azul*', probably, respectively, the Great Egret *Egretta alba* and the Great Blue Heron *Ardea herodius*.

Language and species geographical distributions

The Raven languages of Mayan are spoken in abutting highland areas of Guatemala and the state of Chiapas in southern Mexico. The Heron languages, for the most part, are spoken in Gulf coastal lowland areas of the Mexican states of Chiapas and Tabasco, and in the Gulf coastal plain and abutting regions of northern Veracruz, Mexico (home of the outlying Mayan language, Huastec).

The Common Raven occurs in all areas inhabited by speakers of Raven languages and in *none* of the lowland regions inhabited by speakers of Heron languages. Herons and egrets are found in all areas inhabited by speakers of both Raven and Heron languages (Howell and Webb, 1995) but are substantially more abundant in the lowlands and only rarely encountered in highland areas.

Excluding the bitterns (*Botaurus* spp.), there are 13 species of the family Ardeidae found in areas in which Mayan languages are spoken today. 8 of these species occur in both the highland region of Raven languages and in the lowland region of Heron languages: Great Blue Heron, Great Egret, Snowy Egret (*Egretta thula*), Little Blue Heron (*Egretta caerulea*), Tricolored Heron (*Egretta tricolor*), Cattle Egret (*Bubulcus ibis*), Green Heron (*Butorides virescens*) and Black-crowned Night-Heron (*Nycticorax nycticorax*). With the exception of the Great Blue Heron, all of these species are breeding residents of the lowlands. With the exception of Cattle Egret, which has found its way to the New World from the Old World only in historical times, these species occur in the highlands only as non-breeding winter visitors. 5 of the 13 species occur

Table 14.1 *Geographical distribution of heron species in Mesoamerica*

<table>
<tr><th>Highland resident breeder</th><th>Lowland resident breeder</th><th>Highland winter (non-breeding) visitor</th><th>Lowland winter (non-breeding) visitor</th></tr>
<tr><td></td><td>Bare-throated Tiger-Heron
Agami Heron
Yellow-crowned Night-Heron
Boat-billed Heron</td><td></td><td>Reddish Egret</td></tr>
<tr><td></td><td colspan="2">Great Egret
Snowy Egret
Little Blue Heron
Green Heron
Black-crowned Night-Heron
Tricolored Heron</td><td></td></tr>
<tr><td colspan="2">Cattle Egret</td><td colspan="2">Great Blue Heron</td></tr>
</table>

Source: data from Howell and Webb (1995) only in lowland areas in which Heron languages are spoken, these being Bare-throated Tiger-Heron (*Tigrisoma mexicanum*), Reddish Egret (*Egretta rufescens*), Agami Heron (*Agamia agami*), Yellow-crowned Night-Heron (*Nycticorax violaceus*) and Boat-billed Heron (*Cancroma cochlearia*). Thus, 12 of the 13 species breed only in the lowlands where they are residents (Howell and Webb, 1995) (see Table 14.1).

Developments in Mayan languages

Ethnobotanical/historical linguistic evidence indicates that pM was spoken in a lowland area of Mesoamerica, probably somewhere along the Gulf/Caribbean coastal plain of Mexico (Brown, 2009). Since in prehistoric times, as today, ravens are not found in lowland Mesoamerica, the referent of pM **jooj* must have been heron rather than raven.

The movement of some Proto-Mayan-speaking people from their lowland homeland to the highlands probably first involved ancestors of speakers of languages of the Eastern branch of Mayan, K'ichee'an and Mamean, all highland languages in which **jooj* reflexes now denote the Common Raven. The shift of a reflex of **jooj* from heron to the Common Raven plausibly happened during this early move.

There was almost certainly more than one major relocation of lowland speakers of Mayan into the highlands in prehistoric times. Languages of the Greater Q'anjob'alan branch of Mayan are also all spoken in the highlands and have reflexes of **jooj* designating the Common Raven. Speakers of Proto-Greater Q'anjob'alan may have been involved in a second major migration from the lowlands to the highlands (Brown, 2009). These people could have independently shifted a **jooj* reflex from heron to the Common Raven or could have done so under the influence of other Mayan speakers who arrived in the highlands earlier and had already made the heron-to-raven transfer – that is, possibly speakers of Eastern Mayan languages.

Tzeltalan and Cholan languages have a common ancestor (other than pM) (i.e. Proto-Greater Tzeltalan). Tzeltalan languages and dialects, for the greatest part, are spoken in the highlands of Chiapas and their reflexes of pM **jooj* denote the Common Raven. As noted earlier, Kaufman and Norman (1984) reconstruct **joj* as Proto-Cholan's reflex of pM **jooj* and assign it the gloss '*garza*/heron' because most Cholan languages and dialects show reflexes referring to herons. Since both Proto-Greater Tzeltalan and its immediate daughter language, Proto-Tzeltalan, were lowland languages (Brown, 2009), their respective reflexes of **jooj* probably denoted heron. When descendants of speakers of Proto-Tzeltalan moved out of the lowlands into the highlands, leaving speakers of Cholan languages back in the lowlands where many of their descendants are still found today, their reflexes of **jooj* shifted in meaning from heron to the Common Raven, perhaps an independent switch, but one that could have taken place under the influence of Mayan people whom they encountered in the highlands and who had earlier referentially changed their reflex of **jooj* from heron to raven. Plausibly, these would have been speakers of Greater Q'anjob'alan languages, some of whom are, today, neighbours of speakers of Tzeltalan languages in highland Chiapas.

There was at least one more movement of Mayan-speaking peoples from the lowlands to the highlands involving a change in the referent of a **jooj* reflex. This was probably a recent relocation, perhaps taking place as late as colonial times rather than prehistorically. A word list from the Chol dialect of Tila (Chiapas) compiled in 1789 (Fernández, 1892; Hopkins, 1988) gives *joj*, a reflex of Proto-Cholan **joj*, and assigns it the gloss *cuervo* (the Tumbalá dialect of Chol, spoken just to the east of Tila in Chiapas, has a reflex of **joj* glossed by *garza* in its lexical source). Tila Chol is spoken in a highland area and, thus, conforms with highland Mayan languages and dialects in having a reflex of pM **jooj*, designating the Common Raven. It is unlike other languages and dialects of the Cholan branch of Mayan since reflexes in the latter all denote heron.

Apparently, when speakers of Chol moved into the highland region of Chiapas, probably in post-Columbian times in response to the presence of disrupting Spanish intruders, those who ended up in the Tila area referentially shifted their reflex of Proto-Cholan **joj* from heron to raven, probably under the influence of speakers of Tzeltalan languages, their Mayan-speaking neighbours to the immediate south who had moved into highland Chiapas in prehistoric times and had undergone a similar referential switch.

There were at least two other major movements of Mayan-speaking people out of the area of the Maya Lowlands in which pM was somewhere spoken. These involved relocations of speakers of the two languages of the Huastecan branch of Mayan. Speakers of Huastec and Chicomuceltec moved out of the Maya Lowlands ultimately to two different locations:

1 Huastec speakers north to the northern area of the Gulf coast-hugging Mexican state of Veracruz and abutting regions; and
2 Chicomuceltec speakers into the highland area of south-eastern Chiapas.

Because herons but not ravens are found in the region into which Huastec speakers moved (Howell and Webb, 1995), the Huastec reflex of **jooj* did not shift to raven and, today, denotes heron. Chicomuceltec, a now extinct language known only from a few fairly short word lists, probably had a reflex of **jooj*; but this has not survived in the scanty existing documentation.

There is a remaining branch of Mayan, Yucatecan, with member languages located in lowland areas of the Yucatan Peninsula, Belize, northern Guatemala and Chiapas. Proto-Yucatecan did not have a reflex of pM **jooj*. However, three of the four Yucatecan languages, Mopan, Itzaj and Lancandon, all have a form *jo'jo*' 'heron' that phonologically resembles, but is not a true reflex of, pM **jooj*.

Naming behaviour

This section presents a background discussion for a theory of why reflexes of pM **jooj* 'heron' shifted to raven when Mayan speakers moved from the lowlands to the highlands.

Labelled categories, in general, strongly tend to be conjunctive in membership rather than disjunctive (Brown, 1990). This is to say that things included in the same labelled category are strongly inclined to have many distinctive features in common. In folk biological classification, this is illustrated by the fact that named biological classes, if they are neither monotypic nor special purpose, tend to include very similar species, mostly those belonging to the same genus but also, sometimes, to species of different genera belonging to the same family. On the other hand, it is rare that folk biological classes encompass species of different families. The reason for this would appear to be that such species are typically morphologically disjunctive – that is, very dissimilar (compare Hunn, 1977). Naming behaviour resulting in labelled categories is, for the most part, based on conjunctivity and does not usually tolerate extreme dissimilarity (disconjunctivity).

There are circumstances in which disjunctive things are involved in nomenclatural linkage that does not entail their inclusion in the same labelled category. This is when speakers of a particular language use a word A to refer to an entity X in their local environment and, subsequently, move to a new locale in which X does not occur, but in which an unfamiliar entity Y is found, where Y only slightly resembles X, but nonetheless becomes the new and exclusive referent of A. This, for example, occurred when English-speaking peoples from Britain encountered and named certain unfamiliar birds of eastern North America (Brown, 1992).

Brown (1992) lists 87 English monomial and base names that are applied to birds of both eastern North America and Britain – for example, Swallow, a monomial for *Hirundo rustica* in Britain, which occurs as a base name in the complex construction Barn Swallow for the same species in America. A more complicated example from the list is Cuckoo, which occurs as a monomial for *Cuculus canorus* in Britain. The term is a base element in three American complex labels, Yellow-billed Cuckoo, Black-billed Cuckoo and Mangrove Cuckoo, which label species of the genus *Coccyzus*. In this case, the word Cuckoo is applied (respectively, in two different locations) to birds of two different genera, one of which (*Cuculus*) is found only in the Old World and the other of which (*Coccyzus*) occurs only in the New World. Both genera belong to the family Cuculidae.

Among these 87 English bird names, three nomenclaturally equate British and American birds that belong to different scientific families (Brown, 1992). Flycatcher is used as a base name in binomial labels for birds in both regions. British flycatchers belong to the family Muscicapidae and American flycatchers to the family Tyrannidae. Exemplars of Muscicapidae do not occur in America. Oriole is used as a base name in binomial constructions for birds of both regions. British orioles belong to the family Oriolidae and American orioles to the family Icteridae. Exemplars of Oriolidae are not found in America. Sparrow is used as a base name in binomial labels in both regions. British sparrows belong to the family Passeridae and American sparrows to the family Emberizidae. Members of Passeridae are not native to America.

The nomenclatural equating of British flycatchers with American flycatchers, British orioles with American orioles, and British sparrows with American sparrows all entail the linguistic linkage of birds belonging to two different scientific families. These nomenclaturally joined birds, then, are quite distantly related creatures having distinct lines of phylogenetic development within the class Aves. However, their linkage is not totally surprising because they show some obvious superficial resemblances that are apparent to even casual observers of birds (Brown, 1992). Such similarities are clearly the primary bases for their nomenclatural equation. These superficial resemblances are the result of parallel or convergent evolution, a not uncommon development in nature, some conspicuous other examples being the convergence of cetaceans and fish (Brown, 1984), and of salamanders and lizards (Hunn, 1977).

The fact that orioles, flycatchers and sparrows have been nomenclaturally linked on the basis of superficial similarities may, in part, be explained by prevailing ornithological and historical circumstances. The American birds, while not phylogenetically close to their British counterparts, are nonetheless among those birds of eastern North America that most closely resemble their British counterparts. Thus, when early British colonizers of eastern North America first encountered the American birds, it was perhaps a cognitively easy thing for them to use English terms for British birds in application to American birds that more closely resemble those British birds, even if the resemblance was merely superficial. There simply may have been no better candidates with respect to similarity to which they could have applied their British bird names. A parallel type of circumstance possibly underlies the nomenclatural equation of ravens and herons by prehistoric speakers of Mayan languages.

Why the Mayan shift from heron to raven?

When speakers of Mayan moved from the lowlands to the highlands, they encountered the Common Raven, an unfamiliar bird for which they lacked a name. In addition, they found themselves in local habitats in which herons, for which they had a name, were uncommon if not totally absent. This situation is parallel with that in which the British encountered unnamed, unfamiliar birds when arriving in North America. Just as the British were faced with the task of coining names for newly encountered birds, speakers of Mayan were required to come up with a name for the Common Raven and used their word for heron to designate it.

Presumably, Mayan speakers did this because they discerned a resemblance between herons and ravens of some sort. For the most part (but see below), herons and ravens have very little, if anything, in common with respect to physical appearance. However, they do have calls that are very similar. Both herons and ravens produce low guttural croaks and squawks.

When Mayan speakers moved from their lowland habitats to the highlands, they left environments in which birds typically producing low croaks and squawks were herons, to areas in which very similar calls were produced by ravens. This auditory resemblance must have been striking, indeed, so fetching that it was used as the major physical basis for transferring the Mayan name for heron to raven. This transfer was probably reinforced by the onomatopoetic nature of the Mayan name, **jooj*, which is reminiscent of the calls of both herons and ravens.

Given the strong resemblance of calls of the Common Raven and herons, one might suggest that the names of these birds in Mayan languages may be similar because they are onomatopoetic rather than because these words have a common prehistoric origin (in pM). While call similarity may be involved in the nomenclatural linkage of ravens and herons in Mayan languages, there is no question whatsoever that the bird terms involved have a common origin and that all are reflexes of a single pM word – that is, **jooj* (Kaufman, 2003; Brown and Wichmann, 2004).

The nomenclatural connection between Corvidae and Ardeidae in Mayan is not unique. The scientific name for the genus to which the Black-crowned Night-Heron belongs is *Nycticorax*, literally (in Greek) 'night crow'. In addition, the Arabic name for night-heron is *ghuraab al-layl*, which is literally 'crow of the night'. Such connections, like the Mayan one, are almost certainly based on call similarity.

Was pM **jooj* referentially focused on a single species of heron?

Plausibly, pM **jooj* designated herons, in general, as do some of the reflexes of the word found in modern Mayan languages. Another possibility is that while the term was used for herons, in general, it was semantically focused on a single, especially salient, heron – that is, on a type specific. Or, conceivably, **jooj* could have been referentially restricted to a single species of heron such as is the word's reflex in Chontal. If the word denoted a type specific or was limited to a single species of Mesoamerican heron, that species may have had a greater superficial resemblance to the Common Raven than other Mesoamerican herons.

Size is a feature in which two different birds may superficially resemble one another. The Common Raven from tip of bill to tip of tail is 56cm to 63.5cm (Howell and Webb, 1995). Sizes of the 12 native Mesoamerican heron species, one of which could have been the type specific or single referent of pM **jooj*, are, in order of increasing size, as follows (Howell and Webb, 1995): Green Heron (38–43cm); Boat-billed Heron (45.5–53cm); Snowy Egret (48.5–58.5cm); Yellow-crowned Night-Heron (51–58.5cm); Little Blue Heron (51–61cm); Black-crowned Night-Heron (56–63.5cm); Tricolored Heron

(56–66cm); Agami Heron (66–76.5cm); Reddish Egret (66–76.5cm); Bare-throated Tiger-Heron (71–81.5cm); Great Egret (84–99cm); Great Blue Heron (101.5–127cm).

The size ranges for five of these species (Tricolored Heron, Black-crowned Night-Heron, Little Blue Heron, Yellow-crowned Night-Heron and Snowy Egret), overlap with that of the Common Raven, and the size range of the Black-crowned Night-Heron is the same as the raven's.

Three of the five herons comparable in size to the raven are conspicuously different from it with respect to neck and bill appearance. The Tricolored Heron, Little Blue Heron and Snowy Egret show long necks and much finer bills compared with the raven. On the other hand, necks of both the Black-crowned Night-Heron and Yellow-crowned Night-Heron are relatively short and their bills are stout, more like that of the raven.

The neck of the Black-crowned Night-Heron is usually hunched, while that of the Yellow-crowned Night-Heron is most often seen outstretched, lending to the former a more superficial resemblance to the Common Raven than the latter. In addition, the Black-crowned Night-Heron shows a flight profile more similar to the raven's than that of the Yellow-crowned Night-Heron. The former's slightly extended feet make its rear extremity appear like the wedge-shaped tail of the raven, at least when seen in flight at a distance.

Finally, three experienced birdwatchers were assembled to compare the calls of each of the 12 Mesoamerican herons and egrets with that of the Common Raven using modern digital recordings. Their observation also supports the possible special status of the Black-crowned Night-Heron in the referential application of pM **jooj*. They agreed that calls of 4 of the 12 species were equally among the most similar to that of the raven: Black-crowned Night-Heron, Boat-billed Heron, Great Blue Heron and Great Egret. Both the Boat-billed Heron and the Black-crowned Night-Heron are nocturnal birds, infrequently seen in the daytime and, thus, probably known to the prehistoric Maya primarily by their calls rather than by appearance.

Overall, the Black-crowned Night-Heron, among all Mesoamerican herons, would seem to have more features, in addition to its call, in common with the raven. If pM **jooj* designated a single species of heron or had a single species as a type specific, the Black-crowned Night-Heron would seem to be the best candidate. Thus, on the basis of morphological similarity together with the similarity of calls, two very different kinds of bird, ravens and herons, are linguistically linked in the prehistory of Mayan languages of Mesoamerica.

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15

What's in a Bird's Name: Relationships among Ethno-ornithological Terms in Nage and other Malayo-Polynesian Languages

Gregory Forth

The Nage people of Flores Island, eastern Indonesia, employ 76 names for locally recognized categories of birds. Of these, at least one third have cognates in other Central-Malayo-Polynesian languages, and among the latter as many as ten are further related to bird terms in other Malayo-Polynesian groupings. A major objective of this chapter is to consider the kinds of ornithological species that tend to be named in the same, or related, ways in languages belonging to different language groups – that is, the avifaunal referents of bird names which appear not to change, or to undergo little change, through time. Particular attention is paid to the possible role of onomatopoeia as a factor accounting for similarity of names and the constancy with which certain terms are retained as names for the same bird categories. Attention is also given to the influence of symbolic similarity on nomenclatural relatedness.

Introduction

A recent study of folk knowledge of birds among the Nage of Flores Island in eastern Indonesia records 65 Nage names for ethno-ornithological categories (Forth, 2004) (see Table 15.1). The names are drawn from a total of 76 terms for folk categories, more specifically folk generics (*sensu* Berlin, 1992), which denote avian species, or what scientific ornithologists call 'birds'. The sample is reduced to 65 by deleting 11 compound terms (e.g. *kolo ghodho*) and retaining only the primary term (e.g. *kolo*). Of the 65 names, 52 are demonstrably related to terms for birds in other Indonesian languages spoken either on Flores or on other islands. Nage belongs to the Malayo-Polynesian languages, a group comprising hundreds of languages spoken from Madagascar to Hawai'i, but centred geographically in insular South-East Asia. Together with the indigenous languages of Taiwan, the Malayo-Polynesian languages compose an even larger language family designated as Austronesian.

Like most languages of eastern Indonesia, Nage more specifically belongs to a group known as Central-Malayo-Polynesian. Other Malayo-Polynesian groupings include the Western-Malayo-Polynesian and the Oceanic languages. Western-Malayo-Polynesian languages include Malay as well as languages of western Indonesia (spoken on Sumatra, Java, Bali, Lombok, Borneo and Sulawesi), the Philippines and Madagascar. The Oceanic group includes the languages of Polynesia, Micronesia and parts of Melanesia. Within the Central-Malayo-Polynesian languages, Nage, which is spoken in the central part of Flores Island, is a member of a smaller grouping provisionally defined and designated by Esser (1938) as 'Bima-Sumba'. This comprises languages spoken in the Bimanese region of eastern Sumbawa, on Sumba and in the western and central regions of Flores. The group further includes Savunese (spoken on the Island of Savu, between Sumba and Timor) and the language of Ndao, a small island located off the west coast of Roti. Within the Bima-Sumba group, Nage forms part of a still smaller cluster of central Florenese languages called Ngadha-Lio. On Flores, these mainly contrast with Manggarai, a Bima-Sumba language spoken in the western part of the island. Besides Bima-Sumba, other sub-groupings within the Central-Malayo-Polynesian group include the Flores-Lembata languages spoken in eastern Flores and on several smaller islands to the east (Solor, Adonara and Lembata); the languages of Timor to which Rotinese also belongs; and languages of the Moluccas (see Figure 15.1).

One aim of this chapter is to demonstrate how far Nage bird names are related to names for the same or similar species found in:

- other Bima-Sumba languages;
- other Central-Malayo-Polynesian languages; and
- Western-Malayo-Polynesian languages.

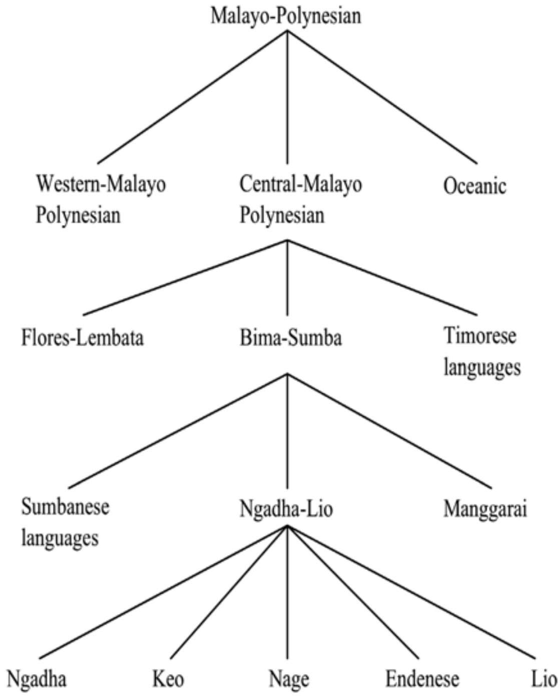

Figure 15.1 *Relationships among Malayo-Polynesian languages*

As will be seen, some related names – or 'cognates' (terms related by common descent from the same parent language, such as English 'fowl' and German '*Vogel*') – occur only in Nage and other Central-Malayo-Polynesian languages, while others are found both in these and in languages of the Western-Malayo-Polynesian group. In the second case, it is reasonable to expect that the name had a counterpart – or 'reflects a proto-term' as linguists express it – in an ancient Malayo-Polynesian language ancestral to both groupings: a hypothetical 'proto-language' that linguists call Proto-Malayo-Polynesian. Cognatic relationship can reasonably be hypothesized only in the absence of evidence for other factors accounting for resemblances between different languages – in particular, borrowing and linguistic universals. In the current instance, the borrowing of bird names is least likely where similar terms occur in both Central-Malayo-Polynesian and Western-Malayo-Polynesian languages.

Further addressed in this chapter are features that may be shared by the various bird categories whose Nage names have cognates in other languages – for example, whether these are especially common or useful birds or whether the names themselves have qualities that facilitate their retention as parent languages split into daughter languages. Expressed another way, the question is why some names for birds are more widespread among Malayo-Polynesian languages than are others, using 'name' to refer to a cognate set: a set of related terms in different languages.

Nage bird names and cognates, all of which apply to the same or similar species, are listed in Table 15.1. One advantage of taking Nage as the point of departure is that the names, and the categories that they designate, can be comprehensively referred to previous publications documenting the ornithological species or genera concerned, as well as Nage knowledge and practice relating to the categories, including local exegesis of their names and local recognition of onomatopoeia (e.g. Forth, 2004). A limitation of the procedure is that by taking a single language as the focus of comparison, one excludes bird names in related languages which do not occur in Nage, but nevertheless have cognates in still other Central-Malayo-Polynesian languages. A review of available lexical evidence from other languages, however, suggests that such terms are relatively few. More importantly, there appear to be none that have clear cognates in Western-Malayo-Polynesian languages; partly for this reason, they do not significantly alter the analysis offered below.

Distribution, familiarity and utility

An obvious reason why some bird names are more widespread than others is that the species named are more widespread. Geographically, the contrast of Western-Malayo-Polynesian and Central-Malayo-Polynesian languages largely coincides with a major biogeographical division. For the most part, people speaking Western-Malayo-Polynesian languages reside within the Oriental zoogeographic realm, while speakers of Central-Malayo-Polynesian languages, including of course Nage, occupy the Australian realm and, more specifically, the region of eastern Indonesia known as Wallacea. Exceptions are the languages of Sulawesi, Lombok and western Sumbawa, all of which are linguistically Western-Malayo-Polynesian, but which are spoken within the Australian realm. Unfortunately, comprehensive lexical materials pertaining to bird kinds found in these three regions are not available. Because certain families of birds are found only in the Oriental or the Australian realm, it is understandable that this distribution will be reflected in bird names even though avifauna belonging to different species, and even genera, can sometimes be called by related names. By itself, this factor explains the absence of Western-Malayo-Polynesian cognates of three Nage bird names: those designating the Yellow-crested Cockatoo *Cacatua sulphurea* (*kea*), Helmeted Friarbird *Philemon buceroides* (*koka*) and Orange-footed Scrubfowl *Megapodius reinwardt* (*wodo*), none of which occurs in the Oriental zoogeographic region. On the other hand, all other bird kinds listed in Table 15.1 are found in both regions, at least at the level of the genus or family.

Birds whose Nage names have cognates in Western-Malayo-Polynesian as well as Central-Malayo-Polynesian languages (see Table 15.1, Part 1) are all quite common species. For obvious reasons, the domestic fowl (*manu*) *Gallus gallus* is the most ubiquitous and familiar of all birds. Yet, all nine of these birds are familiar to Nage and other Indonesians who distinguish them by name, even though at least two (*po*, owls; and *toe ou*, Common Koel, *Eudynamys scolopacea*) are better known from their vocalizations than their physical forms. At the same time, there are many other common birds whose Nage names appear not to be cognatically related to ethno-ornithological terms in Western-Malayo-Polynesian languages, so this factor alone cannot explain the difference. How far the same observation may apply to bird names which have cognates only in other Bima-Sumba languages spoken on Flores Island, or appear to be exclusive to Nage and unrelated to terms in any other language, is less easy to say. Nevertheless, of 16 categories (drawn from Forth, 2004) that can be judged the least well known among Nage folk ornithologists, one half are designated with names that appear to be specific to Nage, while all, except one, of the remainder (*bi* or *ana bi*) have cognates only in other Bima-Sumba languages.

A variant of the question of how far species familiarity affects retention of bird names is whether the most widespread names coincide with the most 'focal' of ethno-ornithological categories – the kinds which local people are likely to identify as the most typical instances of a (covert or overt) category of 'bird'. The question poses difficulties, one of which concerns how far people living in different cultural and natural environments might further differ in which kinds they consider typical birds, as indicated, for example, by the order of their occurrence in recall lists (Forth, 2004). If the Nage alone are to be taken as indicative, it may appear significant that, of the nine birds listed in Part 1 of Table 15.1, the two Columbiformes and the Large-billed Crow *Corvus macrorhynchos* can be considered focal (i.e. among the earliest mentioned in recall lists). However, although also well known to Nage, ducks, owls and the Asian Paradise-flycatcher *Terpsiphone paradisi* are far less focal to the category 'bird'; and largely because of its domestic character, many Nage are ambivalent as to whether the chicken (*manu*) should be classified as a 'bird' at all. In addition, arguably the most focal of birds for Nage are diurnal birds of prey, and none of these figure among the nine Nage names with cognates in Western-Malayo-Polynesian languages.

Another factor possibly common to birds with related names is their practical value. Thus, of the nine birds listed in Part 1 of Table 15.1, ducks, quail, doves and pigeons (*muke* and *zawa*) are prized game birds, just as the chicken (*manu*) is a valued source of meat and eggs. Yet, like many other Indonesians, Nage hunt and consume many more bird kinds than these. What is more, rarely do analysable bird names among Nage refer to practical uses, but, instead, describe morphological or behavioural features of the birds. Much the same assessment applies to the 13 Nage bird names with cognates only in other Central-Malayo-Polynesian languages (see Table 15.1, Part 2); two of these are valued gamebirds (*kata*, *kolo*) while the scrubfowl (*wodo*) is exploited for its large eggs.

Table 15.1 *Nage bird names and Malayo-Polynesian cognates*

Part 1: Nage bird names with cognates both in other Central-Malayo-Polynesian (CMP) languages and in Western-Malayo-Polynesian (WMP) languages.

Bébe or ***Bébe ae***, Duck *Anas* spp. (*ae* is 'water') **Onomatopoeic name (ON)**
CMP: Manggarai *bébek*; Lio *bébe ae*; Ngadha (Mangu Léwa) *bébe wae*; Ngadha (Wogo) *bébe jawa*; western Keo (Guyu Wolo) *bébe mesi*; So'a *bébe wolo*; Sikka *bébe uta*; Nuaulu (Seram Island, Moluccas) *pepeko*.
WMP: Malay/Bahasa Indonesia *bébék*.

Ha, Crow (specifically Large-billed Crow) **ON**
CMP: Eastern Sumbanese *nggangga*; western Sumba (Laura) *gaga*; Nage, Ngadha (Wogo) *ha*; Lio *a*, *ule a* (*ule* is a general term applied to birds and other animals); Manggarai *ka*; Sikka, East Flores, Solor *kang*; Kédang *ang*; Rotinese (Ba'a) *ka*, (Termanu) *ka'*; Ndao *laká*.
WMP: Malay/Bahasa Indonesia *gagak*; compare **gak + gak* (Proto-Hesperonesian = Western Austronesian) (Zorc, 1994).

Lawi luja, Asian Paradise-flycatcher.
CMP: Lio *lawi luja*; Manggarai *lawe ludjang*; Ngadha (Wogo), Rembong *lawi-luzan*, *lawi-nuzan*; Lembata *lawi lalu* (the Lembata (Lomblen) term refers specifically to the male of the species; *lalu* is 'cock').
WMP: Iban (Borneo) *langgai lemujan*, paradise-flycatcher.

Manu, Domestic fowl.
CMP: Encountered in all parts of Flores and in other CMP languages as the name of the domestic fowl and in the names of certain wild bird taxa. Also common in WMP and Oceanic languages (Forth, 2006); compare Proto-Malayo-Polynesian **manuk*, 'chicken, bird, fowl' (Zorc 1994).

Muke, Emerald Dove.
CMP: Ngadha (Wogo), Lio *muke*; Manggarai *mungke*; Sikka *mugeng*; East Flores *mugen*; Solor *muke*; Tetum (Timor) *lamuka*, *lamukan*, 'a dark green dove'; Rotinese (Ba'a) *mu'ek*, (Diu, Bilba) *muké'*; Buru (Moluccas) *ermuken*, 'dove'.
WMP: Various cognates appear in languages of the Philippines, Borneo, Sumatra and the Malay Peninsula; compare Proto-Malayo-Polynesian **-muken*, 'omen dove' (Blust, 1983; Clark, 1994).
Philippines languages: Cebuano *alimúkun*, White-eared Brown-dove *Phapitreron leucotis*; Ilokano *alimúkeng*, 'wild dove with grey plumage'; Maranao *limoken*, 'wild grey dove'; Bagobo *limokon*, Emerald Dove; Subanun *limukun*, unidentified 'bird of evil omen'.
Bornean languages: Kayan *kelebuken*, Green Imperial-pigeon *Ducula aenea*; Kadazan *himbukon*, 'hill-pigeon'.
Other WMP: Bolaang Mongodow (northern Sulawesi) *limbuken*, 'wild dove with sombre, mournful cry'; Karo (northern Sumatra) *limbuken*, 'dove sp.'; Malay (Windstedt, 1965) *limbok*, *lembok*, Emerald Dove.

Piko, Quail *Coturnix* spp. (specifically, Brown Quail *C. ypsilophora*; Blue-breasted Quail *C. chinensis*).
CMP: Wogo, So'a *piko* (in three compounds denoting quails and button-quails); Rembong (Waru Kia dialect) *piko*, 'a kind of quail, possibly the Blue-breasted Quail'.
WMP: Malay *pikau*, Blue-breasted Button-quail, *Excalfactoria chinensis* (Winstedt, 1965); West Kutei Malay (Borneo) *empikau* (Stokhof, 1986); Iban *pitu, empitu*, 'quail ', *C. chinensis* (Richards, 1981).

Po, Owl (including the Barn Owl *Tyto alba* and other Strigidae) **ON**
CMP: Ngadha (Wogo), Lio *po*, Wallace's Scops-owl *Otus silvicola*; Manggarai *po*, Barn Owl or Wallace's Scops-owl (in different dialects); Sikka, East Flores *bo*, Wallace's Scops-owl.
WMP: Iban *pok* (also *puk*, *puak*, 'Scops-owl') (Richards, 1981).

Toe ou**,** Common Koel **ON**
CMP: Ngadha (Wogo) *toe*; Manggarai *toa*; Ndao *toé*; Sikka *manu toa*; East Flores *manu toan*, *tuok*; Solor *ketuo*; Adonara *ketuok*; Kédang *tu wolo* (Verheijen, undated) or *tuaq wolo* (Barnes, pers comm, 2001); Lembata *tuo*; Rotinese (Ba'a) *doa*, (Diu, Bilba) *kukoa*.

Table 15.1 *continued*

WMP: Bahasa Indonesia *tuwur, tuweuw* (MacKinnon, 1991); compare **tu?aw*, 'bird and its cry' (Proto-Hesperonesian = Western Austronesian) (Zorc, 1994).

Zawa, Green Imperial-pigeon.
CMP: Ngadha (Wogo) *zawa*; Keo, Lio *rawa*; eastern and western Sumba *rawa* 'pigeon, dove'; Sikka, East Flores *rawa*; Solor *ra*.
WMP: Iban *rawa*, pigeon (with qualifiers denotes the Pied Imperial-pigeon and Grey Wood-pigeon *Columba argentina*) (Richards, 1981).

Part 2: **Nage bird** names with apparent cognates only in other CMP languages, but including languages of both the 'Bima-Sumba' (B-S) and 'Flores-Lembata' (F-L) groups, and in some cases languages of the Timor region.
** Double asterisk indicates that the genus or other taxon named by the term also occurs in the Oriental zoogeographic realm – that is, in regions where Western-Malayo-Polynesian languages are spoken.
Note: As the 'r' has been lost in many Nage dialects, some bird names differ more from cognates than they might otherwise. Among the names listed below, this applies particularly to *bi* and *leo*.

Ana peti or ***peti***, Munias *Lonchura* spp. and other small passerine birds.**
B-S: Manggarai (several dialects) *peti*, 'almost all small birds'; Manggarai (Lamba Léda) *peti*, Estrildine finches.
F-L: Sikka, East Flores *ti*, Estrildine finches and other small birds (also in compound names).

Bama or ***bama cea***, Russet-capped Tesia *Tesia everetti*** (the genus *Tesia* occurs only in one area of Java, otherwise mostly on the South-East Asian mainland and southern China).
B-S: Ngadha (Wogo), So'a *ana rama*; Lio *ana bama*; Rembong *mbama*.
F-L: Sikka (Léla) *bama*; Nita *blama*.

Bi or ***ana bi***, Red-cheeked Parrot *Geoffroyus geoffroyi*** (within the Oriental region, the Rainbow Lorikeet *Trichoglossus haematodus* occurs only in Bali and Java, where it is rare).
B-S: Ngadha (Wogo), Manggarai *piri*; Lio *mbiri*, Rainbow Lorikeet; eastern Sumba *pirihu*, *pirisu* Rainbow Lorikeet; western Sumba (Wewewa, Kodi, Laura) *pero*, Rainbow Lorikeet.
F-L: Sikka *brik*, Rainbow Lorikeet; East Flores *berik*, Red-cheeked Parrot; Lembata *beri hi'i*, Rainbow Lorikeet.
Timor region: Tetum *birus*, 'parrot with green and yellow feathers'.

Céce, drongo (specifically Wallacean Drongo *Dicrurus densus*)** **ON**
B-S: Ngadha (Wogo) *sése jie*; Lio *sése sie* or *sisi sie*; Manggarai (some dialects) *cécek*; Rembong *sésék*, *sését*.
F-L: Sikka, East Flores *sése*; Solor *sése*, *sések*.

Ceka, fantail (*Rhipidura* spp.)** **ON**
B-S: So'a *seka*; Ngadha (several dialects) *siku-seka*.
Timor region: Rotinese (Ba'a, Diu) (?) *saka-liti*.

Cio woza, cuckoo-shrike (specifically, Black-faced Cuckoo-shrike *Coracina novaehollandiae*)** **ON** (in regard to *cio*).
B-S: Lio *sio wora*; Ngadha (Wogo) *lio*; Manggarai *liok*; Komodo *lioq*; Ndao *ci lolo*.
F-L: Sikka *sia wora* or *sio wora*; Solor *sebio*; East Flores *bior*, *sio wora*.

Iki, Moluccan Kestrel *Falco moluccensis*.** **ON**
B-S: Ngadha (Wogo) *'iki*; Lio *iri kiki*; Rembong (Wangka) *ikit*, Moluccan Kestrel; eastern Sumba *ikitu*, Brahminy Kite *Haliastur indus* and other large diurnal raptors; western Sumba (Wewewa, Laura) *wikita*, diurnal raptors; Ndao *lakiki*, Moluccan Kestrel.
F-L: East Flores, Solor *kewikit*; Sikka *kiwin(g)*, Moluccan Kestrel; Kédang *kiki*, *kiki mulin*, 'bird of prey with red plumage' (Barnes, pers comm, 2001; compare *muli kiki*, Moluccan Kestrel) (Verheijen, undated).
Timor region: Tetum *kikit*, hawk (compare *kikit loko mean*, hawk with a white crop), Tetum *makikit*, eagle or any bird of prey; Rotinese (Diu, Bilba) *téma-kiki'*.

Table 15.1 *continued*

Kata, Green Junglefowl *Gallus varius*.**
B-S: Ngadha (Wogo) *kata*; Lio *hata*; Manggarai *rata*; Komodo *kerata*; eastern Sumba *tata, manu tata* (compare *manu*, fowl).
F-L: Sikka *'rata*, *manu 'rata*; East Flores *rata*; Solor *terata*.

Kea or ***kaka kea***, Sulphur-crested Cockatoo
B-S: Ngadha (Wogo) *kéka*, *kea*; Keo (Sawu, Riti) *kéka*; Lio *wéka*; Rembong *kéak*; Manggarai *kéka*; eastern Sumba *kaka*.
F-L: East Flores, Sikka, Lio *wéka*; Solor *wékak*; Kédang *weaq* or *wé'a*.
Timor region: Tetum *kakae*; Rotinese (Termanu, Diu, Bilba) *kakaé*.
Nuaulu (Seram Island, Moluccas) *weka*, *wekae*, certain parrots, including the Eclectus Parrot *Eclectus roratus*.

Koka, Helmeted Friarbird **ON**
B-S: Ngada (Wogo), Lio *koka*; Manggarai *kokak*; Komodo *kaka koaq*; eastern Sumba *koka*.
F-L: Sikka, East Flores *o'a*; East Flores *kuka*, *kukak*; Solor *kukak*; Kédang *oaq*.
Timor region: Tetum *ko'a-kauk*, *kakoak*, *kae-ko'ak*; Rotinese *koa*, *koa'* .

Kolo, small doves, (*Streptopelia* and *Geopelia*)** (in some Flores-Lembata languages, and also in eastern Sumbanese, variants of *kolo* occur in the names of very various kinds of birds) (Forth, 2006).
B-S: Ngadha (Wogo) *kolo*, *Streptopelia* (compare Wogo *kolo fowo*, *Geopelia*; *kolo ngongo*, *kolo duru*, Emerald Dove); Lio *ana kolo*, *Geopelia*; Rembong, Manggarai *kolong*, Peaceful Dove *G. striata*; western Sumba (Laura) *kolongo*, Barred Dove *G. maugei*.
Ndao *koro-'ia*, Peaceful Dove, *koro-menanga* Spotted Turtle-dove *S. chinensis*, *koro-ai*, Emerald Dove.
F-L: Sikka *olong nosor*, *Geopelia* (compare Sikka *olong gete*, *Streptopelia*; *koro boang*, Treron floris); East Flores *olon boun*, *Geopelia* (compare East Flores *olon lohor*, *Streptopelia*; Solor *kolo bou bedara*, *Streptopelia*; Kédang *olong*, 'kind of spotted dove').
Timor region: Dawan (Atoni) *kolo*, 'bird (in general)'.

Leo, Black-naped Oriole.**
B-S: Ngadha (Wogo) *sése lézo*; Lio *léro*; Manggarai *léros*, *ngkéros*; Komodo *kéroh*.
F-L: Sikka, East Flores *kéor*; Kédang *éor*.

Manu miu, unidentified night bird or vocalization (Nage, Bo'a Wae dialect; in other Nage dialects refers to the Brown Hawk-owl *Ninox scutulata*, as do all cognates listed blow. *Manu* is 'fowl').** **ON**
B-S: Keo *manu miu*; Lio *ule mi'u*; Ngadha (Ruto, Maghi L/ewa) *'ibu ngiu*; Rembong (Térong-Mawang, Léngko Sambi) *ngiung*; Manggarai *iu*.
F-L: Sikka *manu mi'u*; East Flores *manu miuk*.

Tiwe, sunbird *Nectarinia* spp.**
B-S: Ngadha (Wogo) *tiwe*; Lio *tive*, 'small, green bird' (Arndt, 1933).
F-L: Larantuka *tiwi*, ?sunbird (Barnes, pers comm, 2001); Kédang *iwi* (Verheijen, undated) *iwi* or *ciwi* Barnes, pers comm, 2001).

Toto, Lesser Coucal *Centropus bengalensis*** **ON**
B-S: Ngadha (Wogo), Lio *toto*; Manggarai *kotok*, *totok*; eastern Sumba *toturu laka*, *tutuku*; western Sumba (Laura) *kodota*.
F-L: Sikka, East Flores *hohok*; Kédang *todoq*.
Timor region: Tetum *tuduk*, *tuluk*, 'onomatopoeically named bird'; Rotinese (Ba'a) *kokok*, (Diu, Bilba) *koko'*, Lesser Coucal.

Wodo or ***koko wodo***, Orange-footed Scrubfowl.
B-S: Ngadha (Wogo), Lio *wodo*; Rembong, Manggarai, Komodo *wontong*; eastern Sumba *wundu*, *wondu*; western Sumba (Wewewa, Kodi) *wondo*; western Sumba (Laura) *ghondo*; ?Ndao *ho'do*, Swamp Quail *Synoicus ypsilophorus*.
F-L: Sikka *wodong*; East Flores *wodon*; Solor *wodo*.

Table 15.1 *continued*

PART 3: **Nage bird names** with cognates in one or more other Bima-Sumba languages of Flores (Ngadha-Lio and Manggarai sub-groupings) but not in other Central-Malayo-Polynesian groupings.

Ana go Identification uncertain; possibly a bush-lark or pipit, *Mirafra* spp. or *Anthus* sp.
Ngadha (Wogo), So'a *ana go*, *Cisticola* spp.

Ana uza or ***awe uza***, swallows (Hirundinidae) and swifts (Apodidae).
Ngadha (Wogo) *ana uza*; western Keo (Sawu) *ana ura*; eastern Nage (Ndora) *rawa uza*; Ende *ana ae ura*, all *Collocalia esculenta*.
Lio (Wolo Topo) *ana uja* or *ae uja*, *Artamus leucorhynchus*.

Bewu, button-quails, *Turnix* spp.
Lio *ana bewu* (*Turnix* spp., Brown Quail).

Bio, Lonchura and other Estrildine finches.
Eastern Keo (Riti) *mbio*, Lonchuridae; Eastern Nage (Ndora) *bio*, Lonchuridae.

Bopo, fruit-doves (*Ptilinopus* spp.) and the Flores Green-pigeon (*Treron floris*).
Lio *mbopo*, 'a bird with green feathers' (Arndt, 1933).

Detu, Sunda Pygmy-woodpecker, *Dendrocopos moluccensis*.
Ngadha (Wogo) *detu*.

Fega, kingfisher.
Ngadha (Wogo) *fega*; Lio *fengga*, *Caridonax fulgidus*.

Feni, parrot, especially, Great-billed Parrot, *Tanygnathus megalorhynchos*.
Ngadha (Wogo) *feni*, Rainbow Lorikeet; Lengko Sambi, *feni*, Red-cheeked Parrot.

Héga hea, Flores Crow, *Corvus florensis* ? **ON** (*hea*)
Ngadha (Wogo) *héga rea* ; Manggarai *léa*, *kaka éa*.

Ie wea, io wea, Hill Myna, *Gracula religiosa* **ON** (*ie*, *io*)
Ngadha (Wogo) *ie wea*; Lio *ie, ie wea*.

Jata, Brahminy Kite.
Lio *jata ria* (*ria* is 'big').

Kaka daza, Dollarbird, *Eurystomus orientalis* **ON** (*kaka*)
Lio *kaka ndara*, 'a songbird' (Arndt, 1933).

Kua, eagle.
Ngadha (Wogo) *kua ngulu*, Barn Owl.

Kuku raku, White-breasted Waterhen, *Amaurornis phoenicurus* **ON**
Ngadha (Wogo) *kuku raku*, night-heron, *Nycticorax* sp.

Lako lizu, night-heron, *Nycticorax* sp.
Western Keo, Lio *lako liru*; Ende *rako riru*; north-eastern Nage (Danga) *dako diru* (Verheijen, undated).

Leba, Savannah Nightjar, *Caprimulgus affinis*.
Ngadha (Wogo) *lebe*; eastern Keo (Riti) *nggeba tana*; Ende *gheba tana*; north-eastern Nage (Danga) *repa tana*, Tana Wolo *koka lemba* (in all these names, *tana* is 'earth, ground').

Mata to, a rail, probably Red-legged Crake.
Tana Wolo *mata tozo*; Pore *mata tojo*, rail.

Muta me, Channel-billed Cuckoo, *Scythrops novaehollandiae*.
Ngadha (Wogo), Ende *muta mére*.

Naka bo, one or more kinds of munia (*Lonchura*).
Western Keo (Sawu), So'a *naka bo*, Great Tit, *Parus major*.

O ae, herons and egrets, Ardeidae.
Ngadha (Wogo) *oro wae*; Mangggarai *orong*.

Table 15.1 *continued*

'Owa, cuckoo-dove, *Macropygia* spp.
So'a, Ndora, Tédha Mude *rowa*; eastern Keo (Riti) *lowa, 'owa*; western Keo (Sawu) *yowa*; Ngadha *rova*, 'sort of bird'.

Papa, Chestnut-capped Thrush, *Zoothera interpres* **ON**
Ngadha *papa*, 'kind of bird'.

Sizo, small hawk or goshawk, *Accipiter* sp.
Western Keo, eastern Keo (Riti) *siro*; Rembong (Lengko Sambi) *sizo*; Ngadha, *sizo*, 'falcon' (Arndt 1961).

Tute péla, Pied Bush-chat, *Saxicola caprata*.
Soa, Ngadha *tute*; Tana Wolo *tute mite*.

Wi, Buff-banded Rail, *Gallirallus philippensis*.
Ngadha (Wogo) *feri*; Manggarai *weris*, *kaka weris*.

Witu tui, possibly Great Tit **ON**
Western Keo *'itu tui*; Ngadha (Wogo) *witu tui*, Brush Cuckoo, *Cacomantis variolosus*.

Zeghi (or ***jeghi***), Blue-tailed Bee-eater, *Merops superciliosus* **ON**
Ngadha (Wogo) *jeghi*, *teghi*, Collared Kingfisher, *Halcyon chloris*.

Part 4: **Nage bird names** with no apparent cognates in other languages.

Bele teka, Peregrine Falcon *Falco peregrinus*.

Cici ko'i, Tree Sparrow *Passer montanus* **ON** (*cici*)

Deza kela, unidentified small bird.

Ebu titu, Swallows (Hirundinidae) and Swifts (Apodidae); the name is synonymous with *ana uza* (Part 3).

Gako tasi, large black and white herons.

'Iiri ae, wagtail, *Motacilla* spp; a synonym of *wagha lowo* (see below).

Je, an unidentified raptor, possibly Brown Hawk-Owl.

Kete dhéngi, Bare-throated Whistler, *Pachycephala nudigula*.

Koa ka, identification uncertain; probably the Flores Crow and possibly also Common Koel; thus, synonymous with *héga hea* (Part 3) and *toe ou* (Part 1). **ON**

Mele witu, probably a cisticola, *Cisticola* sp.

Mu ki or ***mulu ki***, Blue-breasted Quail.

Wagha lowo, synonymous with *'iri ae* (see above).

Wole wa, a diurnal raptor of uncertain species.

Notes: All cognates refer to the same species designated by the Nage term unless indicated otherwise.
CMP = Central-Malayo-Polynesian languages.
WMP = Western-Malayo-Polynesian languages.
B-S = Bima-Sumba languages.
F-L = Flores-Lembata languages.
ON = onomatopoeic name.

Onomatopoeia

Onomatopoeia among Nage bird names is judged, in the first instance, from local evaluations of names as resembling calls of the birds named, supported by local imitations and ornithological descriptions of the vocalizations in question (compare Berlin, 1992). In a few instances, scientific ornithology indicates probable onomatopoeic names even where local people do not recognize them as such, and in two cases (*bébe* and *leo*, designating ducks and the Black-naped Oriole, *Oriolus chinensis*) the names have been counted as onomatopes – that is, as replicating sounds made by the birds in question. Of the 65 Nage bird names, 13 (including leo) are fully onomatopoeic. Another six names comprise two words (lexemes), only one of which is onomatopoeic; these are counted as partly onomatopoeic. Another 24 terms are either wholly or partly descriptive of visual or other perceptual features or behaviour of the bird. The remainder of the 65 names are not onomatopoeic and have no analysable meaning of any sort. Therefore, 20 per cent of the Nage names are wholly onomatopoeic, while a further 9 per cent are partly so, giving a total of 29 per cent. By contrast, of the nine terms listed in Table 15.1 which have cognates in Western-Malayo-Polynesian as well as Central-Malayo-Polynesian languages, three, or 33.3 per cent, are onomatopoeic. If *bébe* (duck) is added to this list, the total rises to four, or 44.4 per cent. This list contains no names that are only partly onomatopoeic.

Of the 16 names in Table 15.1 which have cognates only in other Central-Malayo-Polynesian languages, all are related to terms occurring in divisions of Central-Malayo-Polynesian outside the Bima-Sumba group, most notably in the Flores-Lembata languages, but, in several cases, also in languages of the Timor region. Of these 16, 6 (or 37.5 per cent) are fully onomatopoeic, while another 2 (*cio woza* and *manu miu*) are partly onomatopoeic, thus giving a total of 8, or 50 per cent. If the totals are combined, of the 25 names listed in Table 15.1 (parts 1 and 2), 3 (or 36 per cent) are fully onomatopoeic, while 2 (or 8 per cent) are partly onomatopoeic. If *bébe* (duck) is included, the first percentage rises to 40 (four cases of ten instead of three of nine) and the total proportion becomes 48 per cent.

What these figures suggest is that names shared by quite distantly related languages within the Central-Malayo-Polynesian group are more likely to be onomatopes than are names that are further shared with much more distantly related Western-Malayo-Polynesian languages. At the same time, the figures for both name sets exceed those for Nage names alone, just 29 per cent of which are partly or fully onomatopoeic. Onomatopoeia further decreases when we compare Nage only with other Bima-Sumba languages on Flores (those belonging, like Nage, to the central Florenese 'Ngadha-Lio' group, or to Manggarai, the language of western Flores) (see Table 15.1, Part 3). Thus, of 27 Nage bird names with cognates in these languages alone, just over 25 per cent are onomatopoeic or partly onomatopoeic. At the same time, 31.5 per cent of the names describe visual or other perceptual features of the birds (e.g. *mata to*, 'red eyes', a kind of rail; *sizo*, 'to sweep down on and seize', referring to a kind of hawk). The pattern is even more marked among the 13 bird names that are exclusive to Nage, having no apparent cognates in any other language. Of these, just over 15 per cent (2 of 13) are entirely or partly onomatopoeic, while as many as 73 per cent (9.5 of 13) refer to visible features of the birds (e.g. *bele teka*, 'sharp wing', denoting a falcon) (see Table 15.1, Part 4).

Possible reasons for this variation are not difficult to find. Names which replicate the characteristic vocalizations of birds are more likely to be retained with language change and the splitting of languages into daughter languages than are names which describe the physical appearance, habits or environmental associations of the same ornithological kinds. This would follow partly because experience of the vocalizations will tend to reinforce the name and because similarity of the calls to the name will render the latter easier to remember. There are, however, evidently limits to the retention of onomatopoeic names in the course of linguistic change. Thus it is that distinct yet more closely related languages (e.g. within the Central-Malayo-Polynesian group) display more 'onomatopoeic cognates' than do more distantly related languages belonging, respectively, to the Central-Malayo-Polynesian and Western-Malayo-Polynesian groups. On the other hand, perceptual features, or names describing a bird's appearance or behaviour, are likely to be expressed in words (lexemes) specific to smaller groupings of languages and dialects. Being in a sense more specific and selective, they are also less easily remembered than names resembling bird calls, which may be the main or only manifestation of a species regularly experienced by folk ornithologists and of which people are more continuously reminded.

Symbolic properties

While less subject to quantification, the data in Table 15.1 suggest a correlation between name retention and a bird's symbolic significance. This finds support in Nage symbolic knowledge of birds as well as in the symbolism of many other Malayo-Polynesian speakers. Six of the nine birds whose names are reflected both in Central-Malayo-Polynesian and Western-Malayo-Polynesian languages have special significance for Nage (Forth, 2004). Three of these (owls, crows and the Common Koel) are 'witch birds' (birds that manifest witches), and two of these (owls and the koel) are identified as such largely with reference to their cries. For Nage, the cries of the koel are also a portent of the rainy season. Similarly, the habits and daily crowing of domestic fowls (*manu*) can have augural as well as chronological significance for Nage (Forth, 2007a), as they do for other Indonesians.

Since three of the above four kinds have onomatopoeic names, there would appear to be a connection between onomatopoeia as a feature of widely retained names and the symbolic value of the birds named, a tendency, in other words, for bird vocalizations to be used (or retained) simultaneously in both naming and symbolism. Another example of this coincidence may be the Emerald Dove, *Chalcophaps indica* (Nage *muke*) (see Table 15.1, Part 1), a bird designated with cognate names in a remarkable variety of Central-Malayo-Polynesian and Western-Malayo-Polynesian languages. Cognates even occur in Oceanic languages (see Proto-Oceanic *(*lV*)*muko*, 'dove', and Proto-Southeast-Solomons **lumuko*, 'ground dove'; Clark, 1994). Although this common dove has no special symbolic value for Nage, it apparently does among Malayo-Polynesian speakers elsewhere; thus, the Malayo-Polynesian proto-form of its name has been reconstructed as *-*muken*, 'omen dove' (Blust, 1983; Clark, 1994). Nage do not regard *muke* as onomatopoeic. However, the fact that the name may have originated as an onamatope is suggested when one compares the Nage form and elements of cognate names (e.g. *muku*, *moke*, *moko*, *mbuke*, *muge* and *buke*) with, for example, eastern Sumbanese *mukumu* or *kamukumu* ('to coo'), which appears in *rawa kamukumú*, the Sumbanese name for another Columbiforme, the Green Imperial-pigeon, *Ducula aenea*. In Rotinese, the same pigeon is called *ku-makamuk* (Ba'a dialect) or *maka-mu*' (Bilba, Diu). Nage do not consider their name for the imperial-pigeon, *zawa*, to be an onomatope; nor do any cognates suggest that the name originated in onomatopoeia (see Table 15.1, Part 1). Still, this bird appears as a major character in a widespread eastern Indonesian mythological tradition concerning the origin of day and night and life and death, and in this tradition the pigeon's symbolic character is defined primarily by its calls (Forth, 2004, 2007b). In this connection, it is further noteworthy that at least one Western-Malayo-Polynesian cognate of *muke* – Kayan *kelebuken* – denotes the Green Imperial-pigeon, the same Columbiforme that figures in the eastern Indonesian myths; and some of the other Western-Malayo-Polynesian cognates of Nage *zawa* might do so as well.

Similarly, it may be more than a coincidence that the Asian Paradise-flycatcher (Nage *lawi luja*) and the quail (*piko*), two birds whose names are reflected in both Western and Central-Malayo-Polynesian languages, form a mythological pair comparable to the imperial-pigeon (*zawa*) and the onomatopoeically designated friarbird (*koka*). They do so specifically in a tradition purporting to explain why the flycatcher (supposedly) never alights on the ground while the quail never perches in trees. At the same time, the strikingly distinctive physical features of the Asian Paradise-flycatcher, and particularly the male bird's extraordinarily long tail feathers, probably play some part in the retention of its name, just as they apparently inform the bird's symbolic value (Forth, 2004). In this connection, it is noteworthy that the resemblance between the flycatcher's Nage name, *lawi luja*, and *langgai lemujan*, the name employed in Iban, a Western-Malayo-Polynesian language, may owe as much to semantic analogy as to cognatic relationship. In Manggarai (western Flores), *lawi* or *lawe* thus means 'elongated tail feather' (Verheijen, 1963; compare Proto-Malayo-Polynesian **lawi*, 'tail feather'; Zorc, 1994), while Iban *langgai*, translates as 'trailing end, tail, train' (Richards, 1981). On the other hand, neither Iban *lamujan* nor Nage *luja* appears to have any separate meaning.

Just how far this sort of argument can further be applied to the 16 birds whose names are widespread specifically within Central-Malayo-Polynesian languages (see Table 15.1, Part 2) cannot be discussed here. Suffice it to say that at least seven or eight, thus roughly one half, have particular symbolic values for Nage (Forth, 2004). These include the friarbird (*koka*), the imperial-pigeon's opponent in the above-mentioned mythological genre (Forth, 2007b), as well as several other witch birds and omen birds (*bama*, *céce*, *cio woza*, *iki*, *kea* and *manu miu*). Apart from cognatic relationship, as noted just above with regard to the Asian Paradise-flycatcher, names for the same birds in different languages can resemble one another simply on the grounds of semantic analogy, having the same intensional (or literal) meaning, while the terms themselves are quite different and unrelated. One example from Florenese languages concerns the Pale-headed Munia *Lonchura pallida*, a bird which in both Bima-Sumba and Flores-Lembata languages is named by terms translating as 'Brahminy Kite munia' (e.g. Nage (*ana*) *peti jata* and Manggarai *peti kondo*) (Verheijen, 1963) with reference to the colour resemblance between the tiny finch and the large bird of prey. Similarly, in both Nage and Ndao, the Rufous Night-Heron (*Nycticorax caledonicus*) is called by terms which mean 'sky dog' (Nage *lako lizu*, Ndao *busa liru*) (Verheijen, 1976), evidently because its nocturnal cries recall canine yelping. In a broad sense, these nominal parallels, too, are grounded in common symbolic usages, even though they do not pertain to names derived from common proto-forms or do so only in part. An example with parallels further afield is *mata to*, 'red eyes', the Nage name for the Red-legged Crake *Rallina fasciata*, compared to the synonymous *mata merah*, the Malay/Bahasa Indonesia name for this and other rails (MacKinnon, 1991).

Conclusions

In regard to cognatic relationship alone, this chapter represents a modest and tentative departure in the comparative study of Malayo-Polynesian ethno-ornithological nomenclature. Much more remains to be done, both in augmenting the relatively meagre lexical materials available and locating naming practices in the context of ethnographically well-documented local cultures. Nevertheless, from the present review of Nage and cognate bird names, it has been possible at least to hint at hypotheses that could be pursued in larger-scale investigations. One has to do with the role of onomatopoeia. The importance of onomatopoeia in vernacular bird naming has been discussed before (Berlin and O'Neill, 1981; Berlin, 1992). This chapter reveals an additional dimension to the phenomenon insofar as it concerns the distribution of cognate names in different languages and different language groups. Concomitantly, the analysis has identified a link between onomatopoeic naming and symbolism as factors jointly involved in bird name retention in a possibly mutually reinforcing way. Lexical materials reviewed in this chapter more specifically suggest that Nage bird names with a greater number of cognates in other languages are more likely to be onomatopoeic than to refer to visual and other perceptual features of the species in question. They are also more likely to apply to the best-known local aviformes. It will be interesting to see how far these generalizations hold with respect to ethno-ornithological nomenclatures drawn from a broader range of Malayo-Polynesian languages.

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Part V

Birds and Conservation

16

An Alternative Reality: Māori Spiritual Guardianship of New Zealand's Native Birds

Philip O'B. Lyver and Henrik Moller

Spiritual guardianship by indigenous peoples has a key role to play in the conservation of wildlife populations and their habitats. Semi-structured interviews and workshops conducted with Māori elders from the Tūhoe, Hauraki and Rakiura tribal groups provided *mātauranga* (traditional ecological knowledge) about spiritual guardianship of three native bird species: kererū (*Hemiphaga novaeseelandiae novaeseelandiae*), oi (*Pterodroma macroptera gouldi*), and tītī (*Puffinus griseus*). Maintaining the integrity of the spiritual component of *mātauranga* was crucial for cultural sustainability of each tribal group. Informants perceived that upholding the *mana* (authority), *mauri* (life force) and *tikanga* (customs and practices) related to a species was fundamental to ensuring its persistence and well-being. Respect for *tapu* (sacredness), spiritual guidance and *tohu* (signals) played a regulatory role in protecting habitat, minimizing disturbance, increasing the chances of seabird chicks fledging and minimizing overharvesting or wastage. For Māori, developing the role and expertise of individuals – for example, *kaitiaki* (guardians) and *tohunga* (specially selected and trained experts) – within their tribes is crucial for the culturally appropriate delivery of environmentally based spiritual guardianship and *mātauranga* as a whole. Spiritual guardianship will, probably, be tolerated within existing 'Westernized' conservation management structures only if the belief, or its outcomes, conform to current laws and conservation practices, and will only be realized if Māori are in a position of authority and decision-making over lands or a resource, free from current wildlife and conservation policy.

Marginalization of Māori spiritual guardianship

For aboriginal peoples around the world, many aspects of societal structure and function, including how they relate to the environment and wildlife, reflect spiritual values and their expression. The practice of spiritual guardianship often involves the ritual harvest and use of natural resources according to cultural protocols validated within an ideology that views humans and all environmental components as part of an interacting life force continuum (Tyler, 1993). Thus, the role that indigenous peoples' knowledge and spiritual guardianship plays within contemporary natural resource management and conservation of colonized New World nations often remains unclear, isolated and underutilized (Taiepa et al, 1997; Manseau et al, 2005; Newman and Moller, 2005; Berkes, 2008). Seldom are indigenous peoples' conceptions of human–animal relationships and reciprocity used within wildlife or resource management policy and decision-making (Nadasdy, 2007). Mostly, spiritual components of indigenous peoples' worldview are treated as 'cultural constructions', implying that they are symbolic, rather than real (Ingold, 2000). By representing such conceptions of the environment as beliefs, rather than accepting the possibility that they may be actually (as well as metaphorically) valid, reinforces the state's domination over the criteria for forming resource management policy (Nadasdy, 2007).

For Māori, attempts to provide appropriate cultural responses to natural resource issues have been overlooked in the environmental decision-making process. Where attempts have been made to translate and integrate sections of *mātauranga Māori* (traditional ecological knowledge, or TEK) and *tikanga* (customs and practices) within the prevailing 'Westernized' culture, problems with debasing or divorcing language and constructs from their cultural setting, and the lack of acceptance of Māori worldview have arisen (Roberts et al, 1995). Even so, through the recent redress of Treaty of Waitangi grievances and land claims, New Zealand (NZ) government ratification of international agreements and enactment of policy (e.g. the 1993 Convention on Biological Diversity; Vision Mātauranga – see MoRST, 2005), a greater role for *mātauranga* in wildlife and resource management in NZ is envisaged (Newman and Moller, 2005; Lyver et al, 2008a, 2008b). For this to occur appropriately, the overarching Māori worldview which emphasizes *whakapapa* (genealogy or interconnection) between the supernatural and natural worlds (Patterson, 1994; Roberts et al, 1995) and regulated by the concepts of *tapu* (sacredness), *mana* (authority or prestige) and *utu* (reciprocity or balance exchange) (Patterson, 1992; King, 2003) must be acknowledged as valid.

Many NZ native birds are a recognized *taonga* (treasured or significant) or *rangatira* (chiefly) species for Māori tribes, from which the people derive part of their identity, and are highly valued sources of food and feathers – for example, tītī and Rakiura (Kitson and Moller, 2008; Moller et al, 2009a, 2009b, kererū and Tūhoe (Lyver et al, 2008a), oi and Hauraki (Lyver et al, 2008b). A large component of the traditional guardianship of these species, which included customary harvest, was embedded within a spiritual context and it was considered *whakamā* (shameful) to receive visitors of importance and not serve a meal of these birds. This act was fundamental in defining an *iwi* (tribe) or an individual as a *kaitiaki* (environmental guardian) for the area and local resources. The ability to provide these birds as food was a reflection on your *mana* as a *kaitiaki*; but as colonial European society progressively assumed power in the late 1800s, traditional Māori guardianship was, until recently, gradually dismantled and ignored. Over the last 30 years, the relative utility of TEK and science for guiding safe environmental management has been increasingly debated, especially where maintenance of culturally important customary uses of natural resources by indigenous peoples, such as Māori, is contested (Moller et al, 2009b). However, seldom are proposed applications of TEK based upon spiritual explanations or interpretations. This chapter describes a range of spiritually based guardianship concepts relating to customary harvests of three native bird species in NZ and demonstrates how these concepts could be used to inform and benefit natural resource management decision-making.

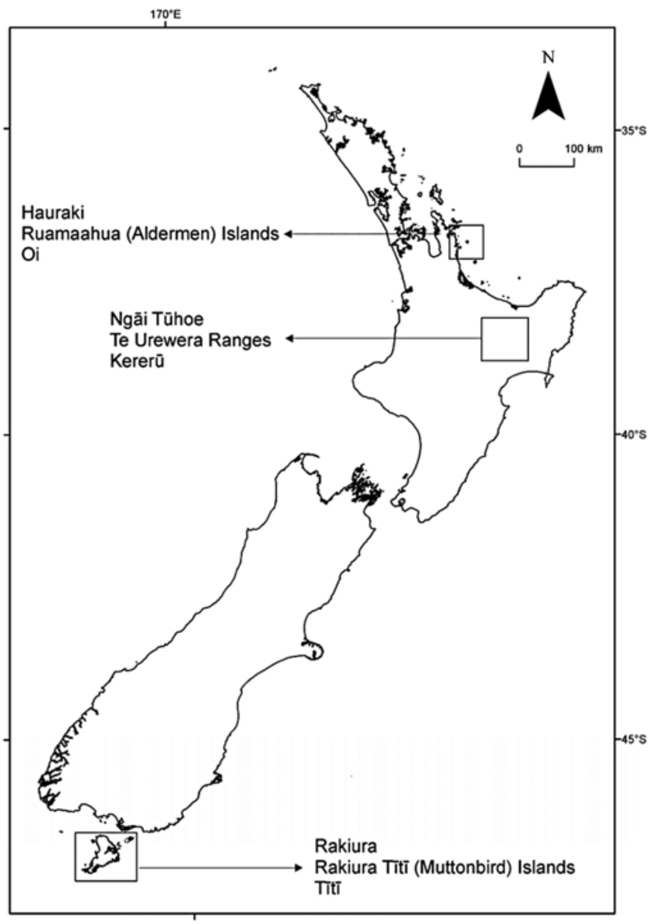

Figure 16.1 *Locations of traditional tribal harvest areas under the guardianship of Tūhoe (kererū), Hauraki (oi) and Rakiura (tītī)*

The authors (one has Māori *whakapapa*, the other a Pākehā – non-Māori) work with Māori communities on *mātauranga*–science partnerships as part of honouring the Treaty of Waitangi (Taiepa et al, 1997). The knowledge presented within this chapter is not owned by the authors but shared by informants from three Māori communities. *Mātauranga* must be seen in the bigger picture, and scientists and wildlife managers listen more attentively to indigenous peoples' voices, involving them in joint environmental decision-making and strong co-management (Borrini-Feyerabend, 1996; Moller et al, 2000).

Kererū and Tūhoe

The kererū is a large fruit pigeon (550g to 850g), endemic to NZ and inhabiting temperate rainforests from 35ºS to 47ºS (Clout, 1988). Birds were harvested by Māori throughout NZ when the birds were feeding on fruit from a native tree, the toromiro (Tūhoe dialectual variation: *miro*) *Podocarpus ferrugineus*. Kererū were also recognized as a valuable food item and gamebird by early European settlers (Clout, 1988; Atkinson, 1993; Coombes, 2003). Large-scale declines in kererū populations throughout NZ have occurred over the last century (Clout, 1988; Lyver et al, 2008a). Tūhoe are *manawhenua* (original people) of the Te Urewera region (see Figure 16.1) and were responsible for the guardianship of the natural resources; but over the last century, the land and associated flora and fauna have come increasingly under state authority and control (Coombes, 2003). At present, the Department of Conservation (DoC) manages the Te Urewera National Park and lists the kererū as 'in gradual decline'.

Oi and Hauraki

The customary take of oi chicks by Hauraki represents one of the three remaining petrel harvests permitted in Australasia (Skira, 1990; Kitson, 2004; Lyver et al, 2008b). Oi breed mainly on islands off the east coast of northern NZ, with the larger colonies on Mokohinau, Ruamaahua (Aldermen), Moutohora (Whale) and Whakaari (White) Islands (Wodzicki and Robertson, 1959; Imber, 1976; Imber et al, 2000). Recent estimates suggest the population comprises approximately 200,000 to 300,000 breeding pairs, indicating a total population in excess of 1 million birds (Taylor, 2000). Northern iwi such as Hauraki traditionally harvested oi chicks annually from mainland and offshore island breeding colonies (e.g. Ruamaahua Islands) (see Figure 16.1). However, in response to declining harvests during the 1960s, Hauraki implemented a *rāhui* (temporary harvest ban). Even so, a small-scale take persisted from the Ruamaahua Islands; today there is renewed interest by the iwi to reinstitute the customary practice. The island group is a designated nature reserve that is managed under an informal collaborative partnership between the Hauraki and the DoC.

Tītī and Rakiura

Tītī is probably the most ecologically important seabird in NZ (Warham and Wilson, 1982). The centre of breeding is in Foveaux Strait and on 36 (harvesting from about 30) Tītī ('Muttonbird') Islands around Stewart Island (see Figure 16.1). Tītī nest in burrows dug by the adults in deep peaty soils under a low forest canopy consisting mainly of tūpare *Olearia colensoi* and tētēaweka *Olearia oporina* tree daisies. The annual harvest is important culturally and economically for the Rakiura community (Waitangi Tribunal, 1991; Stevens, 2006; Kitson and Moller, 2008; Newman et al, 2008; Moller et al, 2009b). Extended family groups visit the islands between March and May each year to harvest late-stage chicks which are sold, bartered or used for home consumption or important communal events (weddings, funerals or cultural commemorations) and *hui* (tribal gatherings) at *marae* (traditional meeting places). Two community-elected committees (Rakiura Tītī Islands Committee and Rakiura Tītī Islands Administering Body) manage the annual tītī harvests in collaboration with the DoC under the auspices of the 1978 Tītī (Muttonbird) Islands Regulations.

The interview process

Invitations were extended to researchers by the tribal governing authorities to present a proposal for *mātauranga*-based studies, then sanctioned by each community at one or more *hui* (tribal gatherings). The individuals approached for interviews were recognized by the community to have knowledge and experiences relating to the birds and their harvest. Documents (a project description; oral history agreement governing information use and confidentiality) were discussed with the informant and signed before the interview commenced.

Semi-structured interviews were conducted to allow for a more 'natural' conversation and unanticipated insights to emerge (Huntington, 2000; Reyes-Garcia et al, 2006; Telfer and Garde, 2006). Each Tūhoe informant was given the questionnaire in both Te Reo Māori (Māori) and English so that they could follow the questions in either language. Interviewers were all fluent in English, Te Reo Māori and Tūhoe vernacular; Te Reo Māori was the first and preferred language of the Tūhoe informants. English was the first language for the majority of Hauraki and Rakiura informants, so questionnaires and interviews were in English.

Interviews with ten Tūhoe *kaumātua* (male elders; ages 50 to 84 years) were conducted during April 2004 to May 2007 for up to three hours and transcribed verbatim. A workshop, in Te Reo Māori and English, was conducted with seven of the informants to verify the narrative and concepts emerging from the interviews. Seven Hauraki *kaumātua* (ages 50 to 88 years), five with more than 30 years' birding experience; four *kuia* (female elders; ages 65 to 78 years); four muttonbirders with less than three years' harvest experience; and four Ruamaahua Islands Trust and Working Group members were interviewed during July 2006 to November 2007 for up to two hours in length. For the Rakiura tītī research, informants (6 women and 13 men; ages 55 to 85) had to be over 50 years old, still actively mutton-birding (two exceptions) and living in the Southland area. Interviews followed the standard practice and techniques employed by social scientists (Denzin and Lincoln, 2003). The heterogeneity of practices and traditions on different islands was addressed by interviewing representatives of various families from 11 different islands and 17 *manu* (family birding territories on tītī breeding ground), as well as testimony of the tītī harvesters gathered from focus group discussions and *hui*. All quotes inset within the text have been transcribed verbatim from informant interviews. Square bracketed text has been inserted within quotes to assist the reader with clarity and interpretation.

Spiritual significance of kererū, oi and tītī

All the informants acknowledged the significance of their specific birds and the practice of *kaitiakitanga* (environmental guardianship) in terms of providing a spiritual connection to their culture and ancestors, as well as maintaining individual well-being, *mana* (prestige) and identity:

> *The oi is a special* kai *[food]. It's a* rangatira *[chiefly] bird. It's got its own taste. You sort of crave for it and you want to have a feed. And every time we've had muttonbird or tītī or oi pulled out on the table, it's special. There's a special feeling to be able to eat the same sort of* kai *that our old people ate.*
>
> *The kererū is treated as a treasure. It is set aside and given a status of its own. There are a whole lot of other birds in the forest that Tūhoe use both for food and other means, the kiwi [*Apteryx mantelli*], the kākā [*Nestor meridonalis*], the tui [*Prosthermadera novaseelandiae*]; but in terms of Tūhoe and our customs the kererū is put above all those others. To my knowledge, kererū is the one bird that has special ritual in terms of the season [it is harvested], in terms of the preparation, in terms of storage. There are a whole lot of different processes and rituals attached to the kererū as against the kaka, the kiwi, the tui and those other birds.*

As recounted, birds such as the kererū, kākā and tui were held in high esteem in the time of the old people because these birds played a role in the traditions and customs. There were rituals and prayers for every aspect pertaining to the birds' survival, preparation for the harvest, the procuring of birds, the processing and cooking of the birds, the eating and the use of feathers. One's manner and even way of thinking had to change before embarking on a harvest expedition; but these practices are not seen any more:

> *As the saying goes: 'The spiritual significance of the kererū includes all the other elements of the forest.' Trees, animals and birds are all part of the spiritual element. So if we think of the spiritual aspect of the kererū, all these elements converge into the preservation of this bird as a main food source. All this* tikanga *is relevant to the bird and to humans. Each person must know the* tikanga.

Tūhoe informants reported that, under their *tikanga*, it was considered appropriate that only women or *rangatira* (chief or high-ranking male individual) could eat the kererū. The kererū was especially revered as a food for pregnant women because the bird's life force or essence would be passed to the unborn child. *Rangatira* were permitted to eat the kererū because of their status: the sacredness of the kererū was considered to be appropriate nourishment for a chief:

> Ko te kupu e puta ana i tōna waha hei whakarangatira i ngā tāngata ko te kupu e whakaora ana i tōna tinana ko te kererū. *[As it is the words that come from the chief that empowers the people, so it is appropriate that the words that empower his own body are the kererū.]*

A number of Tūhoe informants recounted how the ritualistic breaking in half of the kererū, after it was prepared, was an honoured and privilege custom reserved primarily for *tohunga*. The process was described as a ritualistic part of the eating of the bird. In acknowledgement for being the holders of life for the tribe, the women would receive the choice half (chest, tail region or thighs) of the kererū, while the men might receive the lean half (spine and wings).

It is impossible to overstate the spiritual importance of the annual *heke* (journey) to harvest tītī for Rakiura Māori (Kitson and Moller, 2008; Moller et al, 2009b). The interviewees repeatedly identified themselves with the islands and the birds, some referring to having no choice but to go each season, even when strenuous preparations and disruption of their normal work lives seemed an imposition. A heavy responsibility to look after the birds and the islands was reflected in fierce *kaitiakitanga* of the islands in controlling who goes there and their actions when there (Moller et al, 2009b). Some of the main reasons Rakiura informants identified for going mutton-birding were embedded within a spiritual context (see Table 16.1). It was core to what the customary practice meant to them and how they defined themselves, and justified the long period of resource use:

> *There are lots of people around this country who have not been able to maintain those unbroken cultural practices like we have down here. I think that's probably going back 800 years and there wouldn't have been a year that was missed. It's through*

Table 16.1 *Reasons why Rakiura Māori go harvesting tītī (ranked in order of percentage scoring of very important or important)*

Question	*Very important*	*Important*	*Neither important nor unimportant*	*Unimportant*	*Very unimportant*	*n*
So my children and grandchildren can learn about nature	86%	14%	0%	0%	0%	36
To enable my children and grandchildren to express their Rakiura Māori identity	72%	28%	0%	0%	0%	36
To learn/teach the traditions and histories of my *tūpuna*	68%	32%	0%	0%	0%	34
To be with my family	75%	21%	2%	2%	0%	57
To be in the place of my *tūpuna*	75%	20%	2%	3%	0%	59
To be 'at peace with nature'	61%	32%	3%	3%	0%	59
To get a break away from mainland life and pressures	55%	33%	3%	9%	0%	58
For the love of the work itself	53%	33%	7%	5%	2%	55
Because I like to eat the chicks	41%	43%	8%	6%	2%	49
To express my own Rakiura Māori identity	57%	26%	17%	0%	0%	35
For a holiday	35%	42%	5%	16%	2%	57
For the income	4%	23%	23%	30%	21%	53

> *colonization that the cycles of food-gathering have been broken and their access has been broken. They have not been able to maintain their 'ancestral connection' to those resources, that term they use in the Foreshore and Seabed Act. Once again the saying comes to mind:* 'Takahia nga tapuwae o nga tūpuna, kia kore koe e ngaro.' *['Walk in those sacred footsteps of the ancestors and you will never be lost.'] Follow those practices and you'll never get lost; look after those islands as you were taught to, to hand them on.*

Removal of *mana* (authority) and *mauri* (life force)

Traditional rituals and observances conducted by the communities and *tūpuna* (ancestors) of the informants were a demonstration of respect towards the *mana* and *mauri* of their respective birds, to which the birds would respond by making themselves available to the harvesters. Long-term and large-scale decline in *kererū* numbers in the central Te Urewera region were attributed by Tūhoe informants to the tribal members failing to uphold Tūhoe *tikanga* relating to the kererū and the forest:

> *The sacred aspects about the kererū: men can never reach them or maintain them. The sacredness is unattainable. The sacredness of the bird is equal to that of the sacredness of women. So if any rule is broken regarding the sacredness of women, then that is a big issue. Those similar types of rules apply to the kererū. The* mauri *of the kererū has not been looked after [in recent times].*

A contravening of ritual observances (e.g. the undertaking of an extensive process of *karakia* (prayer) before the harvest) and traditional practices (e.g. only plucking and processing kererū once back at the *marae*) was perceived to have resulted in the *mauri* of the kererū being taken from the community by Tāne Mahuta (God of the Forest). The informants reported that if these customs had been observed, then the kererū would still be common and readily available for the community for harvest:

> *There were many areas and there was a hapū (sub-tribe) from Ruatoki (Ngāti Rongo) which had many areas for harvesting. In the areas of Hatupere and Taiarahia, if one area is not good for harvesting, then they will move on to the next area. If the* mauri *is dormant, they will awaken it with a* karakia *to draw the birds back. If there are no birds on the trees, the saying is that 'the* tūpuna *has taken them'. That is why the* mauri *needed to be awakened to draw back these birds.*
>
> *Everything was god-like: approaching a tree and conversing with the forest god, Tāne, informing him that we were entering his domain and not to cast us aside. We need to provide for the chiefs. It was just to share a few words. That was the purpose of the prayer.*

Over the last 50 years, *Tūhoe* informants recounted special occasions where tohunga used traditional rituals to reclaim the mauri of the *kererū* from Tāne Mahuta so that *kererū* would be available once again for the community to harvest. Once the harvest was complete, the tohunga returned the mauri of the *kererū* to the forest through an extensive ritualized process of respect. Many believed that the return of authority over the *kererū*, land and forest to *Tūhoe* by the Crown would assist in recovering the mauri of the *kererū*.

Tūhoe informants attributed the diminution of *tikanga* to the European colonialization process and to Crown authorities removing *kaitiakitanga* responsibilities from the tribe in the first quarter of the 20th century by creating laws and enforcing protection orders that outlawed harvesting of kererū. As a result, a second explanation for the decline in kererū is based on the intervention by Tāne Mahuta:

> *The reason why the kererū is actually disappearing is because Nature seems to think that it is not worthwhile replenishing*

> *because it is not being harvested. That is one of the reasons* pikopiko *[Hen and chicken fern,* Asplenium bulbiferum*] started disappearing years ago because when the Pākehā first came in, they prohibited the picking of* pikopiko. *Whereas now, I can actually tell you the places the* pikopiko *is being picked. Every year I go there and get two bags of* pikopiko, *every year. Nature no longer thinks kererū are required any more, so Nature puts a stop to it.*
>
> *Now they [Pākehā] are saying they are the God of Forest and are telling us how to look after the kererū. They believe it's on their efforts and work that the kererū will recover. From their work with the kokako [*Callaeas cinerea wilsoni*], and the kiwi, the Pākehā now see their role as holding the life force of those birds; but I will hold fast to the talk of my grandparents because there is no one who has ever challenged the power of prayers. I will still hold onto the belief of my own experiences and knowledge.*

Three Hauraki informants indicated that it was disrespectful to the *mauri* of the oi and a violation of traditional teachings to pluck, clean or eat the oi on the islands where they were harvested and that these protocols were also applied to other food resources such as *pipi* (*Paphies australis*) and green-lipped mussel (*Perna canaliculus*). Informants believed that cutting out the oil-filled crops of chicks and leaving them in the entrances of burrows or plucking and cleaning the chicks on the island would deter the adult birds from breeding there in the future:

> *I remember my Aunty going off the deep end a couple of times because someone had gone out to the islands and harvested oi, then prepared the birds on the beach. 'You don't eat* kai *[food] in the cupboard.' She'd bring the whole birds back to her place and clean them all up at her place at Whiritoa.*

Three Hauraki informants reported cleaning and preparing the birds on the islands when they camped out overnight, but described how the feathers or intestines of chicks were either buried on the island or disposed of in the ocean. No offal or feathers were left lying out around the birding grounds.

The kererū had to be eaten in a particular way. It was considered disrespectful or a violation of the kererū's *mana* (prestige) to touch the bird with utensils:

> *The kererū was never prepared with knives. It was prepared with the hands. You would tend to get hurt when you saw others using utensils while preparing the kererū to cook. You know it's a waste of time feeding the kererū to those people. People who*

> *knew how to prepare the kererū correctly would use only their hands.*

Three Tūhoe informants also described how ritualized chants (*haka kererū* or *puha heri kai*), performed prior to the *huahua* (kererū preserved in fat) being served to guests, were also used to acknowledge the significance and relevance of the kererū to the tribe, elevate the *mana* of the tribe and people, and protect against the *mana* or *mauri* of the kererū from being removed by the visitors:

> *To stop the kererū from leaving or declining, one of the rituals of the elders pertains to the cooking of the kererū [*tahu kererū*] before distributing to guests. The elders were afraid that by giving a tin of kererū to Ngati Porou [a neighbouring tribe] they could lose the prestige of the kererū. The [Tūhoe] elders prayed that the prestige of the kererū would remain with them, allowing only the [carcass of] kererū to go. Ritualistic customs [which included* puha heri kai*] were adhered to if kererū was served to visitors.*
>
> *The kererū was then laid on the table and the people serving would take a small amount of oil and rub it into their hair to lift the prestige of the kererū and to prevent the guests from taking the prestige of your bird. Maybe because these rituals have not been adhered to, the life force [of the kererū] has ended elsewhere, as there are no longer any kererū. By no longer adhering to custom, the kererū are therefore declining or moving elsewhere.*

Land and environment, just like people, are seen as having *mana* that safeguards and shows that this is a healthy place to gather food. A Rakiura tītī harvester demonstrated the reciprocity and holism involved even around a decision whether or not to allow scientists to visit their *manu* (family birding ground):

> *I couldn't even go there myself. I wasn't going to risk that awful feeling, even the chance of somehow or other the* mana *of our place would be trampled [because you scientists came]. That was my fear. That is why I wasn't participating fully in research. Because I just couldn't, I just couldn't.*

Spiritual guardianship expressed through customary harvest practices

Tūhoe informants recounted that, historically, preparation for an annual harvest would begin when a *tohunga* instructed a group of specially selected men to gather on a *marae* (traditional meeting place). Women were generally not taken on harvesting forays to safeguard the *mana* and *mauri* of the kererū. The purpose of the hunters gathering at the *marae* was to become focused on the undertaking ahead through an extensive ritual of *karakia* (prayer) and for the *tohunga* to guide them in the *tikanga* associated with the kererū and the hunt. Originally these prayers pertained to the kererū, but now it is common for the elders to offer prayers to the gods (to the unseen) to wave away any obstacles or bad omens so that the hunters will achieve the correct observances and the hunt will proceed safely and easily:

> *The customs in the past were that prayers were the main thing, and the first thing, that you did before the killing of the birds. The purpose of the prayer is for the bird to be given to you [by Tāne Mahuta] and to ask [that] the Pākehā be led away from your hunting area so you won't get caught.*
>
> *The hunters would say prayers and make sure they were familiar with the rules of the hunt. The day before, the rules would be put in process by the* tohunga. *Only the* tohunga *who knew how to hunt kererū would go out. He would tell the hunters not to eat the kererū in a certain way. Also, you do not eat until you return home. They were all the customs relevant to the kererū. If you did not obey the rules given by the* tohunga *and you took food when he said not to, it would be noticed through your failure to catch kererū. You had to have the right frame of mind. You never went beneath the toromiro while your mind was focused on your wife at home. That was no good. You had to be single minded.*

It was recognized amongst elders that the kererū could sense desecration of its *mana* and *mauri* if traditional customs were disrespected or disregarded, or inappropriate harvest practices were used; kererū should be plucked and prepared for eating only when back in the community. If the remains of a harvested kererū were left scattered beneath a toromiro tree or on the forest floor, the kererū would respond by vacating the area and making themselves unavailable to the hunters.

There was a ritualistic and proper way to pluck the kererū:

> *The tail feathers are stuck into the ground. The tail feathers are the first feathers you pull out and you then proceed onto the wing feathers and these are also stuck (standing upright) into the ground. The wing feathers are pulled out from left to right and then the plucking of the rest of the bird begins.*
>
> *You stake them [the tail and wing feathers] in the earth and then sprinkle soil over the feathers to partially cover so they won't blow away. In my way of thinking, if the feathers fly away other kererū will observe that and will fly away and leave that location.*

Tūhoe informants also expressed the importance of the *ahi tapu* (sacred fire) in the preparation before the hunt where a small number of kererū would be harvested and prepared for the women of the family. This practice celebrated the beginning of the harvest and was a way of acknowledging the significance of the occasion. It also served as a means to assess the condition of the kererū and to determine if the time was right to conduct a harvest:

> *My father would begin to pray at the month of June. He would then sit and begin to think that this would be a good time to go to the bush. He would ask his brother to observe the roosting of the kererū. If there were some [kererū] my Dad would begin his rituals related to the kererū. One week later, my Dad would ring his brother, and he would go and observe once again. On his return he would report: 'It's rustling, it's rustling.' You knew then there were a lot of kererū. We would then prepare our equipment and supplies and travel via Mate Kerepū into Tawhana and rest on the way at Ōtane. Before that we would climb the bush at Mate Kerepu and my grandfather would capture four kererū to be brought back for the sacred fires [*ahi tapu*]. The sacred fire is where those kererū would be cooked and served to my Mum.*

Karakia were also recited during and after construction of equipment for harvesting kererū. For example, when the *waka kererū* (a water trough with its edges lined with small nooses, which is hung in trees to snare kererū when they arrive and stoop to drink) was finished the sanctions upon that equipment were lifted, rendering it useable to procure food. The concept that food is the nullifier of sacredness is well known within Māoridom. The informant stated that no matter what the instrument is, whether it is a *waka kererū* or a *huata* or *tao* (long slender spear), it must first be rendered useable through the lifting of *tapu*.

Kererū were only harvested when they were feeding on the toromiro fruit and were fat and highly palatable. The birds being in this condition was Tāne Mahuta's way of guiding the people on the most ecologically appropriate time to harvest. It was also recognized that the harvest period occurred immediately after the breeding period when both newly fledged juveniles and adults were available for harvesting. Elders were aware that harvesting a combination of juveniles and adults reduced the impact of harvest upon the population.

Supernatural guidance of the natural world

For Rakiura Māori, connections with their *tūpuna* (ancestors) can play a strong regulatory role. Ancestors have the power to discipline those who do not uphold the correct practices, a power reinforced through oral narrative. Many of the Rakiura informants recalled being told ghost stories as children: 'Ghosts. They were all over the place when I was a kid. My *tāua* used to always tell stories – don't do this or a ghost will get you. *Taipo* [ghosts] will get you.'

These apparitions were not malevolent but acted as reminders that their *tūpuna* were watching over them:

> *I shone the torch and there was an old lady standing under the tree watching me and she had a scarf around her head. Dad said: 'It's only Granny, she's only looking after you.' That was the old Granny, who we got our mutton-birding rights from. Two of my cousins saw the same old lady, years later. They described her, and it was the same old lady that I'd seen when I was a child.*

The hākuai is a legendary bird that has been described as a *kaitiaki*, or guardian of the tītī (Garven et al, 1997). In legends, the hākuai is the father of the tītī and its call in the night was said to foretell the end of tītī harvest season. Stories of the hākuai were traditionally shared when muttonbirders gathered. People who have heard the call of the hākuai recount its sound as distinctive and spine chilling. On Taukihepa (Big South Cape Island) 'All you could hear is "hākuai hākuai", and all of a sudden you hear "whooooosh" over the top of your head.'

White (albino) tītī are believed to bring bad luck and are therefore treated with respect and fear. They are not harvested and some muttonbirders stated that they would not dare to touch one if encountered. The elders of one muttonbirder had told him that a white bird was actually an ancestor who had come back to 'check up' on the practices of the current generation.

One Hauraki informant referred to how *tohu* (signals or indicators) were likely to have been used to determine whether a harvest occurred or not in a year, or whether a harvest was large or small. The old people had a particular time period for harvesting; but sometimes the weather was too rough and the muttonbirders could not get out to the islands. She believed her ancestors would have seen those conditions as a sign to stay home and not to go out to harvest, whereas today these links might not be made. Another Hauraki informant described how some of the old people used a tuatara *Sphenodon punctatus punctatus* (endemic reptile) as a *kaitiaki* (protector) for the time during which they were out on the islands harvesting:

> *One of the first things my Mum's grandmother used to do when she arrived on the island was to get the tuatara out of the hole and put it into her blouse next to her skin. It [the tuatara] used to just stay there like a* kaitiaki *[guardian]. When it was time to go home she would put it back into the hole where she got it from.*

Respect for *tapu* (sacredness)

Kererū feathers were highly prized by Tūhoe for ornamentation of *korowai* (cloaks), weapons and on the prow and stern of *waka* (traditional watercraft). The wearing of cloaks made of kererū was usually reserved for the women of the tribe. One elder recounted that high-ranking women (women of tribal royalty) often did not eat kererū because they wore a *korowai* made entirely from kererū feathers. Eating the kererū made it *noa* (common), while a cloak made of kererū feathers was *tapu* (sacred) because it touched the body. A woman of high-ranking status who wore a cloak of kererū feathers would not defile the sacredness or essence of the kererū by eating it.

For the three iwi, designating areas as *tapu* is a way of preventing access to sacred sites associated with their tūpuna and protecting areas sensitive to habitat damage. Areas recognized as being occupied by *patupaiarehe* (little people) also served a role of limiting access into sacred sites because the deities were perceived to create confusion in one's mind and cause a person to become lost.

Absolute protection of the kererū breeding phase under Tūhoe lore was achieved in the belief that it is *tapu* (a bad omen) to inadvertently find a kererū nest in the forest during the breeding season. The kererū was referred to as 'the hidden bird' of Tāne Mahuta, so to disturb a kererū nest was deemed a violation against the forest deity, which would bring repercussions. Being the food of chiefs, it was also considered a societal offence to disturb the species outside the harvest period. Similarly, Rakiura Māori absolutely prohibit disturbance or taking of adult tītī:

> *There is the odd time where your foot will go through the ground and make a hole, [and] if anyone walked on and left that unplugged, that's one of the ultimate sins. The worst crime on an island is to kill a* kaiaki *[adult bird].*

Integration of Christian ideology within *tikanga*

Historically, Rakiura families took Sundays off from harvesting, and on some islands, part of Saturday was taken off as well. These were times for rest, social interaction, passing on traditional knowledge, and community assessment of the harvest, as well as religious observance. Taking these days off was considered by some to be a conservation measure because a number of chicks were spared: 'You weren't allowed to catch birds on a Sunday then. It was religious reasons. They used to have bible readings, when we were small, every Sunday in the morning.'

During more recent times families no longer collectively take Sundays off. However, they do set aside occasional days for socializing and fishing. On one island, Good Friday is a scheduled day off from harvesting and is spent socializing and sharing a meal. These set-aside days usually fall when the chicks have yet to emerge from the burrows at night in significant numbers.

Incorporation of Christian beliefs within Māori *tikanga* is widespread and reflected in recitation of Christian prayers in many community activities. In some instances, such beliefs have even been transferred into law. For example, regulations applying until 1962 stated that 'No work in connection with the taking or preserving of the muttonbirds shall be done before 6pm on any Sunday' (Land Act Regulations 1949, Amendment No 3, 1962). The way in which law affects customary harvest management is a potentially important and unstudied aspect of adaptive co-management of natural resources by indigenous peoples throughout the world.

Recognition of spiritual guardianship

Respect for the authority and life force of wildlife is a common conservation ethic in hunter–gatherer cultures around the world, and disregard for the guidelines that govern respectful behaviour is believed to manifest itself as a decline in, or unavailability of, the resource. Tūhoe informants acknowledged that, in recent times, women have been taken on harvesting trips, which, under traditional lore, was prohibited and was thus in violation of that lore. In Māori society, a woman's ability to bear life is considered powerful and sacred. It was believed that if women were taken hunting, the kererū would sense the presence of this power and make themselves unavailable to hunters. A weakening of respect for significant persons (e.g. *kaumātua* and *tohunga*) within the tribe, and traditional customs related to the birds (e.g. eating of kererū by men; plucking of kererū in the forest and oi on islands), over the years was also suggested as a reason for the observed declines in bird populations. This value-belief system is also evident in other indigenous cultures, such as the Siberian Yupik (Krupnik and Vakhtin, 1997).

Tapu is a central concept in the Māori culture (Metge, 1976; Marsden, 1981; Irwin, 1984; Patterson, 1994). Everything designated as *tapu* must either be avoided or handled with care according to prescribed rules (Metge, 1976). *Tapu* is normally understood as prohibition (Irwin, 1984); but in resource management its function can be for protection (Irwin, 1984; Puia, 1990). However, on most Rakiura tītī islands the *tapu* areas are small and will only provide a partial refuge from harvest for tītī chicks. It is estimated that only about 15 per cent of the total tītī breeding ground on the Rakiura Tītī Islands is not harvested (Newman et al, 2008). Within the birded ground, additional protection by *tapu* is very limited and can thus be excluded from consideration in quantitative assessments of the sustainability of the harvests, at least as a direct effect. However, observance of *tapu* will have an indirect effect on tītī harvest sustainability by reinforcing reciprocity and observance of *tikanga*, especially the very important *rāhui* provisions (e.g. protection of adults and banned access to the islands early in the breeding season). Scientific reductionism that separates *rāhui* from a wider context of *tapu*, reciprocity, identity and place will fail to recognize the inter-relationship of *tikanga* and worldview that promotes sustainability in indirect ways.

Reciprocity

Reciprocity between the harvesters and the birds can be approached by ecological linkages, such as the postulated density-dependence mechanisms. However, a deeper recognition of reciprocity underlies the expectation of many informants that their birds will move away if they or their habitats are disrespected. Some Rakiura tītī harvesters drew our attention to a deep relationship between the birds and the people – for example, their belief that the birds 'called the researchers to us [the Rakiura community]' to help arrest declining bird numbers (Tāne Davis, cited in Howard and Moller, 2001). Other muttonbirders, who have been sceptical of the value of the tītī research programme, have expressed their opinion that an upsurge in numbers and condition of the birds in 2007 and 2008 seasons was a direct result of the field research ending in 2005 (Moller et al, 2009b): the birds have felt a 'weight lifted off their shoulders' by the research ending. These are examples of some *kaitiaki* seeking support and guidance from the birds themselves. It is a fundamentally different construct from Western wildlife management approaches, where broadly based scientific decision-making operates. Both approaches are motivated by care; but science is applied to manage birds that are considered passive recipients, whereas some muttonbirders speak of a two-way interaction between people and birds that operates at a metaphysical level. Metaphysical beliefs cannot be confronted on scientific terms but must be acknowledged in science and *mātauranga* partnerships being directed at an indigenous community level (Moller, 2001).

Transgenerational reciprocity and responsibility were also emphasized repeatedly by the *kaumātua* of the Rakiura community. Current *kaitiaki* expressed their responsibility to uphold the *tikanga* and continue the *mātauranga* because it was required of them by their *tūpuna* as much as by their *mokopuna*. Transgenerational equity is at the core of the conservation ethic of all cultures and ethnicities. However, the inclusion (some *kaitiaki* would say participation) of the *tūpuna* in the dialogue and decision-making of the tītī community has been frequent and emphasized. This inclusion makes discourse and decision-making in the community fundamentally different from that concerning harvest and conservation management by Pākehā.

Māori worldview: Literal or metaphor?

Ecologists increasingly emphasize that biological conservation and ecosystem management require a human dimension to be effective (Colding and Folke, 2001), and social institutions play a key role in this respect (Berkes and Folke, 1998). Two of the most common explanations provided by Tūhoe informants for the decline in kererū in Te Urewera were rooted in the spiritual understandings of the environment. It is common for those who base their actions on traditional knowledge to attribute events or changes in populations and environment to ideological or spiritually based mechanisms or explanations of causation. This creates a departure from the science-based system that perceives reality in terms of cause–effect relationships determined entirely by biophysical mechanisms (Moller et al, 2004). Few examples exist in countries with colonial histories where decisions regarding resource use or conservation have been based solely on an indigenous culture's ideological beliefs or metaphysical explanations for changes in populations. The spiritual dimension of *mātauranga* is unlikely to be fully embraced by ecologists and managers (Berkes et al, 1998); but understanding its role in the way in which indigenous communities perceive the environment and how it shapes decision-making must be important for the collaborative management of ecosystems.

Most Eurocentric-trained wildlife managers or scientists subscribe to biophysical explanation for what happens to animal populations and behaviour. The few who also accept metaphysical explanations are inclined to take a functionalist metaphorical approach in their understanding of aboriginal peoples' worldview. The metaphysical explanation of Aborigines might be seen as having a useful function for resource management or conservation, especially if those beliefs are seen as encouraging the 'right' actions by the resource users, albeit for the 'wrong reasons'. Few wildlife biologists would be willing to accept the concept that animals might qualify as conscious constituents capable of engaging in social relationships with humans (Nadasdy, 2007). Scientific principles make it difficult for most ecologists and resource managers to accept and include spiritually based explanations for patterns observed in wildlife populations without hypothesis testing or repeatable ecological reasoning (Crawford, 2009; Lyver et al, 2009). The clash of science and *mātauranga* axioms is one source of discord and failed partnerships in natural resource management (Stephenson and Moller, 2009).

Building a place for spiritual guardianship in New Zealand's conservation

The role and emphasis that Māori spiritual guardianship plays in future wildlife management and conservation efforts in NZ will be influenced, ultimately, by who holds the decision-making power and responsibility. Without a fundamental change in governorship which empowers Māori, Crown legislation (e.g. Wildlife Act 1953; Conservation Act 1987) will consistently determine and drive the nature of conservation management. Given NZ's historic and contemporary conservation legislation and the status of many of its native bird species, scarcity and alienation become the most fundamental threat to the ongoing continuity and practice of spiritual stewardship. Higher-level agreements such as international and national treaties and legislation (e.g. Convention on Biological Diversity; Treaty of Waitangi) support building a place for *mātauranga* in the management of natural resources. However, in most countries with colonial histories, this process and use of knowledge is dictated by the cultural reality of the dominant power culture, which is still largely focused around Eurocentric scientific principles. This form of knowledge integration takes for granted existing power relations between aboriginal peoples and the state by assuming that traditional knowledge is simply a new form of data to incorporate within existing management bureaucracies and acted upon by scientists and managers (Nadasdy, 1999). Therefore, acceptance of spiritual explanations for causation and the basis for decision-making would require a large departure from current conservation management and scientific thinking.

It is more likely that spiritual guardianship will be tolerated within existing conservation structures if the belief or outcomes from the belief conform to current laws and conservation practices. For example, the role of *tapu* on the Rakiura Tītī Islands has a duel application of habitat and resource protection: protection of breeding adults is expected to be significant – ecological models have predicted that eight chicks could theoretically be removed from the population for every adult harvested. Historically, this form of spiritual guardianship was applied on the tītī islands because Rakiura Māori management of these islands and outcomes of the belief practice stay within existing conservation and wildlife laws. It was the Rakiura community itself who designed the birding regulations, enshrining lore into law in ways that are now seen as very beneficial for protecting habitat and breeding survival and productivity (Kitson and Moller, 2008; Moller et al, 2009a). Similarly, the Hauraki spiritually based *kaitiakitanga* practice of processing oi chicks away from the islands has a recognized ecological application of reducing disturbance to the population and is congruent with the co-management arrangement between the iwi and the DoC. Not so easily accepted is the Tūhoe belief that the act of not harvesting signals to Tāne Mahuta that the resource is superfluous in the environment and is translated to widespread declines in the kererū population. In order to lobby for change within NZ, wildlife legislation based on this explanation and the consequent removal of the harvest prohibition over kererū would probably prove problematic. It is likely that aspects of spiritual guardianship would then occur in isolation from state law and policy, especially on Māori-owned lands. As part of the current Treaty of Waitangi claims between the Crown and Tūhoe, the iwi is lobbying for the return of traditional lands that were confiscated to form the Te Urewera National Park (40,000ha): management authority over the park and its resources by Tūhoe is required if the full extent of their *mātauranga* is to be realized. Benefits of Māori-directed management, which have included spiritual dimensions, have already been demonstrated at Morere Scenic Reserve (on the east coast of the North Island of New Zealand), where devolvement of political authority to the local iwi made a more significant contribution to kiekie (*Freycinetia baueriana*, a woody climbing plant of the screwpalm family) management than just attempts to integrate *mātauranga* from the local iwi alone (Coombes, 2007). Accepting spiritually based guardianship does not require an individual to relinquish their own scientific principles, but rather provides the foundation for respect and acknowledgement that there is another (just as legitimate) way of perceiving environmental reality and human–environment relationships. The challenge may be not so much to seek more sophisticated technological solutions to environmental problems, but rather to reanimate our scientific perspective of the world and restore a sense of spiritual stewardship (Tyler, 1993).

Consequences of excluding spiritual guardianship

Indigenous peoples see spiritual awareness and knowing as a fundamentally important and integral part of wise environmental management to go alongside thinking and hard work to solve practical problems of resource conservation and restoration, and application of these values is written into NZ legislation. A leader of the Rakiura tītī harvesters stated:

> *When you look at things holistically like we do, it's about cultural well-being. There is a lot to that – it's the spiritual side, the mental side and the physical side. That's saying all parts have to be in balance for you to have well-being; that's recognizable in legislation, in the RMA [Resource Management Act] and local government acts.*

Opportunities will be lost if key indigenous peoples are excluded from practising their beliefs and knowledge to care for a bird population. First, distant historical baselines are lost – these can be crucial in alerting management authorities to protracted declines in abundance and therefore in identifying likely causes. Historical baselines are valuable for restoration targets. The detailed and locally tuned knowledge of the ecology and biology of the bird held by local experts is not then likely to be applied or perhaps not even retained in the harvesting communities. In addition, the authority, respect and roles of many *kaitiaki* have been eroded by isolation from the resource and past legislation, such as the now revoked 1907 Tohunga Suppression Act. *Mātauranga* and *kaitiakitanga* have had to exist within Pākehā boundaries and ideology, which has influenced the nature of the knowledge and how it is interpreted and implemented. However, nuggets of information and knowledge still remain and need to be revitalized, developed, implemented and acknowledged for what they are.

In many well-meaning instances, the common practice has been for scientists or environmental resource managers to select what aspects of this knowledge fit with scientific concepts and data requirements and procedures (Ellis, 2005; Stevenson, 2006). What this practice often fails to account for is that *mātauranga* is commonly embedded within a broader articulated system of knowledge, which includes ecological and non-ecological components, and its removal from this context is, in effect, 'dumbing-down' the knowledge (Stevenson, 2006). For wildlife management to integrate all elements of *mātauranga* effectively, the initiative and guidance for its implementation needs to come directly from the knowledge holders.

Tearing apart of beliefs in reciprocity and mutual responsibility of humans and nature threatens long-term commitment to sustainable resource use. Agrawal's (2005) concept of 'environmentality' focuses on issues of power-sharing, agency and local governance to trigger local surveillance and appropriate resource protection. Monitoring by locals is seen as one part of building commitment and meaningful roles in the management of local resources. Recognition of spiritual connections and motivations for having locals in charge of their own resources will be fundamentally important, perhaps even more important than having appropriate monitoring and governance structures in place.

Māori have a common *whakatauki* (proverb) that goes: '*Kia ora te whenua, kia ora te tangata*' ('If the land is healthy, the people are healthy'). The case studies of bird harvests in New Zealand illustrate a seamless blend of spiritually based ideologies and a fundamental ethical imperative of three iwi to manage their treasured species with the full breadth of their knowledge.

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17

Everyone Loves Birds: Using Indigenous Knowledge of Birds to Facilitate Conservation in New Guinea

William H. Thomas

One of the greatest barriers confronting programmes that attempt to conserve both indigenous life and biodiversity is the confusion over the relationship between tradition and biodiversity. Because indigenous practitioners do not typically communicate in the genus and species parlance of Western science, it has been difficult to integrate indigenous knowledge within conservation planning. However, indigenous naturalists have been accumulating their knowledge unencumbered by the philosophical shifts of Western thought, developing a dynamic view of nature that incorporates connectedness, disturbance and recovery as a normal course of events in the natural world. Since Western science has only recently moved toward this non-linear view, the indigenous view of nature has, in a sense, been ahead of the emerging scientific consensus. Communication between conservationists and indigenous peoples can be facilitated by using indigenous knowledge of birds to identify the impacts of tradition upon biodiversity. Because indigenous peoples have a long-range perspective on the effects of human activity on avian diversity, they can provide a perspective vital to conservation planning. The Hewa of Papua New Guinea describe their traditions and traditional activities as playing a significant role in shaping the environment by creating a mosaic of habitats of varying diversity. While the current lifestyle of the Hewa may not necessarily be a template for future sustainability, the Hewa view of the natural world provides insights into the potential of indigenous peoples to conserve their resources.

Introduction

> *We, the Indigenous Peoples, have been an integral part of the Amazon Biosphere for millennia. We have used and cared for the resources of that biosphere with a great deal of respect because it is our home, and because we know that our survival and that of our future generations depends on it. Our accumulated knowledge about the ecology of our home, our models for living with the peculiarities of the Amazon Biosphere, our reverence and respect for the tropical forest and its other inhabitants, both plant and animal, are the keys to guaranteeing the future of the Amazon Basin, not only for our peoples, but also for all humanity.* (COICA, 1989)

The above statement was issued in 1989 by the Coordinating Body of Indigenous Organizations of the Amazon Basin (COICA) in an effort to reach out to conservation and development organizations. It plays to the most important of our remaining stereotypes concerning indigenous peoples and their relationship with the land – namely, that indigenous peoples have a special relationship with their land, a relationship that has prevented them from destroying their biological heritage. According to this stereotype, this relationship will enable them to continue to conserve their lands for future generations. When it was issued, the initial reaction to COICA's statement was enthusiastic (Chapin, 2004). It coincided with a surge in the interest in traditional ecological knowledge (TEK) that some had hoped would become a breakthrough for applied anthropology (Sillitoe, 1998). However, in the intervening years, enthusiasm for partnerships with indigenous communities has waned among conservationists (Chapin, 2004). I hope to re-ignite enthusiasm for creating such partnerships, using traditional knowledge of birds to reframe the discussion of the relationship between traditional societies and biodiversity.

The willingness of the Hewa people of Papua New Guinea (see Figure 17.1) to share their knowledge of their forests suggests that by focusing on the effect of human activity on birds, it is possible to establish common ground for the conservation of their lands and a template for others to follow.

Indigenous societies are often portrayed as stewards of their environment. Today their homelands contain much of the planet's remaining biological heritage (Robles, 2002). This, combined with their reverence for nature, has led many to believe that they are natural conservationists and has been the rationalization for combining sustainable development with conservation. Why not capitalize on these sustainable traditional land management techniques to conserve biodiversity (Posey, 1985)? The realization that the traditional lives of indigenous peoples could be compatible with biological diversity opened the possibility of cooperation between two groups that might seem to be natural allies: conservationists and indigenous peoples (Nabhan, 2001). Advocates for this alliance had essentially assumed that indigenous

Figure 17.1 *The largest and most diverse forest in the Pacific*

societies learned to minimize their impact upon the land (Smith, 1984). The apparent compatibility of tradition with biological diversity has, in turn, spawned an interest in understanding traditional management systems (Barrett et al, 2001), collecting TEK (Ludwig et al, 2001; Folke, 2004) and potentially using traditional practices as templates for biodiversity conservation (Posey, 1988).

Yet, the importance of local involvement in conservation may have blinded advocates to the realities of traditional life. Once it became apparent that their work was being cited as evidence that traditional societies had been conserving biodiversity, historical ecologists were quick to point out that such assumptions might be faulty (Sillitoe, 1996). In general, traditional systems seemed to be incapable of conserving species that serve as game (Redford, 1991). Although traditional forest use must be taken into account by modern managers, they cannot assume that these management practices will be compatible with conservation (Posey and Balée, 1989). It is a question of intent (Parker, 1992) because the conservation of biodiversity by traditional societies may have been their intention or a side effect of small-scale gardening by mobile peoples moving over a vast landscape. The fate of the alliance between conservationist and indigenous societies may hang in the balance.

While many agree on the need for local participation, the 20-year experiment of combining conservation with sustainable development is proving to be a disaster for both nature and participating indigenous societies (Soulé, 2000; Chapin, 2004). Prior to embarking on these partnerships for conservation, no consensus had emerged concerning the relationship between traditional life and biological diversity (West and Brechin, 1991). As a result, the inclusion of indigenous peoples in the conservation process has been problematic (Chatty and Colchester, 2002). This, in turn, has caused a backlash among parties who can usually be counted on as advocates for indigenous peoples. For example, some have questioned the usefulness of TEK in the face of global change (Terborgh, 2001; du Toit et al, 2004). Others have pointed to the discrepancy between the Western perception of a traditional conservation ethic and reality (Salim et al, 2001). Advocates for this alliance may also be labouring under erroneous assumptions concerning the practicality of local participation in the face of national laws that negate local input in the conservation process (Pierce and Wadley, 2001). In general, the non-critical acceptance of the compatibility of traditional life with conservation has led to the failure of many conservation-based development schemes in the tropics and prompted conservationists to call for the reconsideration of the partnerships that lie at the heart of conservation-based development schemes (Soulé, 2000; Terborgh, 2001).

Untangling the relationship between biodiversity and traditional life

It has been assumed that the most biologically diverse ecosystems were the most stable (Reice, 1994); but natural systems have proven to be complex and difficult to define. Ecosystems are rarely, if ever, in a state of equilibrium.

This has led ecologists to abandon the equilibrium model and concentrate on the dynamic components of an ecosystem (Pickett et al, 1991); but the shift has gone unrecognized by many anthropologists (Smith, 1984). Authors continue to portray traditional societies as 'in balance' or describe a practice as 'adaptive'. Yet, this use of terms drawn from ecology and evolutionary biology is often outmoded (Hames, 1991).

Traditional societies can act as stewards of their biological inheritance, even under the stress induced by globalization. By factoring disturbance into the relationship between tradition and biodiversity, researchers have moved beyond the stereotypes of the 'noble savage' and are beginning to unravel the archaeological evidence of humanity's role in both historic and prehistoric extinctions (Diamond, 1986; Denevan, 1992). The continued disappearance of wild lands coupled with the coexistence of traditional cultures with biological diversity, often referred to as bio-cultural diversity (Maffi, 2001), has forced conservationists to reconsider notions concerning the nature of wilderness (Mittermeier et al, 2003).

The Hewa

The Hewa are a traditional society of swidden horticulturalists whose homeland is one of the island of New Guinea's most important wilderness areas. Because conservation programmes in Papua New Guinea must be generated by the local people, the Hewan understanding of the relationship between tradition and avian/biological diversity is linked to the conservation of this area.

In order to use the Hewa TEK of birds to describe the relationship between traditional activities and biological diversity so that it is intelligible to both the Hewa and conservationists, it was necessary to develop an ethno database that would go beyond species inventories (see also Nabhan, 2001).

New Guinea is one of the world's most significant centres of biodiversity and contains large tracts of intact forest (Myers et al, 2000). The Hewa live in one of New Guinea's most important wilderness areas, the headwaters of the Strickland River in the Central Range (142° 30'E, 5° 10'S, elevation 500m to 3000m). They number fewer than 2000 people and inhabit roughly 65,000ha of hilly and sub-montane forest in the uppermost Strickland River. These forests are located on the eastern verges of the 'Great Rivers Headwaters', a rain-soaked upland zone in the centre of New Guinea, the richest in biodiversity in this island (Beehler, 1993). Here, the four great river systems of New Guinea converge (Sepik, Fly, Digul and Idenburg). The Strickland is the major tributary of the Fly and the Hewa inhabit the forests where the Strickland meets the Laigaip River. The forests in this region are extensive and the land is dominated by a mosaic of primary and secondary growth forest. While there have been no previous studies of the forests in the Hewa territory, the area surrounding the headwaters of the Strickland River has been identified as a 'major terrestrial unknown' and has no formal conservation status (Swartzendruber, 1993).

While other societies in New Guinea have been described as developing traditions that enable them to coexist with biological diversity (Sillitoe, 1996). The Hewa describe their traditional activities as creating a mosaic of *Agwe* garden, *Poghali* grassland, *Agwe Teli* old garden, *Agwe Teli Popi* old garden 'true', and *Nomakale* primary forest – each with a set of pollinators and seed dispersal agents that are affected by the Hewa cutting the forest to establish and maintain gardens. The microclimate associated with altitude and terrain effectively confines Hewa horticulture between the altitudes of 500m at the riverbank and the base of the mountain wall at 1500m, with the majority of these gardens below 1000m. The Hewa raise their gardens, relying primarily on sweet potato (*Ipomoea batatas*), yams (*Dioscorea* sp.), banana (*Musa* sp.) and, to a lesser degree, cassava (*Manihot esculenta*) and pumpkin (*Cucurbita maxima*) as food crops. Scattered throughout the area are several species of *Pandanus* sp. and *Pangium edule* trees that the Hewa claim individually. The seasonal ripening of these trees, as well as gathering other wild foods and hunting, provides the Hewa with some sustenance, though gardens are the primary source of food. Like many New Guineans, the Hewa reuse their gardens. In order to use as much of the fence surrounding an old garden as possible, the Hewa cut new gardens adjacent to previous ones, thereby creating a chain of old and new gardens. The established gardens seldom lie fallow for more than 25 years, at which time their secondary forest cover is cut, burned and cleared and a new garden planted. The result is a mosaic on the surrounding hillsides comprised primarily of primary forest interspersed with small plots of land in the garden/fallow cycle. This mosaic of new gardens, grasslands, succession and primary forest increases the number of environments and, hence, is one measure of the biodiversity of this territory.

Because New Guinea is east of the Wallace line, the island lacks many of the mammalian agents of seed dispersal found to the west in Indonesia. In order to assess the compatibility of the traditional Hewa lifestyle with biodiversity, informants were asked to describe the impact of traditional gardening upon New Guinea's primary agents of seed dispersal: birds. Well known to both local and international naturalists, birds are the key to forest conservation in New Guinea (Schodde, 1973).

Through a combination of structured interviews, transects and station surveys, the Hewa TEK concerning the impact of traditional activities upon birds was recorded. Working with the field guide *Birds of New Guinea* (Beehler et al, 1986), each informant was asked to identify the birds found in their territory, as well as the altitude and habitat that each bird favoured. Habitats were broadly defined using the above Hewa categories for garden. The old garden/old garden true distinction described their perception of the differences between the bird life found in secondary forest growth that was younger than 20 years (old garden) and secondary growth with more than 20 years (old garden true). The information obtained in interviews was then checked against four months of field surveys (see Beehler et al, 1987 for an example of the protocols used) (see Table 17.1). This gardening cycle is the most important factor in shaping this environment and has the greatest implications for conservation of these forests.

Like Western ornithologists, the Hewa associate species with altitude and habitat. Although the Western genus and species classifications do not correspond to the Hewa folk taxa (to date the 179 Western species correspond to 128 folk taxa), it was more important that the Hewa informants recognized the impact that human disturbance of the primary forest will have upon avian diversity. As expected, the Hewa were keenly aware of the linkage between birds and habitat. They indicated that some species are associated exclusively with primary forest and that others can make use of forests that the Hewa describe as the oldest secondary forest growth – that is, forest that has been growing for 20 or more years. Experience has taught the Hewa that cutting the primary forest will eliminate at least 33 per cent of birds (56 species) that can only live in primary forest. The effect of gardening on the habitat preferences of fruit- and nectar-eating birds is particularly important to biodiversity conservation because if the scale of habitat modification/disturbance is of sufficient magnitude, the Hewa will compromise the forest's ability to regenerate by limiting the habitats preferred by the agents of regeneration: fruit- and nectar-eating birds.

According to the Hewa, frugivores are rare in secondary forest growth that is younger than 20 years. Their gardens create an environment that is hostile to the fruit-doves *Ptilinopus* sp. and some species of lorikeets *Charmosyna* spp. Both species are vital to forest regeneration. In general, the Hewa report that human disturbance creates environments that are hostile to many species identified exclusively with New Guinea's forests. The Vulturine Parrot *Psittrichas fulgidus*, Pheasant Pigeon *Otidiphaps nobis*, Blue-collared Parrot *Geoffroyus simplex*, Wattled Brush-turkey *Aepypodius arfakianus*, Papuan Hornbill *Rhyticeros plicatus*, Flame Bowerbird *Sericulus aureus* and Purple-tailed Imperial-pigeon *Ducula rufigaster* are just a few of the species that the Hewa say will find secondary growth incompatible with their needs.

Table 17.1 *Hewa names of birds and their Western equivalents*

Hewa name	*Common name*	*Scientific name*	*Habitat*	*Diet*	*Altitude*
Masual	Grey Goshawk	*Accipiter novaehollandiae*	B	V	N, C
Masual	Black-mantled Goshawk	*Accipiter melanochlamys*	B	V	N, C
Masual Wuliai	Grey-headed Goshawk	*Accipiter poliocephalus*	B	V	N, C
Yalipap	Feline Owlet-Nightjar	*Aegotheles insignis*	B	I	A
Yalipap	Mountain Owlet-Nightjar	*Aegotheles albertisi*	B	I	A
To	Wattled Brush-turkey	*Aepypodius arfakianus*	B	G	N, C
Ke/Lalkai	Papuan King-parrot	*Alisterus chloropterus*	B	S	N, C
Labinam	Macgregor's Bower-bird	*Amblyornis macgregoriae*	B	F/I	C
Tolual	Gurney's Eagle	*Aquila gurneyi*	B	V	N, C
Fautal	Crested Hawk	*Aviceda subcristata*	B	V	A
Orlau	Josephine's Lorikeet	*Charmosyna josefinae*	B	N	N, C
Orlau	Little Red Lorikeet	*Charmosyna pulchella*	B	N	A
Orlau Meamea	Red-flanked Lorikeet	*Charmosyna placentis*	B	N	A
Orlau	Pygmy Lorikeet	*Charmosyna wilhelminae*	B	N	C
Ititali	White-eared Bronze Cuckoo	*Chrysococcyx meyerii*	B	I	N, C
Pabuka	Shovel-billed Kingfisher	*Clytoceyx rex*	B	A/V	A
Akupana	Northern Scrub Robin	*Drymodes superciliaris*	B	I	A
Muf	Purple-tailed Imperial-pigeon	*Ducula rufigaster*	B	F	N, C
Wipinam	Wattled Ploughbill	*Eulacestoma nigropectus*	B	I	N, C
Masual	Brown Falcon	*Falco berigora*	B	V	N, C
Pialu	White-bibbed Ground-dove	*Gallicolumba jobiensis*	B	F	N, C
Klaikal/Kulakula	Blue-collared Parrot	*Geoffroyus simplex*	B	S	N, C
Klaikal	Red-cheeked Parrot	*Geoffroyus geoffroyi*	B	S/F	N, C
Talifefa	Papuan Mt Pigeon	*Gymnophaps albertisii*	B	F	N, C
Fautal	Long-tailed Buzzard	*Henicopernis longicauda*	B	V	A
Paite Aliainam	Black-billed Cuckoo-dove	*Macropygia nigrirostris*	B	F	N, C
Wem	Common Scrubfowl	*Megapodius freycinet*	B	G	N, C
Fautal	Doria's Hawk	*Megatriorchis doriae*	B	V	A
Itali	Ornate Melectides	*Melectides torquatus*	B	N/A	N, C
Kun	Belford's Melectides	*Melidectes belfordi*	B	N/A	C
Kun	Yellow-browed Melectides	*Melidectes rufocrissalis*	B	N/A	C
Itali	Common Smoky Honeyeater	*Melipotes fumigatus*	B	F	N, C
Lekio	Black-winged Monarch	*Monarcha frater*	B	I/A	A
Ititapi	Red Myzomela	*Myzomela cruentata*	B	N/I	C
Ititapi	Red-throated Myzomela	*Myzomela eques*	B	N/I	C
Ititapi	Mountain Red-headed Myzomela	*Myzomela adolphinae*	B	N/I	C
Ititapi	Papuan Black Myzomela	*Myzomela nigrita*	B	N/I	C
Nilawi	Rufous Owls	*Ninox rufa*	B	V	A
Kawa	Pheasant Pigeon	*Otidiphaps nobis*	B	S/F	N, C
Atupupe	Dwarf Whistler	*Pachycare flavogrisea*	B	I	N, C
Wapintoa	White-eyed Robin	*Pachycephalopsis poliosoma*	B	I	N, C
Kwai	Short-tailed Paradigalla	*Paradigalla brevicauda*	B	A/F	C
Yaipof	Crested Pithoui	*Pithoui cristatus*	B	A	A
Ime	Palm Cockatoo	*Probosciger aterrimus*	B	S/V	A
Awia/Itap	Vulturine Parrot	*Psittrichas fulgidus*	B	F	N, C
Malkun	King of Saxony BOP	*Pteridophora alberti*	B	F/I	C
Tsai	White-breasted Fruit-dove	*Ptilinopis rivoli*	B	F	N, C
Fatula	Pink-spotted Fruit-dove	*Ptilinopus perlatus*	B	F	A
Fatula	Ornate Fruit-dove	*Ptilinopus ornatus*	B	F	A
Waliap	Dwarf Fruit-dove	*Ptilinopus nanus*	B	F	A
Nisuau	Spotted Babbler	*Ptilorrhoa leucosticta*	B	A	A
Nisuau	Chestnut-backed Jewel-babbler	*Ptilorrhoa castanonotus*	B	A	A

Table 17.1 *continued*

Hewa name	*Common name*	*Scientific name*	*Habitat*	*Diet*	*Altitude*
Nisuau	Blue Jewel-babbler	*Ptilorrhoa caerulescens*	B	A	A
Yekowa	Great Cuckoo-dove	*Reinwardtoena reinwardtii*	B	F	A
Telime	Hornbill	*Rhyticeros plicatus*	B	F/G	A
Sipap	Flame Bowerbird	*Sericulus aureus*	B	A/F	C
Tenia	Brown-collared Brush-turkey	*Talegalla jobiensis*	B	G	A
Yamyali Topela	Little Paradise Kingfisher	*Tanysiptera hydrocharis*	B	A/V	N, C
Yamyali Topela	Common Paradise Kingfisher	*Tanysiptera galatea*	B	A/V	N, C
Meaunatal/ Tonaiem	White-faced Robin	*Tregellasia leucops*	B	I	A
Nilawi	Grass Owls	*Tyto capensis*	B	V	A
Nilawi	Sooty Owls	*Tyto tenebricosa*	B	V	A
Peteta	Pygmy Honeyeater	*Oedistoma pygmaeum*	B, Lg	N/I	A
Peteta	Dwarf Honeyeater	*Oedistoma iliolophus*	B, Lg	N/I	A
Pakatul	Satin Flycatcher	*Myiagra cyanoleuca*	Lgt, B	I	A
Meanalu Hot	New Guinea Flightless Rail	*Megacrex inepta*	K	I/G	H, N
Mopagalalo	Willie Wagtail	*Rhipidura leucophrys*	K	I	A
Tai Tai Nok	Spotless Crake	*Porzana tabuensis*	K, Kt	I/G	H
Philopatu	Fairy Gerygone	*Gerygone palpebrosa*	K, Lg	I	A
Philopatu	Green-backed Gerygone	*Gerygone chloronotus*	K, Lg	I	A
Tel	Greater Black Coucal	*Centropus menbeki*	K, Lg, B	A/V	H
Teta	Black Cuckoo-shrike	*Coracina melaena*	K,Lg,B	A/F	A
Tul	Butcher Bird	*Cracticus cassicus*	K, Lg, B	A/F	H, N
Keketia	Black-browed Triller	*Lalage atrovirens*	K, Lg, B	A/F	A
Sisinek	Long-billed Honeyeater	*Melilestes megarhynchus*	K, Lg, B	F/I	A
Niatili	Scrub White-eared Meliphaga	*Meliphaga albonotata*	K, Lg, B	F/I	A
Krifau	Brown Oriole	*Oriolus szalayi*	K, Lg, B	F/I	A
Krifau	Helmeted Friarbird	*Philemon buceroides*	K, Lg, B	F/I	A
Labinam	Rusty Pithoui	*Pitohui ferrugineus*	K, Lg, B	F/I	A
Kokoma	Red-necked Rail	*Rallina tricolor*	K, Lg, B	I/G	A
Kokoma	Forbes' Forest Rail	*Rallina forbesi*	K, Lg, B	I/G	A
Toblaibak	Tawny-breasted Honeyeater	*Xanthotis flaviventer*	K, Lg, B	G	A
Satid	Grey Wagtail	*Motacilla cinerea*	K, Lg, Ng	I	A
Luakanalu	Long-tailed Nightjar	*Caprimulgus macrurus*	K, Ng, Lg, B	I	H, N
Yamyali Manepnam	Azure Kingfisher	*Alcedo azurea*	Lg, B	A/V	A
Yamyali Manepnam	Dwarf Kingfisher	*Ceyx lepidus*	Lg, B	A/V	A
Puka	Black Butcherbird	*Cracticus quoyi*	Lg, B	G	A
Paiepe	Oriental Cuckoo	*Cuculus saturatus*	Lg, B	I	A
Kalapanau	Dollarbird	*Eurystomus orientalis*	Lg, B	I/V	A
Petapeten	Yellow-bellied Gerygone	*Gerygone chrysogaster*	Lg, B	I	A
We	Western Black-capped Lory	*Lorius lory*	Lg, B	N	A
Teti	Trumpet Manucode	*Manucodia keraudrenii*	Lg, B	F	A
Teti	Crinkle-collared Manucode	*Manucodia chalybata*	Lg, B	F	A
Mogalpupe	Golden Monarch	*Monarcha chrysomela*	Lg, B	I/A	A
Noanimano	Black-headed Whistler	*Pachycephala monacha*	Lg, B	I	A
Noloplopnam	Rusty Whistler	*Pachycephala hyperythra*	Lg, B	I	A
Ponaitetela	Island Leaf-warbler	*Phylloscopus trivirgatus*	Lg, B	I	N, C
Isinam	Hooded Pithoui	*Pitohui dicrous*	Lg, B	A/F	A
We	Dusky Lorikeet	*Pseudeos fuscata*	Lg, B	N	A
Taunam	Beautiful Fruit-dove	*Ptilinopus pulchellus*	Lg, B	F	A
Metaghalip	Northern Fantail	*Rhipidura rufiventris*	Lg, B	I	A

Table 17.1 *continued*

Hewa name	*Common name*	*Scientific name*	*Habitat*	*Diet*	*Altitude*
We	Rainbow Lorikeet	*Trichoglossus haematodus*	Lg, B	N	A
Faghal	Double-eyed Fig-parrot	*Cyclopsitta diophthalma*	Lgf, B	F	A
Yamyali Compata	Mountain Kingfisher	*Halcyon megarhyncha*	Lgf, B	A/V	A
Yamyali Compata	Forest Kingfisher	*Halcyon macleayii*	Lgf, B	A/V	A
Yamyali Compata	Sacred Kingfisher	*Halcyon sancta*	Lgf, B	A/V	A
Yau	Raggianna BOP	*Paradisaea raggiana*	Lgf, B	A/F	A
Mok	Papuan Frogmouth	*Podargus papuensis*	Lgf, B	I/V	A
Yaiptauf	Marbled Frogmouth	*Podargus ocellatus*	Lgf, B	I/V	A
Meanalu Cold	Spotted Catbird	*Ailuroedus melanotis*	Lgt, B	A/F	N, C
Meanalu Hot	Bush-hen	*Amaurornis olovaceus*	Lgt, B	I/G	N, C
Numa	Sulphur-crested Cockatoo	*Cacatua galerita*	Lgt, B	S	A
Winiainam	Pheasant Koel	*Centropus phasianinus*	Lgt, B	G	A
Awoo Pital	Magnificent BOP	*Cicinnurus magnificus*	Lgt, B	A/F	A
Nanam	King BOP	*Cicinnurus regius*	Lgt, B	A/F	A
Yaulo	Little Shrike Thrush	*Colluricincla megarhyncha*	Lgt, B	A	A
Osaunam	Bi-coloured Mouse Warbler	*Crateroscelis nigrorufa*	Lgt, B	I	A
Osaunam	Rusty Mouse Warbler	*Crateroscelis murina*	Lgt, B	I	A
Yamyali Uwowla	Rufous-Bell Kookabura	*Dacelo tyro*	Lgt, B	A/V	H, N
Wanainam	Common Koel	*Eudynamys scolopacea*	Lgt, B	I/G	A
Unkau	New Guinea Harpy Eagle	*Harpyopsis novaeguineae*	Lgt, B	V	A
Sisifu/Palu	New Guinea Bronzewing	*Henicophaps albifrons*	Lgt, B	S/F	A
Maunal	Papuan Hanging-parrot	*Loriculus aurantiifrons*	Lgt, B	N/F	A
Masitu	Buff-faced Pygmy-parrot	*Micropsitta pusio*	Lgt, B	L	N, C
Pakatu	Spot-winged Monarch	*Monarcha guttula*	Lgt, B	I	A
Uwaisia	Sclater's Whistlers	*Pachycephala soror*	Lgt, B	I	A
Eli Hot	Spotted Berrypecker	*Rhamphocharis crassirostris*	Lgt, B	F	A
Pusisa	Black Fantail	*Rhipidura threnothorax*	Lgt, B	I	H, N
Wisinep	Scrub-wren	*Sericornis virgatus*	Lgt, B	I	A
Wisinep	Beccari's Scrub-wren	*Sericornis becarii*	Lgt, B	I	A
Wisinep	Grey-green Scrub-wren	*Sericornis arfakianus*	Lgt, B	I	A
Nipalia	Thick-billed Ground-pigeon	*Trugon terrestris*	Lgt, B	S/F	H
Yenuk	New Guinea White-Eye	*Zosterops Novaeguinneae*	Lgt, B	G	A
Yenuk	Black-fronted White-Eye	*Zosterops artifrons*	Lgt, B	G	A
Yenuk	Western Mountain White-Eye	*Zosterops fuscicapillus*	Lgt, B	G	A
Teliam	Dwarf Cassowary	*Casuarius bennetti*	Lgtf, B	F	A
Yatini	Black-bellied Cuckoo-shrike	*Coracina montana*	Lgtf,B	A/F	A
Yatini	Black-shouldered Cuckoo-shrike	*Coracina morio*	Lgtf, B	A/F	A
Yatini	Stout-billed Cuckoo-shrike	*Coracina caeruleogrisea*	Lgtf, B	A/F	A
Yatini	Boyer's Cuckoo-shrike	*Coracina boyeri*	Lgtf, B	A/F	A
Yatini	Grey-headed Cuckoo-shrike	*Coracina schisticeps*	Lgtf, B	A/F	A
Neki	Zoe Imperial-pigeon	*Ducula zoeae*	Lgtf, B	F	A
Yalio	Eclectus Parrot	*Eclectus roratus*	Lgtf, B	S/F	N,C
Meapulu	Cinnamon Ground-dove	*Gallicolumba rufigula*	Lgtf, B	S/W	A
Paite Fiwow	Brown Cuckoo-dove	*Macropygia amboinensis*	Lgtf, B	F	A
Telivi	Black Berrypecker	*Melanocharis nigra*	Lgtf, B	F	A
Polipata/ Momio	Yellow-legged Flycatcher	*Microeca griseoceps*	Lgtf, B	I	A
Polipata /Momio	Olive Flycatcher	*Microeca flavovirescens*	Lgtf, B	I	A
Yaunam	Yellow-bellied Sunbird	*Nectarina jugularis*	Lgtf, B	N/A	A
Wal	Blue-breasted Pitta	*Pitta erythrogaster mackloti*	Lgtf, B	I/A	A
Walwala	Hooded Pitta	*Pitta sordida*	Lgtf, B	I/A	A
Walwala	Noisy Pitta	*Pitta versicolor*	Lgtf, B	I/A	A
Alualu	Wompoo Fruit-dove	*Ptilinopus magnificus*	Lgtf, B	F	A

Table 17.1 *continued*

Hewa name	*Common name*	*Scientific name*	*Habitat*	*Diet*	*Altitude*
Luapa	Superb Fruit-dove	*Ptilinopus superbus*	Lgtf, B	F	A
Yaunam	Slaty-chinned Longbill	*Toxorhamphus poliopterus*	Lgtf, B	N/A	A
Masual Tetia	Chinese Goshawk	*Accipiter soloensis*	Ng, Lg, B	V	H, N
Awenam	Brush Cuckoo	*Cacomantis variolosus*	Ng, Lg, B	I	A
Awenam	Chestnut-breasted Cuckoo	*Cacomantis castaneiventris*	Ng,Lg,B	I	A
Wesanalu	Papuan Flowerpecker	*Dicaeum pectorale*	Ng, Lg, B	A/F	A
Tetikal	Spangled Drongo	*Dicrurus hottentottus*	Ng, Lg, B	I	H, N
Simapanal	Whistling Kite	*Haliastur sphenurus*	Ng, Lg, B	A/V	A
Itain	Moustached Tree-swift	*Hemiprocne mystacea*	Ng, Lg, B	I	A
Isisapi	Emperor Fairy-wren	*Malurus cyanocephalus*	Ng, Lg, B	I	H, N
Isisapi	Broad-billed Fairy-wren	*Malurus grayi*	Ng, Lg, B	I	H, N
Tualiko	White-shouldered Fairy-wren	*Malurus alboscapulatus*	Ng, Lg, B	I	H, N
Pelapela	Blue-tailed Bee-eater	*Merops philippinus*	Ng, Lg, B	I	H, N
Simapanal	Black Kite	*Milvus migrans*	Ng, Lg, B	A/V	A
Atupe	Golden-backed Whistler	*Pachycephala aurea*	Ng, Lg, B	I	A
Telian /Wuaitula	Mountain Peltops	*Peltops montanus*	Ng, Lg, B	I	A
Anapf	Chestnut-bellied Fantail	*Rhipidura hyperthra*	Ng, Lg, B	I	A
Anapf	Rufous-backed Fantail	*Rhipidura rufidorsa*	Ng, Lg, B	I	A
Kghai Ke	Channel-billed Cuckoo	*Scythrops novaehollandiae*	Ng, Lg, B	I/G	H, N
Talinema	Wallace's Fairy-wren	*Sipodotus wallacii*	Ng, Lg, B	I	H, N
Apumat	Salvadori's Teal	*Anas waigiuensis*	W	W	A
Apumat	Plumed Whistling-Duck	*Dendrocygna eytoni*	W	W	A
Abf	White-faced Heron	*Egretta novaehollandiae*	W	V	A
Abf	Pied Heron	*Egretta picata*	W	V	A
Abf	Little Egret	*Egretta garzetta*	W	V	A
Abf	Great Egret	*Egretta alba*	W	V	A
Efaneni	Torrent Flycatcher	*Monachella muellerianna*	W	I	A
Pialimatal	Brahminy Kite	*Haliastur indus*	W, Ng	A/V	A
Aiabli	Swift	*Collocalia esculenta*	W, Ng, K, Lg, B	I	A

Notes: Common names: BOP = Bird of Paradise. Habitat codes: B = primary forest; Lgt = forest 20 years +; Lgtf = few found in forest 20 years +; Lg = secondary forest; Lgf = few found in secondary forest; Ng = new garden; K = grassland; Kt = old grassland; W = water.
Diet codes: V = vertebrates; I = insects; G = generalists; F = fruit; A = arthropods; S = seeds; N = nectar; L = lichen; W = feeds on waterborne vegetation an creatures. Altitude codes: A = all elevations; C = 1000m +; N/C = 800m +; H = 500m–800m.

By gathering TEK on the impacts of human activity, conservationists can obtain information on forest dynamics that is verifiable using site surveys but would require decades to gather by conventional research methods. The Hewa informants have put their land use in a context that illustrates the perils of combining the conservation of their forests with development. Rather than portraying themselves as capable of performing a super-human balancing act, the Hewa describe their traditional gardening purely as a source of disturbance on this landscape. At the current level of gardening, the Hewa increase the biodiversity of their lands. By felling the forest, they create a mosaic of primary forest, secondary forest, grasslands, gardens and the various phases of succession growth (gamma diversity). They also create habitats for organisms that cannot survive in the primary forest (alpha diversity). They are a living example of the biological diversity that can be produced by a small human population with limited technology continually moving while cutting gardens (Balée, 1998). By gardening in the forest, it is possible for the Hewa to create a landscape that contains more organisms and more habitats than an unaltered landscape. In this sense, the Hewa are inextricably linked to the biological diversity found in their homeland.

A forest containing the type of small-scale gardening currently practised by the Hewa is a mosaic of many types of biological communities. The combination of gardens, grasslands, the various stages of forest regrowth and primary forest are more biologically diverse than the climax forest alone. The Hewa are creating habitats, each of which is less diverse (beta diversity) than the primary forest. While the current mosaic is more diverse than mountains covered exclusively in undisturbed primary forest, the total replacement of primary forest by secondary growth will diminish the biodiversity of the Hewa homeland. Their knowledge of this dynamic provides an important insight into the ability of indigenous humans to use the environment without compromising biological diversity.

Although it is always dangerous to generalize to other cultures, the Hewa have put their land use in a context that illustrates the perils of conflating a small-scale disturbance regime with sustainable management. If the relationship between traditional human activity and biodiversity is one of disturbance rather than balance, this has important implications for the ability of local people to conserve biological diversity in the face of changing conditions. The current diversity surrounding most forest-dwellers is a by-product of traditional land use by a small mobile society (Smith and Wishnie, 2000). Activities that at one time were sustainable and actually served to increase the number of species to be found in an area could, under slightly different conditions, diminish biodiversity. One needs look no further than the highland valleys to the south of the Hewa to find examples of the inability of tradition to curb habitat destruction when faced with novel circumstances. These societies, living in the valleys surrounding Lake Kopiago, Mount Hagen and Wabag, simplified their environments long before the arrival of Europeans. They took advantage of the bounty that accompanied the introduction of the sweet potato in the 16th century to grow in numbers and spread across these valleys. As their gardens increased, they transformed and simplified these once diverse landscapes. Their remaining biological diversity has been relegated to those areas too steep or too cold to be gardened profitably.

Finally, and most importantly, by using TEK in this manner, indigenous peoples can have a seat at the negotiating table as equals. Once assumptions concerning stability, balance and biodiversity are jettisoned, it is possible to understand how traditions can both promote biodiversity and cause extinctions under varying conditions. While societies such as the Hewa remain intact and their traditions are compatible with biological diversity, the knowledge exists to develop a land-use plan that is truly sustainable. This will not require super-computers, satellite imagery or an exotic research protocol. Using only traditional knowledge of birds, it is possible to establish the connection between disturbance and biological diversity for other cultures in other areas. In so doing, indigenous landowners and conservation organizations can develop partnerships based on mutual understanding and trust for the sake of the planet's remaining 'good news areas'.

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18

Birds, People and Conservation in Kenya

Mercy Njeri Muiruri and Patrick Maundu

With 1089 species of birds, Kenya has one of the highest diversities of birds in the world. This is attributable to the region's diverse habitats – the result of varied altitude, topography, humidity, precipitation and land use. As natural vegetation in the country is cleared to create room for agriculture, infrastructure and other developments, bird security, their breeding and feeding grounds suffer, thus threatening many species with limited ranges and populations; even flight paths for many migratory species are affected. The country's high cultural diversity, as illustrated by the presence of more than 55 ethnic groups, presents an equally high diversity of bird-related uses and culture, resulting in a rich resource of indigenous knowledge that could be tapped not only for bird conservation, but also for people's livelihoods. Certain beliefs benefit affected bird species while certain uses – for example, in ceremonial attires and adornments – may have the opposite effect. Understanding these cultural beliefs and uses can be beneficial in planning bird conservation measures and human livelihood strategies.

Diversity of birds in Kenya

Kenya has one of the richest avifaunas in Africa. 1089 bird species are currently listed (Fanshawe and Bennun, 1991; East Africa Natural History Society, 1996), of which at least 9 are national endemics. The avifauna includes regular migrants within the African tropics, while others are from subtropical and temperate lands, particularly West Asia, Eastern Europe and Russia. About 170 species of Palaearctic migrants use Kenya as a flight path, with some going as far south as South Africa, while Afrotropical migrants, including those from Madagascar, constitute about 60 species. About 9 species are national endemics, including Williams's Lark (*Mirafra williamsi*), Sharpe's Longclaw (*Macronyx sharpei*), Hinde's Babbler (*Turdoides hindei*), Clarke's Weaver (*Ploceus golandi*), Aberdare Cisticola (*Cisticola aberdare*), Tana River Cisticola (*Cisticola restrictus*), Taita Thrush (*Turdus olivaceus helleri*), Forest Batis (*Batis mixta ultima*) and Montane White-Eye (*Zosterops poliogastor*) (Fishpool, 1996; Bennun and Njoroge, 1999).

Common Kenyan birds of interest to visitors include the common Ostrich (*Struthio camelus*), Secretary Bird (*Segittarius serpentarius*), Kori Bustard (*Ardeotis kori*), flamingos (Phoenicopteridae), Storks (Ciconiidae), Pelicans (Pelecanidae), Ducks (Anatidae), Guineafowls (Numididae) and Weavers (Ploceidae) (and see Table 18.1). A number of Kenya's bird species are introductions and some, such as the House Crow (*Corvus* sp. *splendens*) (GISP, 2007), pose a threat to populations of indigenous species. Of the l23 species in the Kenyan list that are globally threatened, the following are endangered: the Papyrus Gonolek (*Laniarius mufumbiri*), Lesser Kestrel (*Falco naumanni*), Pallid Harrier (*Circus macrourus*), Great Snipe (*Gallinago media*), Sharpe's Longclaw (*Hemimacronyx sharpei*) and Chapin's Flycatcher (*Muscicapa lendu*) (Collar and Stuart, 1994).

Kenya's diverse ecosystems

Located in the Ethiopian zoogeographic region, Kenya is a country of slightly over 0.5 million square kilometres and has a wide variety of ecosystems, the result of its wide altitudinal range (sea level to over 5000m), varied topography, differences in precipitation (150mm in Chalbi Desert to over 2000mm on Mount Kenya and parts of the western region), varying humidity and different land use. This has, in turn, resulted in varied vegetation types and habitats.

Kenya's coastline has huge strips of mangroves and extensive wetlands at the mouths of the larger rivers, Tana and Athi. These ecosystems border the coastal lowlands, with their humid and sub-humid forests punctuated by biodiversity-rich hills (such as the Shimba and Taita) that rise gently to the Nyika Plateau. The Nyika Plateau, located between the hills, is a dry savannah with bushland and scrub and includes Tsavo National Park, which is on the flyway for migratory birds. The area, with its unique avifauna, is continuous with the low, dry north-eastern part of the country occupied by pastoral Somalis. The

Table 18.1 *Some major habitats in Kenya and birds commonly found in them*

Mangroves forests and coastal wetlands	*Coastal humid and sub-humid forests*	*Dry Nyika Plateau, including Tsavo National Park*	*Central Highlands*	*Highlands west of the Rift Valley*	*Rift Valley lakes (Magadi, Naivasha, Nakuru, Bogoria, Baringo, Turkana)*	*Lake Victoria Basin*
Southern Banded Snake-Eagle, *Circaetus fasciolaus* Basra Reed Warbler, *Acrocephalus griseldis* Malindi Pipit, *Motacilla melindae* Crab Plover, *Dromas ardeola*	(a) **Arabuko Sokoke** East Coast Akalat, *Sheppardia gunningi* Spotted Ground Thrush, *Zoothera guttata* Sokoke Scops-owl, *Otus ireneae* Amani Sunbird, *Anthreptes pallidigaster* Clarke's Weaver, *Ploceus golandi* Sokoke Pipit, *Anthus sokokensis* (b) **Shimba Hills** Fischer's Turaco, *Tauraco fischeri* Plain-backed Sunbird, *Anthreptes reichenowi* (c) **Taita Hills** Taita Thrush, *Turdus helleri* Taita White-Eye, *Zosterops silvanus* Taita Apalis, *Apalis fuscigularis* Ayre's Hawk- Eagle, *Hieraaetus ayresii*	Amur Falcon, *Falco amurensis* Steppe Eagle, *Aquila nipalensis* Lesser Spotted Eagle, *Aquila pomarina* Greater Spotted Eagle, *Aquila clanga* Warblers, *Sylvia*, *Hippolais*, *Acrocephalus*, *Phylloscopus*, *Locustella* spp. Shrikes, *Lanius* sp. Nightjars, *Caprimulgus* sp.	(a) **Mount Kenya** Lesser Kestrel, *Falco naumanni* Jackson's Widowbird, *Euplectes jacksoni* Jackson's Francolin, *Francolinus jacksoni* Kenrick's Starling, *Poeoptera kenricki* Hunter's Cisticola, *Cisticola hunteri* (b) **Aberdare Highlands** Aberdare Cisticola, *Cisticola aberdare* Hinde's Babbler, *Turdoides hindei* African Crowned Eagle, *Stephanoaetus coronatus* Striped Flufftail, *Sarothrura affinis* Baillon's Crake, *Porzana pusilla* African Grass Owl, *Tyto capensis* Long-tailed Widowbird, *Euplectes progne* Sharpe's Longclaw, *Macronyxs harpei*	(a) **Nguruman** Grey-crested Helmet-shrike, *Prionops poliolophus* Red-throated Tit, *Parus thruppi* Lammergeier, *Gypaetus barbarus* Purple-throated Cuckoo-shrike, *Campephaga quiscalina* (b) **Mau Forest** Grey-winged Robin, *Sheppardia polioptera* Least Honeyguide, *Indicator rexilis* Red-chested Owlet, *Glaucidium tephronotum* (c) **Cherangani Hills** Thick-billed Honeyguide, *Indicator conirostris* (d) **Mount Elgon** Toro Olive Greenbul, *Phyllastrephus hypochloris* Grey-chested Illadopsis, *Kakamega poliothorax* Ring-necked Francolin, *Francolinus streptophorus*	Lesser Flamingo, *Phoenicopterus minor roseus* Greater Flamingo, *Phoenicopterus (ruber)* Great White Pelican, *Pelecanus onocrotalus* Pink-backed Pelican, *Pelecanus rufescens* Great Cormorant, *Phalacrocorax carbo* Long-tailed Cormorant, *Phalacrocorax africanus* Red-knobbed Coot, *Fulica cristata* African Spoonbill, *Platalea alba* Great Crested Grebe, *Podiceps cristatus* Black-necked Grebe, *Podiceps nigricollis* Little Grebe, *Tachybaptus* ruficollis Gulls, *Larus* sp. Terns, *Sterna* and *Chlidonias* spp. Pied Avocet, *Recurvirostra avosetta* Stints, *Calidris* sp. Plovers, *Charadrius*, *Venellus* and *Pluvialis* sp. Storks, *Ciconia*, *Ephippiorhynchus*, *Leptoptilus*, *Anastomus* and *Mycteria*	(a) **Yala Swamp** Papyrus Gonolek, *Laniarius mufumbiri* Papyrus Yellow Warbler, *Chloropeta gracilirostris* Great Egret, *Casmerodius albus* (b) **Tropical humid forest such as Kakamega Forest** Chapin's Flycatcher, *Muscicapa lendu* Turner's Eremomela, *Eremomela turneri* Cassin's Honeybird, *Prodotiscus insignis* Southern Hyliota, *Hyliota australis* Yellow-bellied White-Eye, *Zosterops senegalensis* Hartlaub's Marsh Widowbird, *Euplectes hartlaubi*

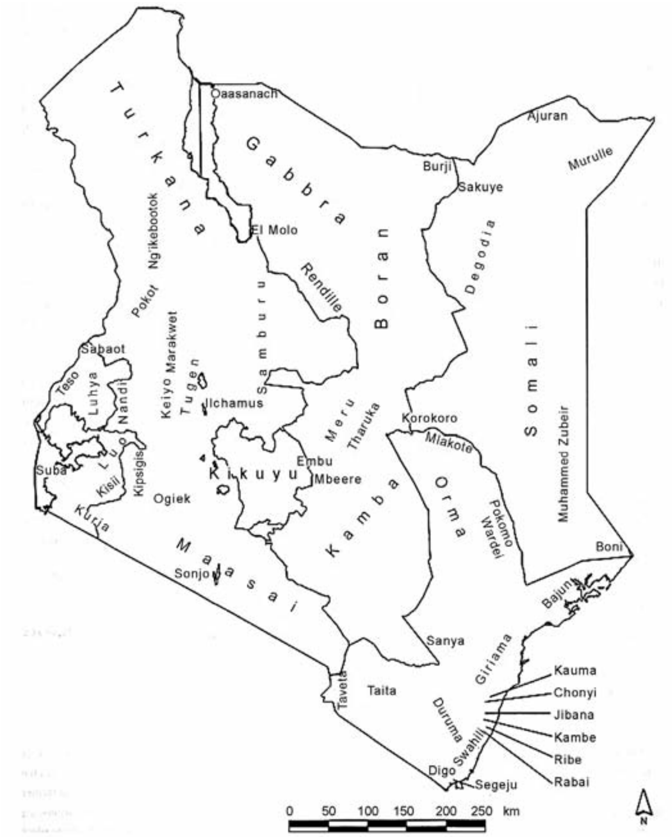
low Nyika Plateau gradually leads to the high plateau (e.g. the Kajiado Plains), which is dry but relatively cooler and is mainly grassland, with scattered bush dominated by the whistling thorn *Acacia drepanolobium*. This zone gives way to the sub-humid to humid Kenya highlands – represented by the Central Highlands (e.g. Mount Kenya and Aberdares). The highlands west of the Rift Valley, the Nguruman, Mau and Cherangani, have forests in some parts but are surrounded by a rich agricultural zone and constitute the main agricultural region in the country. The floor of the Rift Valley opens southwards and northwards to the acacia-dominated lowlands of Magadi and Turkana. The floor is mainly dry, with a few high volcanic mountain peaks (e.g. Suswa and Longonot) and a number of lakes of varying salinity levels (e.g. Magadi, Naivasha, Nakuru, Bogoria, Baringo and Turkana). The humid Lake Victoria Basin marks the extreme western end of the country and has numerous wetland ecosystems, such as Yala Swamp and Kakamega Forest, a humid tropical forest that marks the extreme eastern end of the Guinea–Congolian vegetation type.

Cultural diversity-bird use and knowledge

Kenya has a high cultural diversity represented by more than 55 linguistically distinct indigenous community groups who fall into several higher linguistic groupings, the larger ones being Nilotic, Bantu and Cushitic speakers (see Figure 18.1). Although each community has its own unique culture and traditions about birds, knowledge and use are more prominent among communities who depend on local natural biological resources as their source of livelihoods. Pastoralists and hunter–gatherers, in particular, relate to birds much more than do agriculturalists. A community's culture may have a positive or negative impact upon the survival of the affected species and, hence, is of relevance to conservation. Certain beliefs benefit affected bird species, while certain uses (e.g. in ceremonial attire) may have the opposite effect.

Loss of habitats and effect on bird diversity

Kenya's bird habitats are increasingly under threat from a number of fronts. Population pressure (and uncontrolled destructive livelihood activities), originally most intense in the 20 per cent of the country with arable potential, is now being felt in semi-arid areas. It has led to the conversion of more and more natural habitats to farmland (crop and animals) and also left degraded lands in dry areas. It is considered the single most important threat. Within this are forest destruction by squatters and loggers, as well as charcoal burning, especially in drylands. Development activities are also contributing significantly, particularly conversion of marshland, such as Yala Swamp, to agricultural land, expansion of urban centres and other forms of infrastructure such as roads and power lines. Kenya has, over the last few decades, lost a large portion of its forest land and cover, so that today only about 1.7 per cent of the land area has closed forest. Key forest areas such as the Mau have in recent years been under serious threat by squatters and illegal allocations. Wetlands too have been under



Source: Maundu et al (1999)

Figure 18.1 *Language groups of Kenya*

serious threat from development activities (e.g. horticultural activities around Lake Naivasha and pollution of Lake Nakuru by town effluent). The shrinking of bird habitats threatens many bird populations.

Use of birds in ceremonies

A number of Kenyan communities (e.g. the Maasai, Kalenjin and Samburu) still uphold their traditional lifestyle characterized by various ceremonies that mark specific periods of life. Specific ceremonies are held to mark the initiation from boyhood to being a warrior and to adulthood, a ceremony which involves the killing of important birds, the species selected on the basis of beauty and regard in the communities. Among the Maasai and Samburu, a head-dress is prepared during the passage from boyhood to warrior and into a junior elder. Head-dresses may be made from a lion's skin; but warriors who cannot kill a lion hunt the Ostrich for its feathers. A head-dress made from Ostrich feathers is an ornament of great prestige. Head-dresses are also found among the Luo and Kikuyu. During the circumcision ceremonies of the Maasai (called *emurata*) some of the targeted birds include the *Olkirapash* (Grey-headed Bush-shrike *Malaconotus blanchoti*) *Olkupelia* (Augur Buzzard *Buteo augur* for its legs), *Olkasero* (Speckled Mousebird *Colius striatus*), *Ole kishi olo osholel* (Superb Starling *Lamprotornis superbus*) and *Olekishu orok* (Greater Blue-eared Starling *Lamprotornis chalybeus*). All circumcised boys must undergo an initiation stage called *aibartisho*, lasting about one year. At this stage, they have to continue wearing their head-dress and repairing them with new bird skins. While there are indications that some bird species such as Schalow's Turaco (*Tauraco schalowi*), Augur Buzzard, Hartlaub's Turaco (*Tauraco hartlaubi*), African White-backed Vulture (*Gyps africanus*) and Ostrich have been affected by the hunting, data on their status are lacking.

In cases of any significant impact, mitigation efforts involving the local communities need to be put in place. Some possible alternatives include encouraging warriors to borrow or hire the head-dress from those who already have it and encouraging them to collect Ostrich feathers to repair head-dresses instead of killing an Ostrich. Iltorobo hunters need to be encouraged to collect feathers from roosting and feeding areas of vultures instead of killing these scavengers.

Medicinal use and witchcraft

Vultures in Africa are widely hunted for traditional medicine and rituals. Vulture parts are prescribed for various ailments, including headaches, and are also supposed to be effective for providing clairvoyant powers, foresight and increased intelligence. By eating the brain of the vulture, the witchdoctor is said to receive greater powers to communicate with the dead. The foot of a vulture is believed to bring good luck in gambling; vulture parts are consumed or ground into medicine, which is smoked, drunk, inhaled, smeared on the body, given as an enema or rubbed into an incision.

The Hammerkop (*Scopus umbretta*) is widely associated with witchcraft; according to native superstitions, Hammerkop are evil omens and it is considered bad luck to harm them. Witchdoctors are known to demand the bird itself or the materials that the bird uses for building its huge nest, including human clothes and, in the early days, human bones.

Local communities have been interacting with birds and using them in a variety of ways, including for food, medicine, ornaments, cultural ceremonies and indicators of weather. Each culture has myths, tales, beliefs, riddles, songs and proverbs associated with birds. Since time immemorial, people have been developing song tunes and songs from birds and teaching good character using birds as examples. At times of food shortage, people learned new food types from birds. Above all, birds are still used as the natural waking-up call by many communities in rural areas.

Raptors, especially vultures, are a source of strong primary feathers used in arrow shafts. These feathers are said to remain intact even after years of use.

The Kamba, the Pokot and Iltorobo (Maasai word for people without livestock) communities are well known for making such arrows both for their own use and for commercial purposes; they mainly use feathers from the White-backed Vulture. Among the Iltorobo, one full wing of a vulture may be exchanged for one goat or a dozen arrows and, therefore, a single vulture fetches a fortune for the hunter. Arrows are mainly sold to warriors and hunters, and a hunter may earn a living from the sale of raptor feathers alone. Bird feathers are highly valued and widely used for human ornamentation. Ostrich and guineafowl feathers are used for adornment in traditional ceremonies, and guineafowl feathers are popular adornments in traditional dances. Feathers are stuck in the hair or on special hats.

Many communities in Kenya are known to hunt birds for food. While the Maasai do not normally hunt birds for food, certain communities, such as the Kamba, hunt birds for food as part of their culture. The hunter–gatherer communities of the Iltorobo, now few in the country, tend to rely heavily on wild foods, including birds. Complex trapping or killing systems have been developed by various groups, and although some are common across several groups, a number are unique to some communities. The Luhyia and Luo trap the highly consumed *Tsisindu* (quails *Coturnix* spp.), either for food or for cash. The *Tsisindu* are widely available in the market in western Kenya and are also sold in Nairobi when in season. The quails are a delicacy and highly prized by the community. *Tsisindu* is often served in ceremonies due to its superior taste. Information on the effect of this harvesting is scanty; but the reduction of the population is attributed by the local Luhvia community more to habitat loss than harvesting for food.

Many other common birds are used for food, including the Helmeted Guineafowls (*Numida meleagris*), Crested Guineafowl (*Guttera pucherani*), Vulturine Guineafowl (*Acryllium vulturinum*), Yellow-necked Spurfowls (*Francolinus leucoscepus*), Red-necked Spurfowl (*Francolinus afer*) and the *Mungwethe-gikuyu* (Scaly Francolin *Francolinus squamatus*). Others include Weavers (*Ploceus*), Thrushes (*Turdus*), Robins (*Pogonocichla*, *Sheppardia*, *Cossypha*, *Cercotrichas*) and Doves (*Turtur*, *Aplopelia*, *Streptopelia* and *Oena*). The eggs of the Ostrich, guineafowls, francolins and spurfowls are also much sought after.

Traditional bird-trapping methods

There are various ways of trapping birds, but these may differ from one community to another. Common ways include the use of latex, especially derived from *Euphorbia* or other plants with latex, use of twig baskets and bent-stick snares, as well as use of heavy stones. Other means and materials used to make traps include sticks, thread, grass, empty water basins, sap/glue from *Euphorbia*, wire mesh, fishing nets, reeds/papyrus, baskets and mats. Simple traps for birds have been perfected over time to become complex and highly effective.

The Kamba community, for example, favours the catapult. For larger birds, they use a basket of woven twigs (*ikenge*) with some trigger mechanism and a bait. The Luhyia and Luo communities have developed a complex system of trapping the gamebirds *Tsisindu* (quails), which involves laying a series of traps along their paths and the use of trapped birds as a lure for others. A strong stick is planted in the ground and slightly bent downwards. Some nets are fixed on the stick and the captured male *Tsisindu* are put inside each net. This is done to attract other *Tsisindu*. A trail is made on the ground from the bush towards the stick and at the base of the stick a shallow hole is dug on the ground and covered with lightweight sticks arranged in a row across the hole. Other approaching *Tsisindu* are captured when they fall into the hole.

Some other communities use a stick bent into the shape of a bow as a powerful and sensitive snare to catch larger gamebirds. This trap makes use of a firm stick of good tensile strength pushed into the ground, and bent into the shape of the letter 'c' to create tension in a string of sisal or, these days, sometimes nylon, attached in a complex arrangement to a series of other sticks and pegs in order to tighten when released by the bird's foot catching in a loop of the string. This loop is placed next to food set as bait appropriate to the target species – for example, grain, seeds or fruit might be used to trap pigeons (based on a description by Bensons, pers comm, 2008).

The Kamba and Gikuyu communities are known to use *Euphorbia* latex or any other natural glue from plants. The glue is applied to a tree where birds perch; the birds stick to the perch and are unable to fly away. The hunter then harvests them from their perch (S. M. Ng'ata and P. Muriithi, pers comm, 2008).

Beliefs and taboos

Some birds are killed or persecuted due to their association with bad omens. Amongst the Kamba, children are warned not to eat the Hammerkop because their teeth are said to stick in the meat. Traditionally, Luhyia men keep the plucked tail of a Pin-tailed Whydah (*Vidua macroura*) in their pockets as a charm to attract women. Owls (*Otus*, *Bubo*, *Scotopelia*, *Glaucidium*, *Strix*, *Asio*) are associated with bad omens such as disease and death, especially among the Kamba. The hoot of an owl perched on or near a house is perceived to mean 'someone will be sick or will die'. To counter this, the Kamba place a piece of a clay pot on the branch where the owl was perching. In some communities, witches are also believed to transform into owls.

Among the Turkana, the Long-tailed Nightjar (*Caprimulgus climacurus*) is a rainmaker. Its resonant thumping song is a sign that rain is near and animals will be satisfied. If a Nightjar lands inside a house or at the door of the kraal, then there will be rain. Among the Taita community of coastal Kenya, however, Freckled Nightjars (*Caprimulgus tristigma*) bring death. When a Freckled Nightjar flies over a house it is a sign of disaster. Among the people of Kirinyaga, the call of a Montane Nightjar (*Caprimulgus poliocephalus*) is a sign of an enemy and, hence, danger – a belief that was widely held during the Mau Mau (freedom fight) movement of the 1950s (P. Muriithi, pers comm, 2008)

Most communities in Kenya have taboos about birds. Among the Kamba community the *Kindali* (Common Drongo *Dicrurus adsimilis*) is often seen chasing away hawks and kites and so is not eaten. The sight of a Ground Hornbill (*Bucorvus* sp.) is a sign of death or impending drought and, hence, famine (T. Adhola and N. Otieno, pers comm, 2008). Among the Luhyia, it is believed that when the African Pied Wagtail (*Motacilla aquimp vidua*) perches on the roof of a house somebody there has to die: what is said is '*Eshichinjinjwi shiamala amatala kabhandu*', meaning 'the African Pied Wagtail clears people in homestead' (B. Amakobe, pers comm, 2008). The Bukusu do not eat the *Titingole* (Bronze Mannikin *Lonchura cucullata*) because they believe that it will cause problems to whomsoever eats it – for example, ringworms may develop (N. Nalianya, pers comm, 2008). Among pastoralists the Oxpeckers (*Buphagus* sp.) are valued and are considered to be a friend because of their feeding on parasitic insects such as ticks and fleas that attach to animals. Among the Luhyia, the *Likhokho* (Pied Crow *Corvus albus*) is believed to be an untrustworthy, forgetful and careless bird and, to many communities, is a sign of selfishness, especially with respect to food. A child is taught not to be like a Pied Crow, meaning he or she is to share food with siblings (G. Amutete, pers comm, 2008). If the *Ling'olahi* (Grey Crowned Crane *Balearica regulorum*) roosts near the homestead of the Luhyia and makes a loud noise, there will be a visitor, either welcome or unwelcome, while to the Kalenjin communities, it brings luck to the family because it brings babies. If the bird roosts in the homestead of a barren woman, it is a sign that she will become pregnant (J. Kiptoo, pers comm, 2008).

Birds as messengers

Rural communities in Kenya are highly dependent on the state of weather for their livelihoods – whether crop growing, livestock keeping or hunting and gathering, birds are part and parcel of the communities' monitoring and predicting of weather. They are necessary for decision-making to avoid disasters, especially food shortages.

The calls of certain birds indicate the onset of rain and, therefore, the season for sowing. For example, the call of the Red-chested Cuckoo (*Cuculus solitarius*) signals to the herdsboys and shepherds: 'It will rain, take your flock or herds back home'; and to the farmers: 'Prepare the land and get ready with your seed'; and to the women in the fields: 'Stock enough firewood for the impending wet season.' Among the Meru, the call sounds like '*mbaikia nku*', meaning 'Help me put the load of firewood onto my back [to take home].' To the Gikuyu, the song goes: '*ngwikia ku, ngwikia ku*', or 'Where do I sow the seed?'

The Kamba believe that the call of the *Ivutavutilya* (White-browed Coucal *Centropus* sp. *superciliosus*) signifies impending rain because the call sounds like water pouring into a bottle. Wagtails (*Motacilla*) are associated with wetlands and rains, and are highly valued as indicators of water and rain; they are therefore not hunted lest these dry up. Among the Kikuyu, *Thungururu* (Swallows *Hirundo*) seen in big flocks are a sign of rain, while to the Maasai community, the presence of Cattle Egrets (*Bubulcus ibis*) is a sign of an impending drought or dry spell. It alerts them to move their herds to areas with greener pasture.

Among many pastoralist and gathering communities, the dancing of the Honeyguide (*Indicator* sp.) in the view of honey harvesters means: 'There is a bee nest or beehive nearby, follow me. You can harvest and I get some remains.'

Vultures are associated with corpses and dangerous animals such as lions and hyenas. For reasons linked with cultural differences (e.g. related to the treatment of corpses after battle), for some communities, the sight of vultures signifies death or danger more surely than it does for other communities. Among pastoralist communities during cattle raids or war, the winning party is identified by observing the circling of vultures in the sky relative to positions of the warring parties (H. Saitabau and S. Kibet, pers comm, 2008). Among the Kamba the sight of a woodpecker (*Campethera*, *Dendropicos* and *Picoides*) while one is walking in a forest is indicative of a bad omen, so the group has to beat a retreat because their mission would be unsuccessful (O. M. Kioko, pers comm, 2008).

Ethno-ornithology and conservation

Ethno-ornithological studies have focused on myths, folklore, proverbs, knowledge and use of birds in a host of ways. During past years, most research on birds has been carried out without the 'ethno' component, while community participation in bird-related projects has been minimal. Indigenous knowledge documentation on birds has also been lagging behind those of other disciplines, such as plants, and the whole field of birds and people is still unexplored in spite of its great potential in supplementing conservation efforts and application in improving the quality of people's lives.

One way of involving communities in conservation efforts is strengthening cultural beliefs that support conservation, such as the use of alternative species – for example, chicken feathers for ceremonial attire such as head-dresses and promoting poultry farming to minimize hunting pressure. Using local knowledge of birds will not only provide us with more tools for conservation, but will give us more opportunities to fight hunger and malnutrition, bring cash to local communities, improve household economies and benefit more from their aesthetic value. Ethno-ornithology will provide an opportunity for community participation in bird conservation and sustainable use.

Loss of bird habitats and shrinking bird populations are of global concern. Conservation should not, however, be carried out in isolation from people's livelihoods. The two are often in conflict and therefore the subtle balance of the two has to be found. Ethno-ornithology offers us an opportunity to arrive at a win–win situation – where we achieve conservation but also increase livelihood opportunities for people. While uses such as food can be turned to a livelihood venture, belief systems that benefit conservation might be promoted amongst the relevant communities to achieve positive conservation results. In order to achieve this, a good understanding of local belief systems and uses of birds is essential.

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Bird Messengers for All Seasons: Landscapes of Knowledge among the Bribri of Costa Rica

Nicole Sault

For the Bribri of southern Costa Rica, birds do not simply inhabit the landscape – they are beings with knowledge that can benefit people in everyday life, as well as in critical times of change or disaster. To understand and learn from birds requires paying close attention to their characteristics and behaviour, as well as knowing how to interpret their messages. It also requires the wisdom to recognize one's responsibility for right action in return. Applying an anthropological approach toward analysing the place of birds in the Bribri worldview of interconnections shows how this knowledge influences cultural practices, classification systems and conservation of the rainforest.

Introduction

Unlike the big Keel-billed Toucan (or Rainbow-billed Toucan) (*Ramphastos sulfuratus*), Scarlet Macaw (*Ara macao*) and Resplendent Quetzal (*Pharomachrus mocinno*) portrayed in the tourist literature promoting Costa Rica, one of the birds local people most often mention with great affection is the small brown Clay-coloured Robin *Turdus grayi*, or *yigüirro* (from the Huetar language of Costa Rica; M. Bozzoli, pers comm, 2007). This robin has a lovely song; but what is significant is that it 'calls the rains' at the end of the dry season. For this, the Clay-coloured Robin has earned its status as the national bird of Costa Rica. When the rainy season is late in arriving, people complain that the robins need to sing and bring the rain. Some people say that both parrots and the Emerald Toucanet (*Aulacorhynchus prasinus*) also call the rain.

Many other birds in Costa Rica are important for the messages that they send out: predicting the weather or warning about venomous snakes (Beletsky, 1998). Birds do not simply inhabit the landscape; they are beings with knowledge that can benefit people in everyday life, as well as in critical times of change or disaster. While such knowledge of birds is being lost through modernization and cultural change, many people still recognize the significance of particular birds, such as parrots (Psittacidae), wrens (Troglodytidae) or vultures (Cathartidae).

Besides the Clay-coloured Robin, other birds are important to people – for example, the vulture, because it cleans the land of carcasses. The Rufous-naped Wren (*Campylorhynchus rufinucha*) is important because it eats insects and 'cleans' up barns, or because it warns of poisonous snakes by gathering in a group and making a loud racket. An urban woman described the Resplendent Quetzal (*Pharomachrus mocinno*) as the most significant bird because it represents freedom: put it in a cage and it will die.

Attitudes toward birds vary greatly depending on ethnic background and whether the person concerned is young or old, urban or rural. This chapter considers the implications of bird knowledge for humans, particularly in terms of relationships to the environment and other living creatures. For the Bribri, knowing about birds requires knowledge of the land and other creatures because they are all interconnected. Knowing about birds also means doing something *for* birds because reciprocity is the key to good relationships, as well as survival.

Bird interconnections

The Bribri are a matrilineal society of ranked clans whose language is from the Chibcha family. According to the 2000 census, their population is 14,000 (Hedström, 2006). Traditionally, they have been gatherers and hunters who also practise horticulture, planting crops such as *yuca* (manioc) and *pejibaye* (peach palm) (Bozzoli, 2006). Today bananas, plantain and cacao are their agricultural mainstay. While many continue to live on reserves, they have entered the modern workforce in small numbers and some have achieved university degrees, although discrimination and poverty have hampered them (*Nación*, 2007).

This research was conducted in several communities of the Talamanca region of south-eastern Costa Rica, near the Caribbean. Both the published literature on the Bribri, and interviews conducted for this study with Bribri elders and youths show that they have a vast store of ecological knowledge, which includes birds and inter-relationships with their surroundings.

One difficulty faced when trying to focus interviews specifically on birds is that people will talk about everything else as well — ants, monkeys, tapirs, squirrels, snakes, vines, trees, mountains, rivers, fish and so on. In drawing everything else into the conversation, they are showing the fundamental connectedness of life. It is not possible to understand birds without learning about everything else because birds are not isolated from the rest of life. The main point that people emphasized was the value of all things, not just for decoration or entertainment or even food. For the Bribri, the land and her creatures need to be protected to ensure the ongoing existence of Creation, not simply human survival (the Bribri refer to the land as feminine because they believe that the Earth was created from a tapir-girl, Iríria). Those who disrespect the land will incur the consequences, whether they are Bribri or outsiders. The values and rules by which they live apply to everything and what they say about birds relates to mammals, snakes, plants and geographical features as well.

Bird messengers

Birds do not simply inhabit the landscape; they are viewed as beings with knowledge from which humans can learn. This knowledge not only benefits humans in everyday life, but may be critical in times of change or disaster. In the mythology of the indigenous peoples of South America, 'birds not only have created man and frequently have taught people how to behave, but have saved people from total destruction' (Reina, 1991).

Among the Bribri of Costa Rica, information about birds is understood on various levels: through observing bird behaviour and knowing what the normal patterns are; through awareness of changes in the detailed variations of behaviour and song; and through observing bird interactions with other species, such as monkeys, fish and insects. There are Bribri specialists such as healers, or *awapa*, who have more detailed knowledge about the spiritual power of birds, as well as people who receive messages from birds in dreams. Bribri myths commemorate important events in the creation of the Earth and all things, such as how the birds helped God in creating and teaching the first people. Rituals enact key aspects of these myths.

The Bribri names for birds indicate aspects of bird behaviour. For example, the word for the Broad-billed Motmot (*Electron platyrhynchum*) translates as *guarda barranca*, or 'keeper of the side of a ravine', because these birds nest in tunnels in the banks of streams. The word for Harpy Eagle (*Harpia harpyja*) is *zárpo*, which means 'spider monkey eagle' because that is what the eagle eats (J. Sánchez, pers comm, December 2008). Margery (1984) noted that among the Cabecar (a related group who also speak a Chibcha language), bird names again reflect associations with specific plants and animals. The Cabecar word for Harpy Eagle is *sal.p'ú*, where *sal* means Spider Monkey (*Ateles geoffroyi*) and *p'ú* means eagle. The Cabecar word for the Crested Eagle (*Morphnus guianensis*) is *hók.p'ú*, in which *hók* refers to the White-faced Capuchin (*Cebus capucinus*) and *p'ú* means eagle. The word for Green Hermit (*Phaethornis guy*, or *ermitaño verde*) is *pó.batsu*, where *pó* is a type of banana and *batsu* is hermit because this hummingbird is associated with that plant.

In order to learn from birds (*dú.ra*) one must pay close attention and know how to interpret their behaviour. Birds and other creatures announce changes in weather, the impending arrival of visitors, illness, and the presence of fruit, fish or snakes. When the Common Pauraque (*Nyctidromus albicollis*) calls while perched on a dry tree with its wings extended, this means that there will be a long dry season, and when the Laughing Falcon (*Herpetotheres cachinnans*) calls there will be flu and fever (Sánchez, 1996–1997).

The hummingbird (Trochilidae), *bu.tzún*, is honoured as the messenger of God (Bozzoli, 2006), so people pay close attention to the appearance of hummingbirds. When a hummingbird enters your house and flies around inside, it means you will have visitors that day or the next. For example, a Bribri elder related how on one day many hummingbirds arrived and flew inside the hotel where she once worked, so she advised the hotel owner to expect many guests and prepare food. The hotel owner was doubtful because the place was practically empty and no arrivals were expected; but she went ahead and bought food anyway. The next day a large group of tourists suddenly showed up seeking lodging (Ana Balma, pers comm, 2007).

Other species are also messengers. For example, when the rivers and streams have schools of fish and freshwater shrimp move upstream, a bird called *nes.wák* announces this. People hear this bird's sound and say: 'Ah, it is time to fish' (Sebastian Hernandez, pers comm, 2007). If a hawk is seen hunting and it kills a squirrel, this means that a hunter will die; and, when the Pale-billed Woodpecker (*Campephilus guatemalensis*), *kakax.tzúl*, calls, either a woman has become pregnant or a baby is going to be born.

Among the Huetar on the Pacific slope of Costa Rica, people attend to the calls of certain hawks that announce the presence of *puluses* (small sea snails) along the rocky shoreline. They follow the birds to find the snails, which have a purple liquid used for healing (Quesada, 1998).

The context for the appearance or call of the bird is very important for understanding what it means (see also Forth, 1998; Aragon, 2006). For the Bribri, the call of an owl can simply mean that it is laying eggs. It is only a bad omen if it calls near one's house at dawn or dusk. One needs to notice the details of the bird's behaviour and pay attention to the characteristics and activity of the person who witnessed the bird's behaviour in order to correctly interpret the bird's call. For example, whether the person is a hunter or a pregnant woman will influence the interpretation.

Birds also communicate through dreams. When someone dreams of a vulture, it can mean that the person has parasites and needs to go to a curer. If a woman dreams of a motmot, this could mean that she will abort. A dream of a parrot may mean that the person will be a healer because parrots are associated with wisdom. All three of these birds have special sacred associations in Bribri mythology.

Birds with power

While all life is valued by the Bribri, they believe that there are certain creatures with particular powers for good or evil. Certain birds, such as hawks, can send sickness; but their feathers can also be used in healing ceremonies. The feathers of many other birds are also used for healing. For example, when you kill a Grey-headed Chachalaca (*Ortalis cinereiceps*), a Great Green Macaw (*Ara ambigua*) or a woodpecker, you remove the feathers and keep them for healing purposes. The healer, *awapa*, sings, brushing the sick person with the feathers to draw out the illness. Bird skins and feathers are saved and reused. The feathers of the Brown-billed Scythebill (*Campylorhamphus pusillus*), *bi.yé*, are used to drive away evil. This is a sacred bird that can only be eaten by an old woman. Another bird that gives protection is the Scarlet Macaw (*Ara macao*), or *lapa roja*: its red feathers are used for healing and in mortuary ceremonies to protect the dead from evil spirits and illuminate their path to the next world. Healers also use the rainwater that birds drink from the holes in trees (*dudi*) (Palmer et al, 1992).

There are myths about the sacred power of birds, such as the giant hawks that used to devour humans or send disease, and the parrots that protect humans. The following myth is an example:

> *There is a story from long ago of some hunters who went to hunt [a tapir] and became lost. Then they realized they were at the house of supernatural spirits. Their relatives began doing ceremonies, singing songs for the supernatural being to let the hunters go and do them no harm. The hunters saw two parrots appear and begin to speak to the supernatural being and peck at him. The next day the supernatural being said: 'I will let you go free because these parrots have come to scold me and peck at me, and they will allow me no other choice than to let you go.' So you can see that the parrots can intercede for us.* (Horacio Morales, pers comm, 2007).

These birds were Red-fronted Parrotlets *Touit costaricensis*, sent by the relatives to bring the hunters back (Palmer et al, 1992).

In addition to instructing people and protecting them, birds play important roles in the origin myths about the creation of the cosmic house of the Bribri. There are three species of vultures in the region: the Turkey Vulture (*Cathartes aura*), the King Vulture (*Sarcoramphus papa*) and the Black Vulture (*Coragyps atratus*); but it is the King Vulture that stands out in their mythology.

The King Vulture participated in the construction of the great cosmic house by holding one end of the main post, while a jaguar held the opposite end. The King Vulture also dug the holes for the eight house posts, and this is how the vulture lost the feathers on its head. Together with the armadillo, the King Vulture set in place the framework of the house. Finally, the King Vulture collected all that was left over, which explains why vultures clean everything and make sure nothing is left. The vulture is associated not only with death, but also the heavens because it soars so high and transports the souls of the dead to the next world (Bonatti, 2003).

The Bribri say that when people dance they are giving thanks and honouring the vultures:

> *When* Sibö *(God) created the world and celebrated, God invited the vultures to dance because they knew the songs and the steps and that is how we learned to dance. When we see the vultures pass over we remember this. We dance when we finish sowing corn, after building a house, and in order to give thanks to God and nature for the strength that we are given to reach our goals.* (Juanita Sánchez, pers comm, 2007).

This is why the Bribri say they dance in circles, because the original dancers, the vultures, circle as they soar in the sky.

A Bribri song and dance called the *SoLbón* commemorates how *Sibö* taught people to dance and sing by appearing as a vulture wearing a shining gold necklace. In another version of the myth, the King Vulture went to visit *Sibö* to learn how to dance and sing, after which the King Vulture came to Earth wearing a necklace and taught people how to dance (Bonatti, 2003). According to Stone, the gold necklaces of bird figurines found in ancient tombs reflect these myths and songs about *Sibö* transformed into a vulture who wears a golden necklace (Stone, 1961).

Rules of reciprocity

Teaching, healing and protecting are all gifts from birds and, by rules of etiquette, imply reciprocal obligations. People cannot simply take and take without restraint. There are rules for giving back in return.

Rules of respect include asking permission, whether one is entering the forest or going to a mountain. For example, it is necessary to ask permission the first time one goes to the ocean, and again birds or bird feathers are involved. The ocean is a living being called *Mlurtmi*. To show respect to her, a ceremony should be held before seeing the ocean for the first time. One must go accompanied by someone who has seen the ocean before, covering the head with a cloth or a leaf and closing the eyes. First, the companion looks for a gourd or a leaf and takes a little of the ocean water and wets the person's head. Then the companion takes some feathers of parrotlets, hawks and other birds, puts them in the water and sprinkles the person's head. After this the person can open their eyes and see the ocean (Palmer et al, 1992).

When the Bribri speak of protecting the forest and all that dwells there, this is seen as a religious obligation to the spiritual 'owners' of the forest and God. It is also a kinship obligation, as their matri-clans are named after various birds, mammals, insects and plants, including the motmot and the pelican (Palmer et al, 1992). There are many rules and prohibitions about hunting. For example, one should not hunt migratory birds when they are flying south or arriving from the migration with their young; hunting such birds is only allowed when they are flying north. Everything has a *dueño*, or spirit being, who protects that creature. If a hunter does not obey the rules, he will face consequences, like being bitten by a snake. When people go hunting they avoid naming the animal and, instead, use code words for referring to what they hope to find. If a man is going to hunt the Great Curassow (*Crax rubra*) or the Crested Guan (*Penelope purpurescens*), the hunter will say that he is going to hunt a chicken, or *tomar chicha de pejibaye* (drink fermented peach palm) (Bozzoli, 2006).

Robins, Tropical Mockingbirds (*Mimus gilvus*) and Blue-crowned Motmots (*Momotus momota*) cannot be eaten because they served as helpers when *Sibö* created the world (Hedström, 2006), nor can the Clay-coloured Robin because it contributed to the dance of the Creation by singing (Palmer et al, 1992). Other birds must be avoided depending upon which matrilineal clan one belongs to. Owls are so sacred that they should never be frightened, much less killed, because this can bring about the death of a relative. This is because the owl is a spirit in human form who serves as the messenger of *Sibö*. The owl is sent to sing the announcement of a death (Sánchez, 1996–1997).

Bribri responses to change

Much of what once was Bribri land has been taken over by outsiders; but the Bribri are working against encroachment to defend the reserves that were created during the 1970s and they are trying to buy back the land that was usurped for cattle pasture in order to reforest it (Palmer et al, 1992). In addition to the difficulty in finding funds to buy back the land, there is a serious problem of retaliation against the Bribri, Cabecar and other indigenous groups when they try to stop illegal loggers and poachers.

At the KéköLdi Reserve, the Bribri have created a group of their own: Keepers Who Conserve *KéköLdi* (*Wak ka Köneke*), or *Dueños Conservadores de KéköLdi*. This is an environmental education and protection programme designed to educate schoolchildren and ecotourists, train Bribri volunteers in protecting the reserve, and buy more land back for reforestation, which will contribute to a biological corridor protecting wildlife. As Juanita Sánchez (pers comm, December 2008) explained: 'Reforestation helps because the trees that have fruit provide food for the birds. Many times the birds don't remain because they have no food. Other trees that people plant don't provide food, like the laurel, but they provide nesting areas.'

Ecotourists are seen by the Bribri as people who want to learn about how to conserve the land and resources. The Bribri say that they are happy to share their knowledge and ideas, as long as outsiders respect Bribri culture and territorial rights. Palmer et al (1992) state that while many people ask how to save the tropical forest, few ask how to help indigenous peoples from being destroyed. However, the Bribri say that the two are intimately related, for destroying the tropical forest means the end of indigenous peoples, while strengthening indigenous groups allows them to continue conserving the forest. Their position as caretakers has been substantiated by an international research team led by Daniel Nepstad of the Woods Hole Research Center and the Instituto de Pesquisa Ambiental da Amazônia, who presented satellite data to demonstrate that rainforest parks and indigenous territories halt deforestation and forest fires in Brazil. According to *Science Daily*, the research group used satellite photos of land cover and fires from 1997 to 2000 to compare parks and indigenous lands. They found that deforestation was up to 20 times higher outside indigenous reserves and fires were up to 9 times higher. The researchers found that 'virtually all indigenous lands substantially inhibit deforestation up to 400 years after contact with the national society'. This shows not only that 'protecting nature [can] be reconciled with human habitation', but that 'it wouldn't happen without the people' (Woods Hole Research Center, 2006).

Recommendations

According to human rights law and indigenous law, recognized internationally as well as by the government of Costa Rica, it is necessary to consult with indigenous communities before archaeologists, ornithologists and tourists make decisions that affect these communities. When projects or research are being undertaken, it is important for the indigenous communities to be heard and to listen to what they have to say about a particular project and how it could harm or benefit the community (Alex Paez, pers comm, December 2008).

When research is conducted on indigenous reserves in Costa Rica, this research should employ local people who have specialized bird knowledge. Rather than using some of the more invasive conventional methods, indigenous peoples could be included in designing projects that use alternative techniques for observing and monitoring birds and other wildlife. With their skills, local knowledge and motivation to teach and protect, they can make important contributions to such research. Giving attention to a systems approach that considers inter-relationships between birds, plants, insects and mammals could be very fruitful. By training local people for year-round observation, long-term observations and record-keeping, such projects would be of immense benefit.

Whether tourists coming to Costa Rica consider themselves to be eco-tourists or not, all visitors to the country would benefit by taking the time to learn about the various hotels and lodges available in order to see what lies behind the 'eco' label. By asking a few simple questions, the visitor can learn whether the lodge is actually doing something to reduce the environmental impact of tourism and is making a positive contribution towards protecting the environment. For example, does the lodge promote reforestation of native species? Do they recycle? How are garbage and wastewater treated? Do they serve sustainably grown food? How does the local community benefit from their presence? Some lodges are actively involved with the local community, helping former hunters to become guides and establishing libraries, clinics and recycling centres.

Conclusions

The Bribri narratives reveal that, for them, the surrounding landscape is not passive or quiet – it is alive and teeming with sound, interacting with them and communicating. While birds are very noticeable in their ability to 'talk', there are many ways in which the landscape communicates to the Bribri and other indigenous peoples of Costa Rica.

Bird knowledge is gained through close observation of bird characteristics and behaviour, learning how to interpret their messages, paying attention to the myths and participating in ceremonies. This knowledge is connected and unified by an underlying wisdom that recognizes personal responsibility for correct action. This means showing respect for the forest and all that dwells there, conducting ceremonies properly, and protecting birds and their habitat. These are not only personal obligations; they are what one's living relatives, the ancestors, spirit beings and *Sibö* require. Knowledge implies reciprocal action in return: knowing about birds means doing something for birds. In the Bribri case, knowledge entails action because stewardship of the land is inherent to a reciprocal relationship of respect.

According to Hunn (2007): 'Traditional environmental knowledge is primarily of value as a living tradition, adapting to changing realities while sustaining a people in their distinctive way of life.' As bird populations dwindle, the presence of birds in everyday life is taking on new meaning for the Bribri. 'So that the birds do not disappear we must protect the forest, because if the forest is cut down then they will disappear, and they will no longer be able to help people … Today what is killing us is ignorance. It is very important to safeguard this ancestral knowledge' (Juanita Sánchez, pers comm, December 2008).

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20

The Bull of the Bog: Bittern Conservation Practice in a Western Bio-cultural Setting

Maan Barua and Paul Jepson

The Great Bittern (*Botaurus stellaris*) is a species of conservation concern in the UK and is a flagship for the conservation of wetland habitats in the country. Although bittern conservation is largely driven by scientific management programmes, the bird has had a strong presence in the public sphere as well. This chapter traces cultural associations of the Great Bittern and outlines a history of its conservation in the UK in order to unpack how bittern conservation reflects and maintains particular English ethnicities. Folk associations, aspects of charisma and traditions within practice play an important role in shaping conservation, and they are not entirely expunged from the contemporary domain. This allows us to locate the 'ethnic' in Western bio-cultural conservation settings and broadens the scope of ethno-ornithology to delve into practices that might not be traditionally viewed as ethnic. It provides new insights to practitioners and enables a more reflexive understanding of contemporary bird conservation.

Introduction

The Great Bittern, *Botaurus stellaris* (hereon: bittern), is a widespread species of the family Ardeidae, occurring from Britain east to China, and from Russia south to Turkey (Kushlan and Hafner, 2000). Although not globally threatened, the bittern has an unfavourable conservation status in Europe, and especially in Britain, where the number of breeding males declined from 70 in the 1970s to fewer than 20 in the 1990s, leading to its inclusion in the list of UK Birds of Conservation Concern (Tucker and Heath, 1994; Gilbert et al, 2002; Gregory et al, 2002). Despite its rarity, cryptic plumage and secretive nature, the bittern has a high profile and is a favourite of the press and public (Gilbert et al, 2005). Its threatened status and popular appeal have made it an ideal flagship species for the preservation and restoration of wetland reserves, especially those owned or managed by the Royal Society for the Protection of Birds (RSPB), Europe's largest wildlife conservation charity with a membership of more than 1 million people.

Bittern conservation is largely directed by science-based management programmes (Tyler et al, 1998; White et al, 2006), and operates within a 'Western' conservation paradigm. However, the role of public values in setting conservation agenda cannot be totally overlooked (Jepson and Canney, 2003). Endangerment is not the sole driver of bittern conservation in the UK – rather, it is buttressed by the cultural values associated with the bird. By tracing the presence of the bittern in folklore, and by examining aspects of its 'non-human charisma' (Lorimer, 2007), this chapter seeks to unravel how cultural associations of the bittern come to create a form of conservation that both reflects and maintains a particular English ethnicity. The history of bittern conservation in the UK, from the early concern regarding its demise in the 1870s through to the rise of RSPB conservation practice in the 20th century, is considered to demonstrate how bittern conservation practice arose and gained prominence in the public domain, while examining whether there is space for values and ethnicity in bird conservation in a Western bio-cultural setting.

Cultural associations of the bittern

The word 'bittern' seems to have been derived via Middle English from the Old French '*butor*', itself derived from the Latin *butio* and *taurus*, meaning bittern and bull (White et al, 2006). The bittern's distinct booming call was a striking feature of the rural soundscape of medieval England. As a result, it populates place names, literature, folklore and the popular vernacular. There are more than 20 colloquial names for the bittern in English: Bitter, Bittor, Bittoun, Bitter Bum and Bitter Bump, Bog-blutter, Bog-bumper, Bog-drum, Bog-jumper, Bull of the Bog, Bumble, Bumpy-coss, Butter Bump, Buttle Bump and Bottle Bump, Bytter, Heather Blutter, Mire Drum, Mire Drumble, Night Raven, Speckled Heronshew, Fenland's turkey (Atkinson, 1898; Stewart, 1898; Nelson, 1907; Lockwood, 1993; Cocker, 1997; White et al, 2006).

Places such as Bisterne, near Ringwood, and Bitterne, near Southampton, were probably named after this bird (Anon, 1907). The boom was often described as similar to the bellowing of a bull and, hence, the name Bull of the Bog (Wade, 1908). The call of the bittern was seen as a portent of doom in the Middle Ages (Self, 2005). In Yorkshire, its peculiar calls were associated with the advent of summer:

> *When on Potteric Carr the Butter Bumps cry,*
> *The women of Bulby say summer is nigh.*

And:

> *When the Butter-bumps cry,*
> *Summer is nigh.* (Nelson, 1907)

In the Doncaster neighbourhood, the bittern's call was also used to forecast weather (Nelson, 1907):

> *There'll either be rain or else summat waur,*
> *When Butter-bumps sing upo' Potteric Carr.*

A common folk belief was that the bittern produced its boom by thrusting its bill into a reed, which served as a pipe for swelling the note above its natural pitch in order to produce its boom. Others held the view that it did so by putting its head underwater and blowing violently (Nelson, 1907).

At the turn of the 19th century, the species' little-known habits were a focus of enquiry:

> *From its skulking propensities, its habits have not been so completely studied as most birds'. It hardly ever takes to the wing, remains hidden in the rushes throughout its stay here.* (Stewart, 1898)

However, by the 19th century bittern numbers had declined severely in England, so naturalists travelled to Holland to interview 'marshmen' who had knowledge of the bird and its habits:

> *The mystery attaching to this bird, so seldom seen but so often heard, always made its nest a special object of search; but it was not till after years of hard work and watching, until in fact we went to live amongst the Dutch marshmen, spent long days with them, talking their language and questioning them about the ways of marsh birds, that we came to understand and find out its secrets. The marshmen say that each pair of birds keeps to its*

> *own ground, and that the cock bird sits booming to his mate as she is engaged in nesting duties somewhere in the neighbourhood.*
>
> *As regards the means of producing a note of so great a volume, various theories have been propounded. The old superstition that the bird thrusts its bill into a reed-stem in order to increase the sound may be dismissed at once; but the note when heard at close quarters sounds as if some pent-up force were bursting forth, and perhaps the statement of Leonhard Baldner, the Strasburg naturalist (1666), that 'the voice of these birds is produced through the long nostrils, whilst the beak is closed and lifted up', may be the true explanation. Certainly, for a bird with no convolutions of the trachea, the volume of sound is enormous.* (Wade, 1908)

The boom of the bittern enables people to 'tune in' to its behaviour, to be affected by it (Latour, 2004; Lorimer, 2008). Part of the bittern's status may also stem from the 'non-human charisma' that is endowed upon it (Lorimer, 2007). Its cryptic plumage and the mystery surrounding the bird were integral to calls for bird conservation as early as the 19th century. For instance, in his plea for the protection of rare birds in Britain, Hudson (1894) (cited in Anon, 1928) wrote that the bittern was 'one of the most fascinating of British birds on account of its solitary, mysterious habits, its strange richly coloured and beautifully pencilled plumage, and that booming cry, once familiar in our land, shakes the sounding marsh'. The colloquial name 'Bog-ox' in Germany was evoked to create the motto 'Strong like a Bog-Ox! For our Lakes!' for German LIFE projects (White et al, 2006). A cartoon bittern showing his human-like biceps muscle was designed as a mascot to illustrate this motto (see Figure 20.1). This anthropomorphizing is partly enabled by the large size and powerful features of the bittern, in conjunction with the cultural associations in which the species is enmeshed. Thus, traditional beliefs and the disproportionate charisma endowed upon the bittern become embedded in practices of conservation.

Bittern conservation in the UK: A brief history

Bittern populations in England may have been in slow decline since the 15th century due to the drainage of habitat and hunting. The bird was considered good eating and there are several references to the bittern as a table bird:

> *Historically, the connection of the Bittern with Yorkshire is of great antiquity, for we find allusion to it in the provision made for the great banquet given at Cawood in honour of the enthronization of Geo. Nevell as Archbishop of York in 1466, the sixth year of Edward the Fourth's reign.*

Figure 20.1
Anthropomorphizing the Bull of the Bog

Source: EU LIFE Nature Project Germany

> *We are also told, in the* Northumberland Household Book, *that the prices of 'Bytters', for Earl Percy's table at the Castles of Wressill and Lekinfield, in 1512 was fixed at '12d. a pece [sic] so they be good'.* (Nelson, 1907)

Roast bittern was a common dish for fenland families – hence, it was sometimes nicknamed the 'fenman's turkey'. In the mid 19th century, bitterns began to spark interest among naturalists due to a decline in numbers:

> *… although not absolutely a rare bird, its presence is not always to be reckoned upon, for in one year it may be tolerably common, and then for several succeeding seasons scarcely to be procured at all. In proof of the correctness of these remarks, Selby observes that at the present day the capture of a Bittern is, in many parts of England, a subject of great interest.* (Yarrell, 1871–1885)

The increasing rarity of the bittern made it a target of collectors for the vibrant taxidermy market such that its extinction by the end of the century in England was predicted:

> *… the gun, and the pursuit of specimen-hunters and collectors, have made this a rare species almost everywhere… Recorded instances even of its nesting here are becoming more and more rare and unusual and ere long, it is to be feared, this beautifully plumaged bird will be among the things that 'have been'.* (Atkinson, 1898)
>
> *The drainage of the fen country reduced the numbers of the species; the collectors completed the task. Not many years ago a Bittern built its nest in Avington Park, near Winchester, but few*

> *persons had been, or were likely to be, fortunate enough to see a live Bittern. Almost every year the presence of these birds is reported from part of England, but rarely indeed does one succeed in escaping the gun and the taxidermist.* (Anon, 1907)

By the early 20th century, the bittern was only a migrant to Britain; but this created hope that, if unmolested, it would start breeding again (Bonhote, 1907). The newly formed RSPB lobbied for legislation to protect the bird. The shortening of the working week and growing popularity of the motor car initiated a 'rediscovery' of the English countryside. Their arguments emphasized the idea that the bittern and its boom were an integral part of the countryside and, hence, an English identity (Atkinson, 1898; Anon, 1928). This was picked up by the press, which often carried storylines such as 'Shall the booming of the Bittern be no more heard in the land?' (Anon, 1926).

Once the bittern was protected, several prosecutions for illegal shootings followed. These were reported to raise awareness of the bittern's plight:

> *A further instance of Bittern-shooting in the same county has since been reported in the* Shooting Times, *another in Berkshire, and a third locality unnamed but apparently also Berks. 'Something ought to be done to stop this ruthless slaughter', says the Editor of the paper. But how, if offenders, when caught, are taught to think a live Bittern worth half-a-crown, while they know that a Bittern dead and stuffed has a considerably higher value? (Anon, 1918)*

During the 1920s, the bittern was protected throughout the year in at least 30 counties and declared a specially protected bird by an Act of Parliament (Protection of Birds Act 1925; see Anon, 1926). The species became an important icon for the RSPB and featured on the cover of their bulletin *Bird Notes and News* for almost ten years during the 1920s and 1930s (see Figure 20.2). When it was replaced a note appeared in the periodical:

> *The fascinating figure of the Bittern, familiar for ten years to readers of* Bird Notes & News, *disappears from the cover with this issue; but it is cheering to hear from Lord Desborough that three Bitterns have been heard booming in their Norfolk sanctuary in spite of the grievous floods in that region.* (Anon, 1938)

In Britain, bittern conservation efforts of the RSPB were closely linked to the establishment of Minsmere, a nature reserve in Suffolk and one of the organization's major successes (Adams, 1996). The marsh at Minsmere formed after strategic wartime flooding between 1940 and 1995 (Axell and Hosking, 1977), and was a site where birds such as the bittern, Marsh Harrier (*Circus aeruginosus*) and Pied Avocet (*Recurvirostra avosetta*) bred after a long absence in

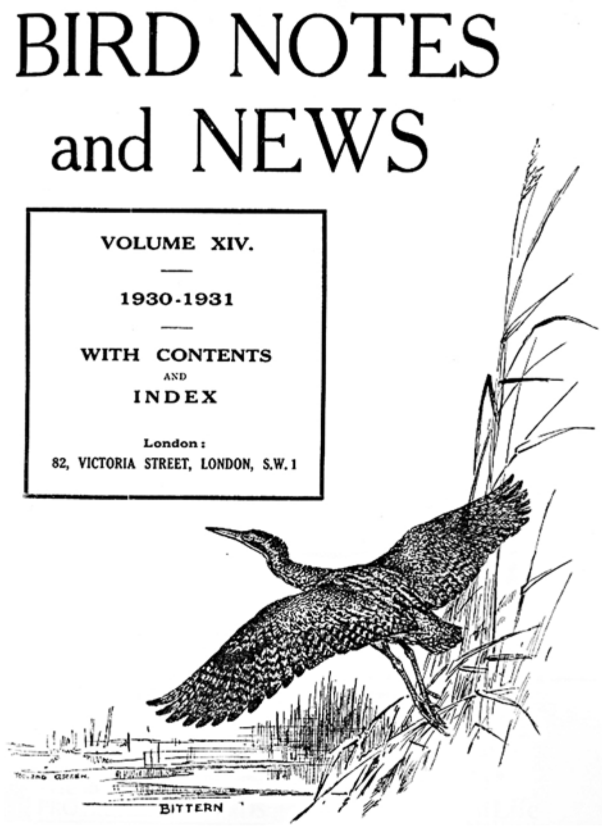

Figure 20.2 *Bittern on the cover of the RSPB bulletin* Bird Notes and News *(1930–1931)*

Source: Bird Notes and News

Britain. The value of the reserve was fostered by a climate of war weariness and a growing middle-class seeking leisure, as well as the desire to rebuild a shattered economy and forge a new British identity:

> *You could feel the RSPB was forging a whole new industry. A war-weary ration-booked, regulated populace was reassessing its values and developing an interest in the outdoors... Birds, with their beauty, mobility and folklore image, were the most attractive animals to watch. They evoked the most sympathy, which the RSPB could now turn into cash to buy them protection.* (Axell, 1992)

In the creation of Minsmere, reports of booming bitterns resonated with a sense of patriotism, rebirth, redemption and a future with hope. The public 'awaited gentle education by actual demonstration on the ground ... on the need to do something physical about their vaguely cherished countryside' (Axell and Hosking, 1977): the setting up of nature reserves such as Minsmere were examples of such demonstration. In the public imagination, the bittern symbolized many elements of this countryside. Its return helped to legitimize in many minds a new form of conservation that blended management and manipulation of habitats with the public benefits associated with education and recreation.

Minsmere was to be a place where people could go to see bitterns:

> *... the bulk of management effort would be large, manipulated, safe habitats for common and special birds, surrounded by screened tracks and big permanent wooden hides. We should have to accept the need to become part of the entertainment industry. Education in conservation there would certainly be – it would come mainly from the ability of the public to watch birds making use of the habitats provided.*
>
> *The part for the RSPB to play would be to show that birds and birdwatchers, expert, amateur or incipient, could get along together. People on a bird reserve would respond to gentle control. Birds would respond to the management of habitats and become conditioned to the presence of people around parts of it.* (Axell and Hosking, 1977)

The illusiveness of the bittern reinvigorated conservation's image as modern and cultivated. It became a symbol of the skill of photographers who immortalized the bird. Photographs were augmented by paintings by the artist Charles Tunnicliffe, who went to Minsmere during its early days to observe and sketch the bittern at the nest (Hosking and Lane, 1970). The RSPB made full use of images of the bittern to promote their conservation efforts (Axell, 1992). The creation of Minsmere was also about rendering conservation practices visible, an approach that is integral to RSPB conservation today. For the last few years, the RSPB has run a programme under the slogan 'Aren't birds brilliant' to encourage people to see and appreciate birds such as the bittern. The Lee Valley Country Park north of London is one such reserve where approximately 8000 people come annually to see bitterns (White et al, 2006).

By the 1970s, the conservation management paradigm was becoming formalized into a set discipline, and habitat manipulation for wildlife conservation was being codified gradually into a complex lexicon of techniques (Adams, 1996). A sharp decline in breeding male bitterns identified in 1976 (Day and Wilson, 1978) called into question the efficacy of this approach, but more significantly gave credibility and urgency to the call for a strong scientific basis to conservation. The bittern was instrumental in the rise of more formal studies by the RSPB. It spurred major surveys to catalogue details of reedbeds in England and Wales during the late 1970s and early 1980s with the objective of assessing habitat requirements of birds such as the bittern (Bibby and Lunn, 1982). The study found that more than 60 per cent of the population was restricted to three sites – Minsmere, Walberswick and Leighton Moss – and that bittern numbers were limited by habitat availability. Although many suitable habitats in Britain lacked bitterns, there was a realization of the potential in managing these sites for them (Bibby and Lunn, 1982).

Bittern populations continued to decline – they had bred at 22 localities in 1981; but this fell to 12 during the 1990s (Tyler et al, 1998). There was an urgent call from the scientific community within the RSPB to assess and understand factors determining their numbers and distribution (Tyler et al, 1998). A research programme was initiated in the late 1980s to look at habitat usage, productivity, movement and dispersal within the UK bittern population (Gilbert et al, 2002). These practices helped to shape the development of a scientific policy within the RSPB, where research was to be used to diagnose causes of declines, develop and test practical solutions, and then apply that knowledge to guide the management of reserves. The results obtained were to be utilized to influence UK wildlife legislation, as well as wider policy areas such as agriculture, fisheries and planning (RSPB, 2002).

Funding for bringing back bittern populations came from a European Union (EU) LIFE Nature project in accordance with the EU Species Action Plan for Bittern (RSPB, 1998). This also involved forging links with partners in Germany, France and Finland in order to share management expertise. The project had a strong media component for making the public aware of developments, and articles in the press often carried storylines such as 'Project to make bitterns boom', 'Bittern plan is booming' and 'Booming good news for bitterns'. Newspaper cuttings often associated the bird with the wildness of the English countryside – 'The elusive bittern symbolises all that is wild about Norfolk's Broads and Coast' (RSPB, 1998) – and indicated a resurfacing of sentiments that were evoked during the early part of the 20th century when the bittern was almost extinct in Britain. There was a conscious effort to create a bittern brand (White et al, 2006), and in the UK there is now the Bittern Train Line in East Anglia and a Bittern Beer from Norfolk (see Plates 14 and 15).

Sites would remain suitable for bitterns only if there was regular conservation management based on good scientific understanding of the species and its ecology (Tyler et al, 1998). The decline of populations of the bittern in Europe meant that there was greater reliance on the productivity of the remaining British birds. New sites had to be created close to existing key populations to investigate whether birds would colonize them (Tyler et al, 1998). The expansion of a network of reserves for bittern conservation may be traced to the success of Minsmere, an example of conservation management that the RSPB sought to replicate (Adams, 1996). Reedbed restoration was carried out at 13 sites as part of the EU LIFE Nature project. The number of breeding males rose to 30, the highest since the 1980s (RSPB, 2001).

'Booming bitterns' was used by the media to describe the achievements of the RSPB: 'Bittern conservation is a booming success', 'It's boom time for bitterns' (RSPB, 2006). The booming population of bitterns was neatly captured by a cartoon in the German press, where elements of anthropomorphizing, the call of the bird and growth of populations are all mixed into one (see Figure 20.3).

Source: De Gelderlander, Germany

Figure 20.3 *Boom boom boom*

Discussion

Cocker (1997) described the bittern as an unlikely environmental celebrity:

> *In many ways the Bittern is the most unlikely environmental celebrity you could imagine. Typical are the daft names by which it was once known to generations of country folk, my all-time favourite trio being Bitter Bum, Butter Bump and Bog Blutter… During the last decade the eco-salesmen of conservation have made the Bittern the most high-profile bird in the country.*

The bittern possesses certain biophysical characteristics – its booming call, elusive habits and occupancy of marshes and fens that conspired to embed it in cultural narratives and practices of educated English relating to nature and the countryside. This 'embedding' has taken different forms during different eras. The Bittern has been a table bird for kings, an evocation of poets, a prized specimen for collectors, a post-war conservation success symbolizing recovery of a damaged English landscape, and a call for science-based conservation.

While bittern conservation policies in the UK (and other countries in Europe) stem from the danger of it becoming extinct, the cultural associations of the bird continue to play a subtle but important role. The bittern is viewed as an ambassador for marshlands (RSPB, 2006; White et al, 2006). The RSPB spends around UK£3 million on research annually, the bulk of which is through RSPB core funds provided by members and supporters (RSPB, 2001). It is a species that helps to raise support exceeding that provided by government funding, and this is largely because of the charismatic stature of the bittern in the UK. Conservation often gets caught up in the idea of nation states (Hinchliffe, 2004) and bittern conservation is rooted in an English ethnicity. It is strongly tied to part of a cultural identity that cherishes a 'mythic landscape … rich in wild creatures and of great beauty, part of the "organic community" of "Old England"' (Adams, 1996). The folk beliefs surrounding the bittern help to identify it as part of this assemblage. Many of the cultural values associated with bitterns resurface in different forms in contemporary practice, often buttress conservation initiatives and work in favour of the bittern. Practices of managing habitats for bitterns, and creating nature reserves, play a role in keeping the above assemblage alive in the public imagination and in sustaining many of its values. The local pride in Minsmere and bird reserves carried both novelty as well as prestige (Axell, 1992).

Bittern conservation in the UK operates in a bio-cultural setting, where there is interplay between biological conservation and cultural frameworks. When the history of bittern conservation is unpacked, folk associations, aspects of charisma and traditions within practice emerge as elements already woven into the fabric of bittern conservation. Ethnographies of bird conservation are gradually beginning to emerge (Lorimer, 2008), and they could provide fresh thought in understanding human–bird interactions. This would be enriching not just for the field of ethno-ornithology, but bird conservation itself.

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21

Towards an Indonesian Bird Conservation Ethos: Reflections from a Study of Bird-keeping in the Cities of Java and Bali

Paul Jepson

This chapter explores how the specifics of an Indonesian cultural context might be integrated within the common package of rationales and practices that have come to define international bird conservation, or more specifically the approach of the BirdLife International Partnership. Drawing on the concepts of frame and governmentality, it argues that a distinct Indonesian bird ethos could emerge through creating more spaces for interplay between the international bird conservation logics operating in Indonesia and the ways of knowing and appreciating birds associated with the popular urban pastimes of keeping, competing and breeding songbirds. These latter practices focus on the individual bird and are characterized by a sophisticated knowledge of song, form, posture and husbandry. This knowledge contrasts with international conservation's focus on species and notions of scarcity, rarity, endemism and diversity. It is suggested that a distinct Indonesian bird conservation approach is beginning to emerge from activities associated with the certification of captive-bred birds and the reintroduction of the Bali Starling (*Leucopsar rothschildi*). This trend might be amplified through linking bird-keeper interests with the fate of wild bird populations. Demand on the part of bird-keepers for information on the diet and breeding habitats of wild birds and interest in song variations, combined with new media technology, might form a basis for such frame 'bridging'. In short, this chapter explores processes through which the making visible of local bird-related knowledge practices could lead to a common, but differentiated, international bird conservation ethos.

For the preservation of diversity in all its forms, we may find that sharing thoughts is superior to collecting knowledge, or that forms of friendship have advantages over forms of reason. (Lowe, 2006, p74)

Introduction

This chapter will explore how the specifics of cultural context might be incorporated within international conservation through an exposition of knowledge practices relating to the keeping and competing of songbirds in Indonesia. In a household survey of six cities on Java and Bali, birds were the most popular pet: one in three households kept a bird and two in three households reported keeping a bird in the previous ten years. This popular pastime has deep and diverse culture roots. For instance, a 'bird in a cage' is one of five symbols of a traditional Javanese knight representing the importance of a hobby in a balanced life (Toer, 1996); the role of the cockfight in Balinese culture has been much discussed among anthropologists (Geertz, 2005) and the popularity of birds among people of Chinese ethnicity is well known (Layton, 1991). In the cosmopolitan cities of Java and Bali, these ethnic ways of knowing birds have interacted with broader trends in society to produce a distinctly Indonesian or, more specifically, urban Indonesian study of birds. This local knowledge of birds has largely been ignored by Indonesian bird conservation groups, who have orientated towards the scientific and policy frameworks promoted by international bird conservation networks. Indonesian bird conservation groups were mostly founded by biology graduates during the early 1990s; but they have struggled to grow and remain largely dependent on external funding sources. The core idea developed in this chapter is that a vigorous bird conservation movement could emerge in developing countries such as Indonesia if:

- the worldviews, forms of knowledge and practices that underpin Western-generated conservation approaches are made visible;
- local ways of knowing birds and the practices and actor groups related to these are revealed; and
- conditions and spaces for interplay between the two are created.

Analytical tools

In order to develop this idea, two analytical approaches from social theory – namely, framing and governmentality – are employed. The concept of 'frames' suggests that people make sense of, and act within, a complex world by gathering together a framing assemblage of ideas, objects and practices. Elements of such assemblages include images, metaphors and beliefs, alongside the everyday practices and technologies through which we live our lives (Goffman, 1974). Frames develop over time and can be understood as the sedimented histories of particular ways of understanding and engaging with the world.

Frames are always partial and capture the understandings of particular groups. When frames include collective actions that attract widespread consent, they become institutionalized and determine policy, scientific, management and cultural practices (Tarrow, 1992). This idea of framing is receiving increasing attention from policy analysts (Callon, 1998; Miller, 2000), including those with an interest in conservation (e.g. Bowker, 2000; Lorimer, 2006). A conservation frame comprises an assemblage of, among other things:

- beliefs and aspirations (values) concerning the human–nature relationship;
- scientific, cultural and recreational practices and the particular knowledges and aesthetics that they produce;
- actions, species and places that are emblematic of these frames; along with
- the individuals and organizations who construct, replicate and advocate them.

Frame analytical approaches draw attention to the fact that ideas about nature and what is natural are framed within particular social and cultural contexts; and, furthermore, that this framing of nature determines political and public support for conservation and the type of intervention deemed necessary and appropriate. The new social movement literature identifies a set of framing processes that enable advocates of social agendas to engage the support of new constituencies by aligning their issues with frames important to others through processes of frame bridging, amplification and/or transformation (Snow et al, 1986). Such processes are commonplace in national conservation practices[1]. The point here is to ask whether conservation frames could appear that blend or integrate elements from local/national cultural frames and Western/international conservation frames. This gives rise to a series of supplementary questions, such as what elements might be core or common to cross-cultural notions of bird conservation and what actions might initiate processes of frame integration? In short, how might we move towards a common, but differentiated, bird conservation ethos?

A governmentality approach focuses on the practices deployed in attempts to steer societies, organizations and individuals towards pro-conservation (or at least conservation-benign) behaviours. Foucoult's (1991) notion of governmentality can broadly be read as the construction of logics or rationalities (political, scientific and moral) that are deployed by various actors (government, corporations and non-governmental organizations, NGOs) consciously or otherwise through dispersed technologies of rule (material objects and associated practices – e.g. protected areas) that they believe will cause others to act in ways that will bring about progress towards some desirable future state (Dean, 1999; Rutherford, 2007). The practice of knowledge formation is central both to the construction and maintenance of the logics of government and to the effective development and deployment of the technologies of government. For example, the formation of knowledge on the diversity of species and their patterns of distribution, abundance and status enabled the construction, during the 1990s, of the notion of biodiversity as an economic and development asset and an asset under threat. This created a powerful new rationality for international conservation action (Takacs, 1996). The same knowledge enabled the development of new technologies to prioritize the geographies of action (e.g. biodiversity hotspots, Important Bird Areas, etc.) and promoted a call for new knowledges to inform the design of new conservation techniques that recognize the needs of communities subjected to these influential new (and Western-produced) conservation rationales. Governmentality perspectives draw attention to the role of knowledge in producing the rationalities and technologies through which power operates and how they gain legitimacy through their prevalence. Invariably, such perspectives reveal the partial and contested nature of this knowledge and the politics that this produces. More specifically, governmentality helps to position conservation as emerging from the nexus of knowledge-practice formations interplaying with broader socio-political forces, and this offers a means by which to think about how different local and/or indigenous ways of knowing birds might be embraced to further the notion of a common, but differentiated, international bird conservation ethos. Framing and governmentality analytics can be seen as complementary and nested: notions of the frame provide the wider cultural context of human–bird relations from which, and within, specific logics and techniques for bird conservation emerge and are embedded.

These themes are developed with data and insights generated during two periods of engagement with bird conservation in Indonesia. In the first, the author focused on establishing key aspects of the emergent international conservation regime within Indonesian conservation governance as head of the BirdLife International–Indonesia Programme and consultant (1991–2001). These aspects included linking IUCN Red Lists of Threatened Species, Endemic Bird Areas (EBAs) and Important Bird Areas (IBAs) to earlier protected area instruments. In the second period, the author worked with a group of Indonesian organizations who were collaborating on the development of voluntary market-based approaches to governing bird-keeping in Indonesia. This latter work involved large-scale surveys of contemporary bird-related knowledges and practices in the cities of Java and Bali (Jepson and Ladle, 2006, 2009).

International bird conservation governmentalities

Since the mid 1980s, the international bird conservation effort has focused on global adoption of a common package of conservation logics and technologies. Led by the BirdLife International partnership, an international bird conservation regime has emerged. This is characterized by:

- criteria-based frameworks that classify species according to extinction risk and identify key sites;

- policy instruments relating to the protection of species and sites and the regulation of bird trade; and
- the engagement of citizens in these efforts.

Today concepts such as IUCN Red Lists of Threatened Species, restricted-range species, IBAs, EBAs and site-support networks shape the form of bird conservation discourse in countries as culturally diverse as Holland, Jordan, Zimbabwe, Surinam, Nepal and Indonesia.

The prospect of creating a common and systematic international conservation 'governmentality' provided the impetus for national non-governmental bird and conservation organizations to form the BirdLife International partnership in 1991, and its subsequent roll-out has enabled the partnership to exert significant influence in international environmental governance. However, its 'one-size-fits-all' approach also reflects broader global Western macro-policy of the time, such as the neo-liberal economic policies that sought to reduce poverty and inequality and promote democracy and social harmony. The recognition that such Western-contrived generic development policy approaches may not work is prompting re-evaluation. In particular, there is increasing recognition of the need to incorporate the particularities of national and cultural contexts within the formulation of effective policies. In contrast to livelihood-oriented development, the impact of conservation policy is difficult to evaluate and this creates a risk of continuing with approaches that are not as effective as they might be. A growing body of policy-related literature in development studies, anthropology, and science and technology studies points to the importance of approaches that 'blend' the knowledge formations of those generating policy (governors) with those who are the target of policy (governed) (e.g. Agrawal, 2005; Lowe, 2006). A question for those involved in the governance of international bird conservation institutions is whether or how to respond to these trends and insights from wider policy. Or, put another way, it is important to think about how local ways of knowing birds can benefit international conservation frameworks and how the process of embracing non-Western knowledges can break down perceptions (where they exist) that Western knowledge practices are superior in the pursuit of bird conservation.

Indonesia and international bird conservation governmentalities

Since 1970, the Indonesian government has adopted two international conservation governmentalities with strong bird conservation components. The first was the package of rationales and regulatory instruments formalized in the Convention on International Trade in Endangered Species (1973) and the second was the principle of establishing a representative network of protected areas (Holdgate, 1999) subsequently incorporated within the 1992 Convention on Biological Diversity. The BirdLife International–Indonesia Programme was established in 1991 to strengthen resolve and capacity of the Indonesian Ministry of Forestry to enact these governmentalities through:

- quantifying the status of bird species in international trade (mostly psittacines from east Indonesia);
- deploying the Endemic Bird Area approach to reveal gaps in representation; and
- promoting participation of Indonesian biological science students in these activities and bird-watching, more generally (Jepson, 1995).

Underpinning the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is the moral rationale (value) that human actions relating to trade and consumption should not knowingly cause the extinction of species. This value is deeply embedded in European and North American cultures due to particular histories of engagement with nature and other peoples in the context of colonial exploration and exploitation. Briefly, there are three strands which appear to be particularly pertinent to this argument:

1 the development of formal systems to classify nature prompted by a desire to discuss, acquire and exchange specimens from new territories (e.g. Wulf, 2008);
2 a rash of bird extinctions given high profile by new print media (e.g. Jepson and Whittaker, 2002);
3 the rise of pet-keeping in cities and associated animal welfare sentiments (Thomas, 1984).

These knowledge formations and associated social values provided a strong political rational for CITES in Western countries. For developing country governments, international conservation was one policy area where they could assume leadership roles in the new world order (MacKenzie, 1988).

The representation principle (Dasmann, 1972) accommodated these rationales but was more closely aligned with a key rationale of post-World War II international development – namely, adoption of principles of rational resource management based on the classification of land according to assessments of its suitability for different economic-development purposes. In Indonesia, the rationale for establishing conservation areas extended beyond international logics relating to ecotourism, genetic reservoir and ecosystems service values to include the political need to rein in the crony practices of allocating logging concessions that had got out of hand (Jepson, 2001). This widening of the protected area frame continued as Indonesian biodiversity scientists developed versions of national park management able to incorporate the knowledge practices of communities and improvements to their livelihoods. Lowe (2006) sees this process of blending scientific and local ecological knowledges in national park management as part of a wider process of embracing ethnic diversity within the Indonesian state.

Although distinct in purpose and approach, CITES and protected area policy are founded on common practices of knowledge formation – namely, observation-based surveys of bird species presence/absence, abundance and (to a lesser extent) movements. In combination with habitat classification, this knowledge enables the CITES appendix to become operable (via classifications of extinction risk and assessments of sustainable off-take) and facilitates the design of representative reserve networks (via principles of complementarity, etc.) (Margules and Pressey, 2000).

For reasons that are poorly understood, Western public and scientific sentiment underwent a major shift away from collecting, killing and caging birds, which was normal in the late 19th century, to observation-based study and appreciation of wild birds. The notion of purposeful birdwatching that gained ground in Western countries from 1950 onwards reflected this shift and created the conditions from which the above-mentioned practices of knowledge formation emerged. A new generation of educated and adventurous European birdwatchers extended the geographic scope of birding to Asia, Africa and Latin America during the 1980s. BirdLife International was adept at collating and classifying these and other bird observations into authoritative global overviews with direct policy relevance (e.g. Collar and Andrew, 1989; ICBP, 1992). As a result, the present international bird conservation regime is underpinned by knowledge practices that value notions of scarcity, rarity, endemism and diversity.

Bird-related practices and knowledges in Indonesia

The Western mode of birdwatching with its focus on bird finding and identification, scarcity and counting is rare in Indonesia. After nearly 20 years of training young Indonesian biologists in birdwatching and field ornithology approaches, a self-sustaining quorum of Indonesian birders has yet to emerge. This might be because Indonesian practices of bird appreciation and study focus on the aesthetic appreciation of song and posture and the techniques of care and breeding. Urban Indonesians know birds as individuals and have sophisticated knowledge formation practices related to appreciating, keeping, acquiring and breeding particular birds. The concept of species is evident (but as breeds and forms); but the desire to know national avifaunas and the status of wild bird populations is less evident. In short, Indonesians seek a 'deep' knowledge of birdsong, behaviour and husbandry, and this contrasts with the 'shallower' overview knowledge of species status and distributions that typifies international bird conservation institutions.

Birds are a positive cultural and economic force in the cities of Java and Bali. A household survey (n = 1781) in the six largest cities (Jakarta, Bandung, Solo, Yogyakarta, Surabaya and Denpasar) found that one in three households (35.7 per cent) currently keep a bird and about two in three households (57.6

per cent) had kept a bird in the previous ten years. Birds were the most popular pets, and dove was the most popular category (34.2 per cent of bird-keeping households), followed by songbirds (28.4 per cent), show chickens (22.9 per cent), pigeons (7.3 per cent) and exotics (various species sourced by collectors) (1.3 per cent). The estimated number of birds kept was 2.16 million, of which about 1 million were wild caught, the majority being in the songbird category. The pastime has caused rolling local extinctions in Indonesia of the more popular species and is suspected as a major contributing factor to the dearth of common birds in the Indonesian countryside (Jepson and Ladle, 2009).

The bird-keeping pastime is popular among all seven distinct ethnic groups residing on Java and Bali. However, of the three major ethnic groups, it is most frequent among the Balinese and least frequent among the Sundanese. There is a clear trend for the proportion of bird-keeping households to increase from west to east across Java, although the total number of households is highest in populous Jakarta. This suggests that bird-keeping has its roots in the culture of the old Javanese kingdoms. When asked the closed-choice question: 'Why do you keep birds?', the most popular of six options among songbird-keeping households (n = 427) was 'birds remind me of my village' (41 per cent) followed by 'birds provide me with companionship' (25.3 per cent) and 'birds stimulate my interest and knowledge' (25.1 per cent). A similar question set found strong agreement with statements relating to:

- release stress (4.1/5 = strongly agree);
- create a pleasant household atmosphere (4.1/5);
- fill free time (3.9/5);
- provide a talking point (3.9/5).

These responses are consistent with Thomas's (1984) account of the rise of pet-keeping in 18th-century European cities as being a response to the stresses and dislocation of urbanization manifested in a desire to retain a connection with the rural. More fundamentally, they underline the prominence of birds in the home life of contemporary urban Indonesians.

The practice of competing birds is central to the bird-keeping pastime. While pigeons are raced (popular with dock workers), the two largest categories, doves and songbirds, are competed in song contests. Until the mid 1970s, Zebra Doves (*Geopelia striata*) were the main species competed. The popularity of this species can be explained by the likening of its song to chants from the Koran and the patronage of President Suharto (1963 to 1997) for competitions involving these species. It is said that for President Suharto, the calming coo of the Zebra Dove symbolized peace and stability among the rural masses of Indonesia. As a non-passerine, the Zebra Dove's vocalization is innate and genetically determined. As a consequence, song contests involving Zebra Doves came to mirror the clientelist hierarchies of the New Order regime where those with power could purchase, gift or be given champion birds or their offspring.

During the 1970s two trends emerged which subsequently merged into a new type of birdsong contest and the phenomenon called *kicau-mania*. The first was the importation of canaries (*Serinus canaria*) and lovebirds (*Agapornis* spp.), which quickly became popular because they are easy to breed, and have excellent songs and high levels of phenotypic plasticity, which combine to make them excellent competition birds. The second development involved bird enthusiasts within the Jakarta governing elite acquiring species of *Garrulax* with exceptional songs from China and competing them for fabulous prizes. It appears that the competitions provided a means via prize sponsorship for companies or individuals to ensure favourable consideration from members of the governing elite.

The contests were held in public parks and attracted wider interest among bird-keepers. It is reported that in the early 1980s, villagers, or urban residents with strong connections to their village, started bringing to the contests native bird species with song capabilities and repertoires that equalled or bettered the Chinese imports. The species that really made an impact were two *Zoothera* thrushes (Orange-headed *Z. citrina* and Chestnut-capped *Z. interpres*), White-rumped Shama (*Copsychus malabaricus*) and Long-tailed Shrike (*Lanius schach*), along with Straw-headed Bulbul (*Pycnonotus zeylanicus*), which was already a sought-after cage bird because of its deep association with Javanese culture. The introduction of native species broadened participation in the song contests, which resulted in specific 'classes' for native species being introduced. The *Garrulax* thrushes disappeared from the contests in the early 2000s, first because the collapse of the rupiah in the 1997 Asian economic crisis made them expensive, and second because the government banned their import in 2000 due to fears of transmission of avian influenza. Subsequently, the songbird contests have stabilized into nine classes of competition species (seven native species, plus canary and lovebird) along with a 'mixed local' class where new species can be introduced. The Orange-headed Thrush is the firm favourite because it postures (enters a 'drunken trance') while it delivers its exceptional song. Since 2001 five champion birds are reported to have changed hands for 250 million rupiahs (approximately €16,000) (Jepson, 2008).

The species competed in these new competitions are Oscines (i.e. they have a complex syrinx and develop songs through an imprinting-like process of learning). This biology means that birds can be (and are) trained to sing better and, as a result, anyone can potentially catch and train a champion. Via their birds, people from all social strata and backgrounds can meet and compete, and because the birds mimic and (some) posture while they sing, the hobby exhibits fashions and trends. In short, it is dynamic and vibrant.

The term *kicauan* bird has emerged as a collective noun for these species. The hobby has been embraced by the spirit of *reformasi* and entrepreneurship of the last decade. *Kicau-mania* is established in Java and Bali and is now taking root in the cities of East Kalimantan. Each year over 350 songbird contest events are organized at the district, provincial and national level (of which there are four). Participants compete their birds either as members of a bird club or as a 'single fighter'. The bird clubs are city based and made up of local entrepreneurs. The 'big boss' may be a wealthy entrepreneur who can afford to pay €15,000 or more for existing champions or a gifted trainer and spotter of 'prospects'. Irrespective of this, bird clubs seek prestige through their success and through hosting songbird competitions. They form networks of entrepreneurship linking cities across west Indonesia and linking cities with their rural hinterlands. As a result, the hobby has enormous popular appeal. For men of small means, ownership of a competition bird endows them with a social and financial asset (if only imagined), and wives see this as a respectable and aspirational hobby for their husbands – one that brings them into contact with successful people from other walks of life and, put bluntly, one that endows them with work-finding networks in the new realities where companies lay off staff (Mundayat, 2005).

Kicau-mania is reinvigorating old and creating new knowledge practices relating to birds; as a result, new professions are emerging. Most obvious are expertise relating to song and the practices of listening and judging. In contrast to Western ornithologists where birdsong is talked about as a tool for identification, finding or mapping birds, Indonesians discuss birdsong in ways more akin to how music is talked about. They know birds as individual exponents of a score (the species' song) with the ability to improvise and add personality to a performance (with coaching). Getting a bird to a state where it will sing continuously for 20 minutes or more in close proximity to other singing males requires skill and expertise. This knowledge practice creates the everyday hobby for amateurs and rewarding work for a growing number of professionals (called '*jokis*'). It involves three aspects: nutrition, careful management of light and dark regimes, and training by positioning the bird in relation to other singing males (con-specifics and 'master' birds of different species with distinct song phrases). A third knowledge practice is scouting and sourcing 'prospects' – birds with the potential to succeed at different song contest levels. This is not unlike football scouting in that it involves studying form, attending local competitions, and building relationships with village agents and trainers collecting birds from the wild. Perhaps the final knowledge practice to mention is that relating to organizing and governing this hobby. This involves knowing the prominent competitors, sponsors and officials whose support is needed to mount an event, engaging the judges and their governing association (Pelestari Burung Indonesian (PBI); see below), and having a sense of new trends and developments that will enhance the prestige and, hence, appeal of a particular event and the hobby more generally.

The organized structure of song contests, the notion of champions and the practice of acquiring and training birds, which can be pursued casually or seriously, combine to create a popular cultural profile for bird-keeping. Bird-breeding is also popular and is growing in popularity and profile and showing signs of becoming organized. Small-scale (household) breeding of Zebra Doves is long established, but did not evolve into an organized collective knowledge practice. This is because the production of more valuable competition birds became centralized on a few bird farms with the resources to acquire and control pedigree. The introduction of canaries and lovebirds created a new impetus for breeding because, as already mentioned, breeders could compete their birds in *kicauan* competitions. The public profile of bird-breeding is growing as breeders succeed in breeding the now famous species competed in *kicauan* competitions. This brings prestige and fame to the breeders and with this the possibility of profitable breeding and/or consultancy businesses.

Successfully breeding territorial species requires the development of specialist knowledge on housing, feeding and, perhaps most crucially, how to prompt the birds to mate. It appears to emerge from a combination of careful observation, experimentation and inspiration that reveal sophisticated insights on key aspects of a species' breeding biology. Bird-breeders form species-specific associations to exchange knowledge, breeding stock, and attract and support new breeders. Leading breeders create networks with bird-breeding enterprises to provide consultancy advice and breeding stock. The organization (PBI: the Indonesian Ornithological Society) which trains and accredits song competition judges is building a bird-breeder membership (currently over 400).

These knowledge practices on bird-competing, bird-keeping and bird-breeding are communicated and replicated through three principle media. The most influential is the weekly tabloid newspaper *Agrobis Burung* (circulation 22,000). This is an offshoot of the established farmers' newspaper *Agrobis* and as such it retains themes of animal husbandry and business. The paper reports new developments in breeding and competing birds, and is organized into sections dealing with the three major hobby groups (*kicauan*, doves and pigeons). These include tabulated song contest results and adverts for forthcoming events. The tabloid is published in full colour and includes very contemporary and eye-catching bird images and graphics. The second medium is the website and e-group *kicau-mania* (www.kicaumania.org), which posts song contest and breeding news and hosts a lively discussion group. Finally, in the more formalized settings of meeting and training workshops, the PBI creates spaces for knowledge exchange, network development and the creation of standards relating to competing, keeping and breeding birds.

Towards an Indonesian bird conservation ethos

The above account points to the prominence of birds and bird-related knowledge practices in the contemporary urban culture of Indonesia. The figures involved compare or even exceed those in countries known for their popular interest in birds such as the UK. For instance, it is projected that there are 50,000 to 70,000 active hobbyists in Java and Bali and 1.422 million (1.189 million to 1.745 million) bird-keeping households in the six largest cites with a combined population of about 23 million households (Jepson and Ladle, 2009). In the UK there are an estimated 30,000 active birdwatchers, while the Royal Society for the Protection of Bird's (RSPB's) million membership translates to 675,952 households out of the 26 million UK households (RSPB, internal communication, 5 June 2009). The difference is the inclusion of a desire to conserve and protect wild birds, which is intertwined in the UK framing of birds and human–bird relations. In 2004, six out of ten Britons surveyed claimed they had fed wild birds in the last year and just 4 per cent of the population owns a pet bird (mostly budgerigars and canaries) (RSPB, internal communication, 5 June 2009).

The results of our survey (n = 699) suggests that urban bird-keeping households in Java and Bali are open to conservation ideas. Just 12.8 per cent agreed with the statement: 'I do not care if species of wild birds go extinct in Indonesia' and 71.5 per cent agreed with the statement: 'Taking birds from the wild will deplete wild populations.' However, these positive responses need to be tempered with the 41.5 per cent who agreed with the statement: 'The state of wild bird populations is of no concern to me.' Generally, better-educated bird-keepers were more likely to have pro-conservation attitudes than their less-well educated cohorts. Moreover, influential figures in the communities of practice that provide the informal leadership and governance of the hobby are actively pro-conservation, notably the editor of *Agrobis Burung* and the Bali Starling (breeder) Association, which is releasing captive-bred birds into Bali Barat National Park.

Given these insights, it is suggested that an Indonesian bird conservation ethos might emerge from actions that:

- seek to amplify the bird-keeper frame to include the fate of wild bird populations; and
- introduce governance technologies that can operate 'beyond' the state' (i.e. in the public domain).

This will require a more sophisticated conceptualization of frames, governance technologies and the interplay between the two; but the following examples and tentative thoughts are illustrative of the idea. The bird-keeper frame contains elements relating to song, animal husbandry, the village, community, entrepreneurship and so on. More usefully, we might think of the bird species involved as boundary objects – namely, objects that are able to link different frames and yet retain their identity (Star and Griesemer, 1989). From this perspective, *kicau-mania* might be explained as the ability of a particular set of species to link frames relating to tradition, identity, prestige and self-esteem, social networks and security into a set of knowledge practices that have become a cultural force. The opportunity for conservation lies in the fact that the prominent species – Orange-headed Thrush, White-rumped Shama and Long-tailed Shrike – are very definitely still wild and this creates the possibility of linking with, and drawing in, bird conservation frames.

The question then becomes what aspects of the conservation issues frame might interface and generate synergistic effects within the bird-keeper frame constellation? What might conservationists consciously emphasize, downplay and/or revive? The most obvious and, perhaps, most difficult aspect for Western bird conservationists to downplay is the antipathy to keeping birds in a cage. William Blake's line 'a robin [bird] in a cage puts all heaven in a rage' and the associations between flying birds and freedom have considerable agency in Euro-American bird conservation frames. The sentimentalization of birds in Britain during the 18th and 19th centuries generated a popular awareness of the negative impacts of bird-trapping and made bird-keeping socially unacceptable. This and other factors caused scientific ornithologists (and, by implication, the founders of Western bird conservation) to disassociate themselves from bird-keepers (Birkhead and van Balen, 2008). Moreover, the engagement of powerful animal rights NGOs in CITES makes it politically expedient for influential bird conservation actors to adopt anti-bird-keeping policies and rationalize these by arguing that all bird-keeping and trade threatens wild populations and/or poses a risk to human health (e.g. transmission of avian influenza). Maintaining such positions, in Indonesia at least, will constrain the opportunity for interplay between bird conservation and bird-keeper knowledge practices. This is because the issues of animal rights sit uncomfortably with Indonesian ways of knowing birds, which more closely originate from animal husbandry knowledge practices. Significantly, bird welfare issues are an active topic of discussion among bird-breeders and songbird competitors – they have to be because high welfare standards are necessary to get birds to sing or mate! In short, a more relaxed attitude to bird-keeping on the part of bird conservationists might create spaces for the emergence of an Indonesian bird conservation frame with a strong animal welfare (but not rights) emphasis.

Perhaps a key precursor to the adoption of pro-conservation attitudes and behaviours is introducing ideas of the wild in the minds of citizens and creating a sense of place, limits and vulnerability. Conservation has been adept at 'logo-ising' biological space and creating a sense of conservation territory (*sensu* Anderson, 1983, 1991). The Ospreys and the Caledonian Forest/Scotland; the Capercaillie and forest/Bavarian Alps; the Cock-of-the-Rock and rainforest/Andes; and the Crowned Crane and wetland/Uganda are some examples. The production of such bird icons has drawn on cultural assets in the West relating to interests in new territories and their 'curiosities', the 'grand tour' expansion of transport infrastructure, recreational travel and the travelogue. Such assets are weak or absent in Indonesia; but bird-keeping provides a different set of cultural assets that could be deployed to similar effect. For instance, there is an enthusiastic demand for information about how wild birds live their lives – what they eat, when they breed, where they make their nests, etc. The famous *kicauan* species are the focus of this interest and supply chains in these species extend across west Indonesia. It is not too difficult to imagine an approach that blends these iconic songbirds, older ornithological methods and the new internet and social networking technology (Google Earth, blogs, twitter, etc.) to spatialize Indonesia's bird habitats in the minds of urban

Indonesians. The Indonesian's sophisticated appreciation of birdsong could also be deployed in a similar way. Although technically more demanding, the likelihood that songbirds in different regions have different dialects or song repertoires could be harnessed to make visible the biogeography of Indonesia's wild birds.

The research on bird-keeping knowledge practices described above was integrated with the development of a voluntarily-marked based approach to governing the bird-keeping hobby. The central logic is that the negative impacts of the pastime on wild birds could be reduced through promoting captive-bred alternatives and that a bird certification scheme could create the conditions for this to work (Jepson et al, 2008). Certification is now commonplace in conservation (e.g. forest and marine stewardship councils) and captures the notion of a governance technology in that it represents an assessment and standardization device that can reconfigure and construct actor relations and steer the behaviours of actor networks. The idea of applying certification to bird conservation was novel and had the effect of making visible the different communities of practice engaged in the breeding, trading, competing, popularization and conservation of birds, and bringing these groups together for the first time in a series of three regional workshops. This produced an exchange of perspectives, generated ideas and forged new networks around a common idea of governing practices involving birds. No common purpose was agreed (although the architecture of a certification scheme was formulated); but it did create a space for a more forward-looking discourse and one that involved conservation voices. One outcome is that *Burung Indonesia* and bird-breeders now have stands at the bigger song contests, thereby strengthening the agency of these events as a locus for conversations and networking that might inform a future Indonesian bird conservation ethos.

The second example involves the studbook technology and the Assosiasi Pelestari Curik Bali (APCB), the Bali Starling Association. The species studbook was introduced into Indonesia in the 1980s by American zoos involved in efforts to save the last remaining wild population of Bali Starling through release of captive-bred individuals. During the period of international engagement in the Bali Starling Project (1986 to 2001), strict procedures were applied to the use of studbook technologies, which effectively barred the participation of private breeders. When the project failed and international conservation groups withdrew, the studbook technology was deployed by Indonesians to organize an association (assemblage) of private breeders, owners, government ornithologists and conservation project officers. Large numbers of Bali Starlings have been bred, and between 2007 and 2009 88 birds were released into Bali Barat National Park. This is a clear demonstration that Indonesian bird-breeders are conservation minded and it points to the potential of reintroductions as a conservation action that might easily sit within the current bird-keeper frame. Inspired by the Bali Starling success, some are talking about reintroducing the Straw-headed Bulbul, a traditional songbird favourite now extinct in the wild, but a species that is bred in increasing numbers. Reintroduction projects require sites that are well protected and therefore create a bridge with a core policy approach of international bird conservation. Moreover, the engagement of influential citizen networks in the breeding of birds for research creates accountability pressures on government and other influential actors that are currently unavailable to established bird conservation organizations.

Conclusions

This chapter has drawn on the analytics of frames and governance technologies to think about the relationship between national knowledge practices relating to birds and the international bird conservation regime. These analytics draws attention to the Western-situated knowledge practices implicit in the current international bird conservation frame and suggest that rather than trying to build local capacity in these, a better starting point for conservation, in Indonesia at least, is to understand and then amplify local frames relating to birds, and allow these the space to generate new conservation governance techniques. In contrast to the managerial project approach that currently dominates international conservation action, and the prescriptive rigour of logical frameworks and outcome indicators that structure this approach, there is a case for a more *laissez-faire* and theory-guided approach to international bird conservation. This would involve understanding and reflecting on the frames that shape human–bird relationships and engaging in their reproduction and amplification as a participant rather than external governor. Perhaps rather idealistically, experience with introducing the notion of bird certification suggests that conservation motivations and actions may emerge among people who are bird minded, culturally active and networked once they are exposed to certain forms of information and governance technologies. A critical mass of such people is likely to occur in cities. Among such networks, the privileged status and expertise that conservationists enjoy in government or rural governance settings is reduced. This creates an opportunity to contribute new knowledges and practices in a manner that can be deconstructed and moulded to suit local understandings and needs.

In summary, ethno-ornithology might be thought of not so much as the study of indigenous or traditional ways of naming and knowing birds and interpreting these as a coherent knowledge (though this aspect is important), but more as the study of the knowledge practices that shape different framings of bird-related knowledges or, as this Indonesian case study has indicated, how tradition and broader political, social and economic trends conspire to produce changing knowledge practices that are distinct and unique to particular countries, groups or times. Such understanding might reveal cultural assets that can help to inform and inspire place-specific bird conservation visions and practices appropriate for the times.

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Note

1 The World Wide Fund for Nature–Portugal (WWF-Portugal) generated support for saving the White-tailed Eagle by aligning their conservation issue frame with the powerful ideas of identity, pride and esteem that assemble around clubs in a 'football frame'. The bridging link was an eagle called Victory, which sits atop the emblem of the famous Benfica football team. WWF and the club together mounted a media campaign which spread a spoof story that the eagle was lost and appealed to supporters to call for its return. Their calls were answered by their magnificent mascot circling down into the stadium and alighting on top of their emblem (www.youtube.com/watch?v=VSZR13_f6KA). This highly original and emotive strategy engaged Benfica fans in a collective act of saying that *the wild eagle is our eagle and our lives will be diminished without it*, while subtly presenting conservation as simultaneously caring for nature and people's cultural identity.

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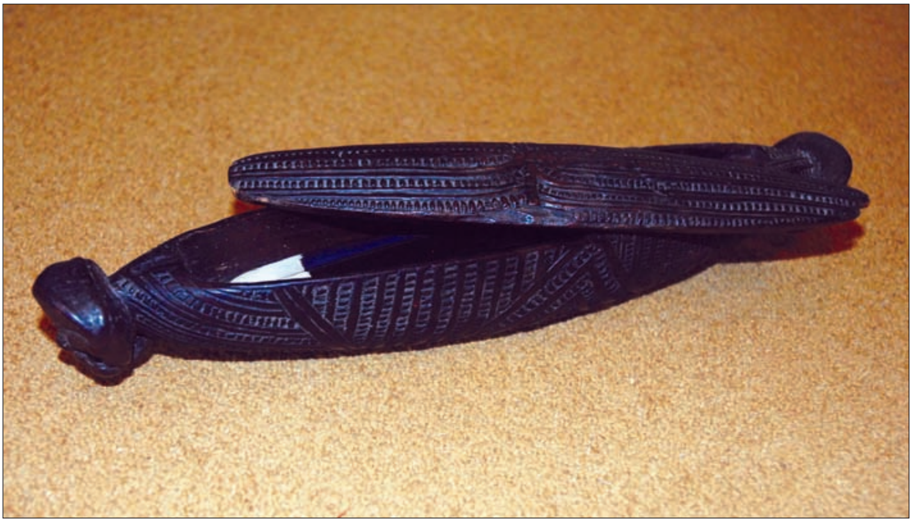
▲**Plate 1** *Painting by C. F. Goldie of Te Aho-o-te Rangi Wharepu, a distinguished Māori warrior, wearing Huia tail feathers in his hair.*

Source: copyright Auckland War Memorial Museum

▲**Plate 2** *Male and female Huia.*

Source: illustration by J. G. Keulemans from Buller's *History of the Birds of New Zealand* (1888)



▲**Plate 3** *An early feather box made to store and protect the tail feathers from Huia, the style of carving probably dating from the late 18th or early 19th century.*

Source (Plates 3–4): David Houston

◄**Plate 4** *Santa Cruz red feather money roll, surrounded by a protective wrapping of palm leaves. A wooden 'charm', with a carving of a turtle, has been placed on top, and the middle and ends of the roll are decorated with strings of shells.*

▲ **Plate 5** *The first stage in manufacture was the collection of feathers. This early 1960s photograph shows the method of trapping honeyeaters: a stuffed decoy bird attracts males to a perch, to which sticky latex from the sap of the paper mulberry tree has been applied.*

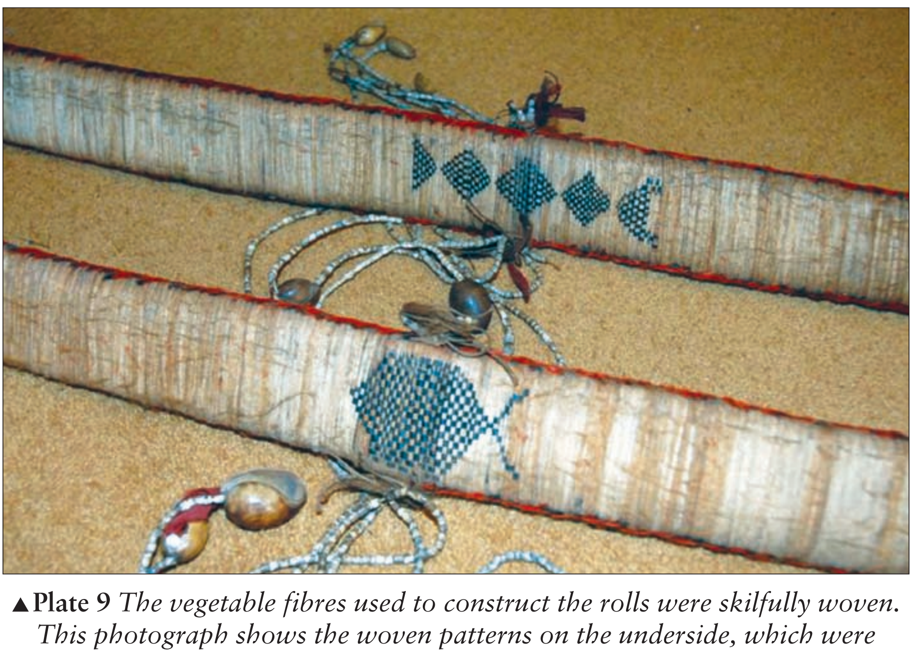
▲ **Plate 6** *Bird trapper with a collection of red honeyeaters.*

Source (Plates 5–7): William Davenport

▲ **Plate 7** *The second stage of manufacture was the production of a series of platelets made by gluing together the feathers from a pigeon with a glue made from the paper mulberry tree. A wooden template was used to ensure an even size to each platelet, and they were completed by the addition of a line of scarlet feathers from the honeyeater along one edge.*

◀**Plate 8** *The roll was then constructed by tying these platelets onto two stretched cords with vegetable fibre and a backing strip of tree bark, such that each platelet overlaps the predecessor and only the edge strip of red feathers are visible on the finished surface.*

Source: William Davenport



▲**Plate 9** *The vegetable fibres used to construct the rolls were skilfully woven. This photograph shows the woven patterns on the underside, which were made at both ends and the centre of each roll; these were decorative, but also used as a signature to identify the craftsman responsible for the construction of each roll.*

Source: David Houston

◂**Plate 10** *Inspection of feather rolls to assess their value. Note how some have lost most of their original red feathers and, hence, much of their value.*

Source (Plates 10–12): William Davenport

◂**Plate 11** *Pile of feather currency being inspected to assess the value.*

◂**Plate 12** *Photograph taken by William Davenport during the early 1960s of a 'bride price' procession. Only the women at the front have rolls of high value, with full red feather covering; the remaining rolls seem to have lost most of their feathers and would be of low value.*

▲**Plate 13** *John Martin wears the tunic symbolizing the story of Raven climbing down the bull kelp.*

Source: C. Martin

▲ **Plate 14** *'Bittern Branding': Bittern Train Line beer mat, Norfolk.*

Source (Plates 14–15): White, G., Purps, J. and Alsbury, S. (eds) (2006) *The Bittern in Europe: A Guide to Species and Habitat Management*, Royal Society for the Protection of Birds, Sandy, UK

▶ **Plate 15** *Bittern Beer, Reephaven Brewery, Norfolk.*