

Knowing and managing biodiversity in the Pacific Islands: challenges of environmentalism in Marovo Lagoon

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Engaging with biodiversity: knowledge and classifications

In this article I shall investigate some dimensions of how the inhabitants of the Marovo Lagoon area of the Solomon Islands, in the Melanesian South Pacific (Fig. 1), know and manage the remarkable reef and rainforest environments that constitute the foundations of their everyday lives, cultural identity and material sustenance – the latter mainly through subsistence fishing and agriculture, though increasingly connected to global political economy. My starting point is the observation that biodiversity – for which the Marovo Lagoon is internationally famous – is locally understood by the customary owners and users of these diverse environments in ways that are both compatible and incompatible with the more global views and desires of the biologists who measure biodiversity and the environmentalists who wish to conserve it.

The relations between the local people who live in, and are from, an environment and the outside agents who want to study and protect that environment are always complex and many sided. The setting aside of local resources for purposes of biodiversity conservation and the transformation of economic territories into protected nature areas (to use two widespread conservation

strategies as examples) may involve difficult dimensions of power and persuasion. In this regard it is important to note that the indigenous inhabitants of the modern Melanesian nation states of Papua New Guinea, the Solomon Islands and Vanuatu largely maintain constitutionally enshrined customary privileges of control over local lands and seas and their resources. Generally, Melanesian lands and inshore reefs and seas are under forms of customary land and sea tenure,

managed by kinship-based social groups. This political fact of strong local autonomy, comparatively rare in the world, combined with the cultural diversity of this region (about a quarter of the world's languages are spoken in these three nations), pose significant challenges to biodiversity conservation, in terms of the need for constructing interfaces and reaching commensurability between local and scientific knowledge and strategies. The case study of the Marovo

Lagoon which forms the core of this article exemplifies some of these challenges, while also giving glimpses of entanglements between the local and the global – a complex arena that has been analysed in more detail in a previous issue of this journal (Hviding 2003a).

More than a hundred years ago, two intellectual founders of comparative social science argued for the importance of detailed

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FIGURE 1. The Melanesian south-west Pacific.

ethnographic study for reaching an understanding of how members of a given society, however remote and exotic, classify their social and natural environment. In their classic essay “De quelques formes primitives de classification”, Émile Durkheim and Marcel Mauss (1903) thus paved the way for anthropological studies of the ways in which cultural systems of classification are structured internally and differ worldwide. In the essay Durkheim and Mauss were mainly concerned with the symbolic relations between social order and worldview, and were preoccu-

pled with the moral and religious dimensions of classification rather than with specific approaches to the natural environment as such. For this and other reasons (including its publication in an increasingly obscure French journal) their seminal work was influential mostly in an indirect sense in the development from the 1950s of “ethnobiology”, “ethnobotany”, and other sub-branches of anthropological inquiry of how “nature” is viewed by different “cultures”. For example, Brent Berlin, widely regarded as a founder of modern

ethnobiology, does not even refer to the work of Durkheim and Mauss in his authoritative work *Ethnobiological classification* (1992).

Yet implicit links have continued, and remain in place, between early French sociological thought on how peoples remote in space and/or time classify their environment and modern ethnobiology, represented by Berlin's position and by such different masterpieces of classification-oriented ecological anthropology as the studies by Conklin (1957) of ethnobotany among the Hanunóo shifting cultivators in the Philippines and by Ellen (1993) of animal knowledge among the Nuaulu of eastern Indonesia. These landmark studies from Asian tropical forest environments show how high levels of biodiversity – seen as the number of species known by science to be present in the flora and fauna of the biotope(s) – are mirrored by rich and complex cultural repertoires of local knowledge about that flora and fauna by the people who use the biotope(s) daily. This is not to say that the latter necessarily classify plants, animals, and environmental processes in terms that overlap with western biology, botany, ecology, meteorology, and so forth. What Durkheim and Mauss, in the language of their time, termed “primitive classification” needs not be commensurate with the Linnaean taxonomic structures used by the life sciences to classify the natural worlds. But conversely, the given fact that different peoples in localities far apart do not classify their surrounding world entirely in the same manner is not to imply total incommensurability.

As exemplified by the classic studies by Johannes (1981) of traditional fishing and its related knowledge in the Palau islands of the Micronesian Pacific and by Majnep and Bulmer (1977) of the classification and knowledge of birds in the highlands of New Guinea, many remote corners of the world have their share of local naturalists whose dedication to advance wisdom and penchant for elaborate classification certainly rival their western scientific counterparts – to the degree where they may easily enter into informed conversation with expert marine biologists or ornithologists. In my own long-term work with the people of Marovo Lagoon I have had the privilege of participating in one extraordinary instance of such conversation between mutually recognised experts, when

the late R.E. Johannes, noted marine biologist and scholar of Pacific Islands fisheries, spent a few weeks in 1987 working with the most knowledgeable fishermen of Marovo to talk about lunar spawning cycles and other topics of mutual interest concerning important food fishes (Johannes 1989; Johannes and Hviding 2000). I believe this example to be representative of much more general opportunities in the Pacific and beyond. Where there is contrasting knowledge, there is also potential for dialogue and convergence (Hviding 2003b).

In his introduction to the 1969 English edition of Durkheim and Mauss' work, Rodney Needham (1969, p. vii) posed an analogy between “when a person who has been blind since birth is operated on and given sight” and when “an ethnographer begins his study of a strange people”. In both cases, he argues, the person in question is rather suddenly exposed to chaotic, confusing and bewildering impressions, “none of which seems to bear any comprehensible relationship to the others” (in the case of the blind person given sight) and “none of which can safely be assumed to be what they appear” (in the case of the ethnographer encountering “an unknown society”). As a prolonged state of such incomprehension would make the ethnographer's project of cross-culturally comparative understanding impossible, Needham observes:

It is only with the most arduous and protracted efforts that the ethnographer can grasp something of how the people he is trying to understand see themselves and the world in which they live, and not until he has achieved this can he usefully proceed to the technical investigations proper to his academic subject. (1969, pp. vii–viii)

While such “arduous and protracted efforts” would ideally seem to form part of the most general anthropological toolbox and certainly not to be confined to the techniques of ethnobiology, there are these days many more academic disciplines besides anthropology whose practitioners are working among people who are quite alien to themselves, yet who live in environments that are at the core of practitioners' interest. In the present context of discussing the roles of local knowledge, practices and worldviews in relation to biodiversity conservation, I am thinking especially of

natural scientists, resource managers, government agents, and environmentalist workers (from whatever scientific or non-scientific backgrounds), all of whom are typical actors on the ground wherever biodiversity conservation is an issue.

As succinctly stated in the background briefing for the conference session at which this article has its origins, “biodiversity management involves interaction and negotiation between resource managers, scientists, developers and local resource users and producers” (Biodiversity, Science and Governance 2005). A rapidly increasing range of anthropological studies of local, on-the-ground encounters generated by global biodiversity conservation initiatives confirm this observation and attest to the complexities of the associated “interaction and negotiation”, as exemplified in the rainforests of Colombia (Escobar 1999) and Borneo (Brosius 2003), in East African wildlife reserves (Neumann 1997), and marine parks (Walley 2004), and in the lagoons and rainforests of the Solomon Islands in the South Pacific (Hviding and Bayliss-Smith 2000). From this follows the well-supported argument that biodiversity conservation initiatives in most cases are bound to focus on species and environments that are already culturally and economically significant for somebody else: those who live in, subsist on and, in many cases claim property rights to, the “species” and “areas” which for them are more likely to be “resources” and “territories”. Or, more bluntly: the conservationist’s environment may in fact be man-made, a product of human activities over many generations. “Nature” may well be the local inhabitants’ “culture”; and moreover, an apparently pristine natural environment may be the outcome of long-term human use.

Biodiversity contested: complexities of a hotspot

The human inhabitants of the internationally famous, and infamously threatened, biodiversity hotspot of Marovo Lagoon know, use and manage their lands and seas and the organisms there in their own unique way; which, however, exemplifies a widespread pattern in the Pacific Islands whereby land and sea are subsumed in a

single continuum in terms of both classification and management. The Marovo people’s accumulated experience in engaging with people and parties from outside worlds have, moreover, endowed them with a reputation for unpredictability and trouble among logging companies and conservation organisations alike (Hviding 2003a).

Marovo Lagoon, located in the New Georgia area of Western Province, Solomon Islands, is an ecologically diverse environment dominated by no less than 700 square kilometres of coral reef lagoon. This great lagoon is fringed to the seaward by a unique double chain of raised barrier reefs, and to the landward by Gatokae, Vangunu and New Georgia, high volcanic islands of the New Georgia group (Fig. 2). From the 1,120 metre summit of Vangunu due north to the outer edge of the barrier reef islands of the central lagoon, there is a distance (as the crow flies) of some 27 kilometres, including an island-studded lagoon seascape from mainland shore to barrier reef that is some 7 to 8 kilometres wide. The customary land and sea tenure system of Marovo, whereby each corporate kinship group (*butubutu*) holds as their ancestral property a bounded section (*puava*) of land and/or lagoon and barrier reef, plus added social features of exchange and use rights for neighbours and relatives, gives every Marovo villager potential access to a rich and complex mosaic of ecological zones and resources.

As of 2005 about 13,000 Marovo people lived in some 50 villages, mainly on the lagoon coasts of the high islands. Most of the land and all the lagoon and reefs are held under customary law by kinship-based groups (a notable exception being 10,000 hectares of government-held forest estate on southeast Vangunu, which since 1992 has been the scene of large-scale logging and the establishment of an oil palm plantation). The prevailing system of tenure over land and sea is flexible and adaptive, and its degree of enforcement by the customary chiefs and other leaders of the land-and-sea holding *butubutu* tends to fluctuate with changing perceptions of scarcity and challenges by external market forces (Hviding 1996). Adherence to Christian churches, mainly Methodist and Seventh-day Adventist (but with the influential presence since the 1950s also of the indigenous Christian Fellowship Church), has been universal through-

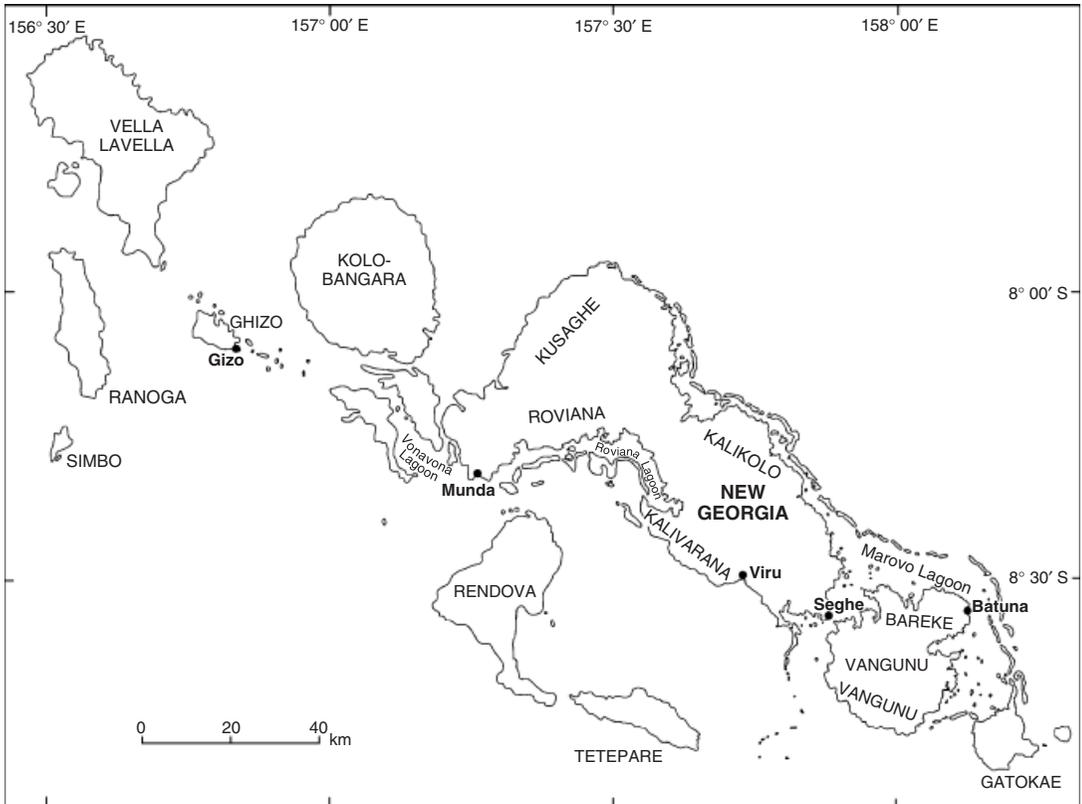


FIGURE 2. Map of the New Georgia islands showing Marovo Lagoon.

out the area since the first decades of the twentieth century. Into the twenty-first century the local economy remains household based, built on the shifting cultivation of root crops (mainly sweet potatoes) in the lowland rainforest, on reef and lagoon fishing, on hunting and gathering on reefs and in rainforest, and on a small but diverse cash sector whose various sources of income wax and wane with the vagaries of global economy. Since the 1990s the latter economic sector has seen considerable and conflict-ridden expansion caused by the widespread operations throughout the Marovo area of Asian logging companies, and by the timber royalties the companies pay to the customary landowning groups from whose forests they extract timber (Hviding 1996; Hviding and Bayliss-Smith 2000). Concurrently, however, the household-based subsistence economy saw

a resurgence in the period 1998–2003, when the Solomon Islands nation was in disarray from armed conflict centred on the island of Guadalcanal (location of the national capital Honiara), and considerable back-migration from Honiara to most rural areas took place.

The inroads made on the lands, reefs and seas of Marovo by logging, fishing, and mining on an industrial scale have coincided with mounting efforts by environmentalist organisations to counter what they see as the environmentally detrimental effects of resource development by outside agents. Since the late 1980s the Marovo Lagoon has gained global fame for its marine and terrestrial biodiversity and its outstanding natural features, particularly the double chain of raised and forested barrier reef islands that define the lagoon. The barrier reefs figure among the world's prime scuba-

diving destinations, and a number of international conservation agencies have run a long, though confused and so far unsuccessful, campaign for the enlistment of the area as a UNESCO World Heritage Site, and for its establishment as a prime destination for ecotourism. Meanwhile, over the past decades the *butubutu* of Marovo, who through customary law own the lagoon and the land, have engaged with the fishing and logging companies and the international conservation agencies in a multitude of ways, generally aiming to retain their privileges of control over resources embodied in ancient but highly adaptable systems of land and marine tenure.

There is considerable variation in logging practice, commercial pressures and threats to biodiversity in different parts of Marovo. In the areas of northern Marovo controlled by the Christian Fellowship Church, conservationist NGOs have not gained access during recent decades, although Australian conservationists played some role in the Christian Fellowship Church resistance to logging by the transnational giant Unilever in the early 1980s, leading to the latter's ultimate withdrawal (Hviding and Bayliss-Smith 2000, pp. 225–235). Instead, in the Christian Fellowship Church-controlled areas, rather well-controlled industrial logging by an Asian company has since 1989 been locally acceptable, since it generates income for the development of infrastructure and allows for the diversification of village-based economies, including community-based forest plantations. This connection between the local and the global proved to be of particular importance in the years 1998–2003 when the national economy was in a state of near collapse and most rural areas in the Solomons received no government services. Other areas of Marovo have seen less controlled, more destructive logging, giving few visible benefits to the local economy and little or no infrastructure development.

While the notion that the Marovo rainforest is pristine is a far-fetched one, given knowledge of large inland populations in the past (see below), throughout the area the view that urgent challenges of an environmental kind need to be addressed has increasingly been expressed. This is not in itself new. Already in 1985, a locally-initiated research and conserva-

tion project was launched with government support and the involvement of Commonwealth funding (Hviding and Baines 1994). In an earlier article in this journal, I analysed the complicated history in which the economic ambitions, environmental concerns and political strategies of the many different resource-owning groups of Marovo sit forever uneasily, yet at times also concur with, company desires, environmentalist ideologies, and even tourist adventure (Hviding 2003a; see also Hviding and Bayliss-Smith [2000] for a comprehensive analysis of logging, conservation, and tourism).

Through the 1990s increased international attention was given to the lagoon and a multitude of conservationist NGOs (among them the major actors World Wildlife Fund and Greenpeace) as well as state agents such as New Zealand Aid (NZAID) engaged with the customary land- and sea-owning groups of Marovo to promote ecologically sustainable development projects – ranging from butterfly farming to World Heritage listing – though with little success. As argued generally for the Western Solomons by Foale (2001), there has been a consistently poor fit between “landowner aspirations and environmentalist agendas” in that the latter have failed to take into account the complex realities of the former and instead pursued a quest for “conservation plans” anchored in an over-simplified vision of rural “communities”, failing to handle the social conflict, fluctuating tenure practices, and overlapping resource rights that are part and parcel of village life. The lack of any formalised central political structure for the entire Marovo Lagoon (since the largely inefficient Area Council system of the Solomon Islands was abolished by the national government in 1997), and the failure of most conservationist NGOs and overseas aid organisations to connect closely with the area's churches and schools, have combined to make the record of conservation projects in Marovo a poor one. Today's challenges to the future well-being of the environment and resources of Marovo Lagoon are indeed greater than ever, although the subsistence base remains relatively strong.

Early on, chiefs and other leaders in Marovo initiated and supported academic research in the area by social and natural scientists with the aim of documenting resource use, management institutions and traditional envir-

omental knowledge (Baines and Hviding 1992). A special request in this regard has been the production of an environmental encyclopedia (Hviding 2005) for use in primary, secondary, and community education, based on the fundamental premise in Marovo culture that one cannot manage, or properly use, the resources of reef and rainforest without having sufficient knowledge of them. This practical orientation pervades Marovo views of the environment, to the extent that “nature” (which has no equivalent word in the Marovo language) is first and foremost viewed as a source of sustenance for local ways of human existence, not something to be conserved for its own sake. Thus, for example, the industrial logging of selected areas of rainforest (such as in the areas controlled by the Christian Fellowship Church mentioned above) may be locally acceptable as long as it generates an income for the development of village-based economies, which at the same time remain dependent on the maintenance of environment and resources through generations of local knowledge.

The *Environmental Encyclopedia* (Hviding 2005) is the outcome of two decades of work by its author, in close collaboration with indigenous experts on the living things of the sea and the land. With more than 1,200 entries in ten chapters loosely organised by local biotope classification, the book describes the vernacular names, indigenous knowledge, and local uses of the marine, coastal, and terrestrial environments and their living inhabitants (Fig. 3). Each entry has parallel Marovo and English texts, and scientific identifications are given where feasible. Notably, the inclusion of English text and scientific identifications was insisted upon by the early initiators of my work with this book, from a wish that the outside world could be engaged in knowledge of, and dialogue about, the environment and resources of the Marovo Lagoon. The book was first published in 1995 and provided by the author to Marovo schools and villages in 1996. A considerably expanded, elaborately illustrated edition was published by UNESCO in 2005 and currently spearheads efforts by the Solomon Islands government to develop locally relevant curriculum materials for vernacular education. The book may safely be said to focus on Marovo people’s environmental knowledge, although

the described environments of land, reef and sea are fairly typical of the Western Province and indeed of the Solomon Islands in general. Marovo Lagoon is exceptional, however, in its combined range of ecological zones as well as in the sheer scale of the interrelated land-and-sea system that constitutes the source of livelihood of the people.

To allow the book to be also useful in the wider linguistic field of Marovo, I included two comprehensive lists that cross-reference terms for living organisms and environmental features in the Hoava and Vangunu languages to their Marovo equivalents (Marovo language being the dominant one among the area’s five vernaculars). Clearly, lists of this kind could also be compiled for other languages, with the Marovo names contained in the book as a source and linguistic bridge. The Solomon Islands government has encouraged readers from other parts of the country, near and far, to carry out such work, which should be possible so long as there is someone who has knowledge of both the Marovo and local languages, as well as the relevant environmental knowledge.

Biodiversity and the tropical environment: the Marovo view

Let me now provide a brief summary of local views of the lands and seas under customary ownership, as subsumed in the important Marovo concept of *puava* (Fig. 4), which in a restricted sense means “earth, ground” – a concept totally in line with other land-and-sea estates of Oceania discussed in the regional anthropological literature. The basic relationships between people, land and sea in Marovo are between kinship-based groups (*butubutu*) and delimited territories (*puava*) of land, sea, and reefs. A land- and sea-holding *butubutu* bears the same name as the *puava* its members own, use, and manage as communal property handed down through many generations. A common saying sums up this foundational relationship between people and environment: “*Kino pa Marovo ieni soto pa tututi oro soto pa puava*” (human life in Marovo is joined to genealogy and land). Two other

MARA TATADU

Meka mara gete, oha vasinakiki tinina, ngachu via tatadu pa chikuna. Ko pa lupa na sangava.

Fish, fam. Carangidae: a medium to large-sized trevally with a golden tinge and very sharp tail scutes, lives in reef passages.

MARA TUTULI

Meka mara getegetena pu ko tania ria vinahilahila buma pa kale tinina.

Fish, fam. Carangidae: a medium to large-sized trevally with a small number of conspicuous blue spots on the sides.

MAROGO

Heheuku kiki, kokoani tania lea pa kogu mani varihagonoi pa kolokolo tania heheuku, pa ka hike rane talavuni pa taomipaleke mani pa ka lima rane talavuni pa karua rane susua pa soaini. Ta vae pa chaba vekovekoi oro vahorehore.

Fishes, fam. Lutjanidae: small Hussars, *Lutjanus adetii*, and other similar small red Lutjanids that form aggregations. It is believed that all MAROGO will grow to become HEHEUKU. While HEHEUKU form aggregations in shallow water at the barrier reef, MAROGO form bottom aggregations in the lagoon. Both form aggregations around the new and full moons.

MAROGO KEORO

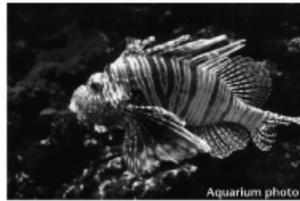
Marogo pu hevaheva tinina. Kino tania huana marogo mana ko gone pa keoro.

Fish, fam. Lutjanidae: *Lutjanus adetii*, small MAROGO that live in sandy areas and therefore have a very pale pink to white colour. Their habits are like those of all other MAROGO.

MAROGO VORI

Marogo kiki, soku via pa katiga kolokolo, ko pa dia vori pa saghauru.

Fish, fam. Lutjanidae: *Lutjanus adetii*, very small MAROGO that can sometimes be caught in huge numbers from their vori ('nests') on medium-depth reefs.



MATAKELA

Ihana pu ko liloro pa idaka na binu, gete via tiherena mani soku via kalu na varichopuruna. Ta siti uka pula ta suni nia tinoni, tata hua nou.

Fishes, fam. Scorpaenidae: Lionfish/Firefish, *Pterois volitans* and similar species. They swim slowly among stones and coral, and have highly venomous spines which cause tremendous pain, which is almost as bad as pain caused by stonefish (NOU).



MATALAVA

Meka ihana huana osanga mana gete via matana. Heva tinina mani chichinoko pa kakadona. Huana mihu kino tania.

Fish, fam. Lethrinidae: *Monotaxus grandoculus*, Large-eye bream. A silver-coloured fish with a black back. Its habits are similar to MIHU. The name is a shortened form of mata lavata ('huge eyes').

MATALOBA

Meka ihana kiki pu gete matana mani orava hua chori tinina. Huana chori mana kadi meka kino tadikaru puku ihana pira. Ko varichopuruna pa tiheredi na chalividi katigae. Hara chori kiki katogae. Kolokolo tania pana ipu rugacha pa soa ini, pa ka lima rane kaduvu pana ipu pu ieni ta kilae vamucha koburu. Ta vae pa chaba lobaloba pa kolokolo rugacha.

Fishes, fam. Holocentridae: Soldierfishes, *Myripristis* spp. These small, bright red and big-eyed fishes resemble the larger CHORI, but their behaviour is different. Some MATALOBA have poisonous spines on the head and fins, and these are most likely juvenile CHORI. MATALOBA are abundant around the full moon and can sometimes be caught in large numbers on moonlit nights by a special trolling technique (lobaloba) using thin lines and small baited hooks from a paddled canoe.

MATAPOU

Meka ihana baina, huana birake mana gete. Orava oro buma tinina. Kani kokuchu chikuna, hevaheva tiherena. Hara birake pu getena. Mucha pa binubinuani mana kani ko meluku tania.

Fish, fam. Scaridae: A large orange and blue-green parrotfish with a longish tail, and with blue edges and light colours on the fins. It is quite similar to BIRAKE but bigger, and sometimes forms baina groups. Identified by Marovo fishermen as the adult phase of the Stareye

FIGURE 3. Sample page from Hviding (2005).

standard expressions convey the closeness of *butubutu*–*puava* relationships: “If there is no *puava*, there can be no *butubutu*”; “The *butubutu* guards the *puava*”. This mutual relationship between defined units of people and defined units of territory and environment is seen as fundamental for the continued lives of both. A *butubutu* derives its identity, as well

as day-to-day sustenance, from the *puava* it holds through inalienable ancestral title, and the *puava* cannot be sold or otherwise transferred to non-members. This principle is also enshrined in Solomon Islands national legislation concerning customary tenure. The following figure gives a generalised picture of the *puava* of Marovo as an assemblage of ecological

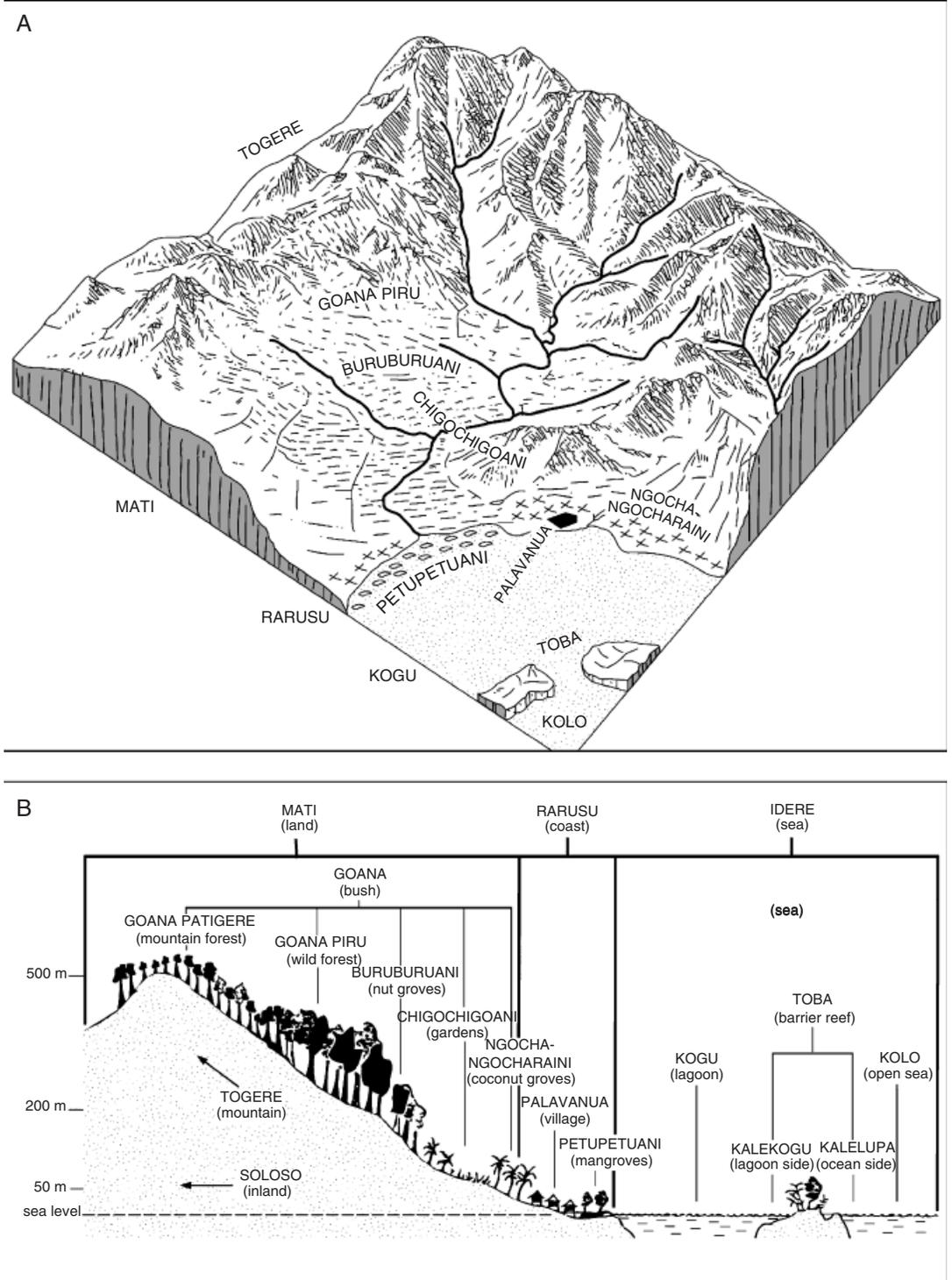


FIGURE 4. Classification of land and sea environments in Marovo; A) landscape view; B) cross-section.
 Source: Hviding and Bayliss-Smith (2000)



A boy from the Lobi community in the forest near his village, Marovo Lagoon, Solomon Islands.

Editing/Nathalie Behring

zones, each encoded in an overall system of classification.

In the classification of a typical *puava*, land (*mati*) and sea (*idere*) are the foundational pairs of complementary zones. The land is further divided into forest (*goana*) and coast (*rarusu*). *Rarusu* is the zone of human settlement and also, on seashore and in mangroves, the transitional zone where land and sea merge through the flow of tides and rivers. Surprisingly, the word *mati* (land) re-emerges here as the overall term for near-shore shallow reefs and mangrove areas (the latter termed *petupetuani*, after *petu* “mangrove tree”), with reference to the anomalous position of these zones in terms of sea (*idere*). Thus *rarusu* is a central focus of the *puava*; it is also invariably referred to as being located “below” (*pa peka*) relative to the forest (which is elevated also literally) and to the sea, both of which are “above” (*pa ulu*). From the coast or village, one moves up to the forest, but also up through the lagoon (*kogu*) to the raised barrier

reef islands (*toba*) that define the lagoon and are separated by passages to the open sea (*kolo*). Conversely, when located up in one of these more remote zones, one moves down to the mainland coast again.

The overall zone of forest or bush (*goana*) escapes the classificatory ambiguity of the coast and is divided in a straightforward spatial sequence into coconut groves (*ngochangocharaini*, after *ngochara*, “coconut tree”), swidden garden areas (*chigochigoani*, after *chigo* “garden”) some of which may be at any time under fallow, special cultivated groves of nut trees (notably of the ritually important *Canarium* nuts) called *buruburuani* (after the name for *Canarium* tree), and successively more remote zones named after typical vegetation or topography. This classificatory diversity culminates in *goana piru*, literally “wild forest”, assumed never to have been significantly disturbed by human activity and, unless logged by recent commercial operations, remaining as hunting

grounds. A special category of *goana piru* is *goana pa togere*, “mountain forest”, an environment of ridges and peaks whose stunted and tangled vegetation is regarded as inhospitable to humans and game animals alike. In the Marovo language, the concept of *soloso* refers to these far inner lands of mountains, peaks and steep ravines, while also being the term for “large mountainous island” and indeed, in an extended sense, “the world”. The latter sense reflects some long-standing views that a sizeable volcanic island and its reef-and-lagoon surroundings is a total foundation for the localised existence of people, plants, and animals. In this sense *soloso* is directly opposed to the equally remote, yet more unlimited, domain of *kolo* (the open ocean).

As an area of extraordinary marine and terrestrial biodiversity, the Marovo Lagoon is the focus of a similarly rich body of indigenous knowledge of these environments and their bountiful offerings to human existence. While the overall breadth of biodiversity and knowledge may be greater in Marovo than in most other places in Oceania, the Marovo example demonstrates typical patterns for all Pacific Islands with respect to the integration between land and sea in human life-worlds. To summarise (I refer to Hviding 2005 for details), Marovo repertoires for talking about land, reefs, and sea and the non-human occupants of these environments are composed of a basic vocabulary of names for 500 plants, 70 birds, 350 fish, and 100 marine shells. Added to this are some 50 distinct terms for forest types, land topography and freshwater systems, and more than 70 separate terms for reef types and underwater and coastal topography, as well as innumerable designations for the habitual whereabouts of specific species of marine and terrestrial life. For example, reef-related terms and names for specific reefs convey much information valuable for fishing by differentiating between a great number of distinct forms of fish habitats requiring one or another of about 80 common fish-catching techniques (Hviding 1996, chapter 6), most of which are still practised around the Marovo Lagoon.

Whereas *saghauru* is a generic term for “reef” (as is *goana* for “forest”), knowledge of the great repertoire of named reef zones and bottom types converges with knowledge about the migration patterns and seasonal aggrega-

tions of important food fishes – not unlike the way in which the complementary repertoire of land-related terms for forest zones and topography guides the hunter and crop cultivator in their search for game, wild honey, medicinal plants, and good plots for new gardens. Furthermore, lowland and coastal forest provide reliable seasonal indicators to guide everyday fishing. The abundance of flowers, the ripening of fruits or the reddening and shedding of leaves are known to coincide with the times of certain important food fishes to spawn, to have a lot of desired body fat, or to aggregate for feeding purposes in certain places. Such fishing-related knowledge, in many cases species specific, is superimposed on cyclical calendars composed of lunar phases, tidal stages and wind directions, and an experienced fisherman’s store of such knowledge tends to make fishing a very predictable affair in which every fishing trip is far from opportunistic, but geared towards the capture of just a few target species.

Marovo classification of plants, fish, shells, snakes, birds, and more includes a very large repertoire of lower level taxa (largely corresponding to scientific species) grouped into fewer, more inclusive categories. Fundamentally, the concept of *ria tingitonga todi* (living things) includes all small and large organisms that move in sea or air, on reef or land, as well as non-moving organisms (plants and plant-like) of the sea and land. The major Marovo categories of living things that move are presented below:

- *Ihana* (fish): All marine and freshwater fish, including also marine mammals, and in the widest sense all other swimming organisms such as turtles, squid, jellyfish, and so forth.
- *Oloko* (bird): All birds, also including bats. This term is further significant on a higher level of life-form classification, since it also serves as an all-encompassing term for birds and land animals, embracing the more specific term *mademaheledi* (see below). In this sense, *oloko* corresponds to the pan-Oceanic term *manu*, which in most Austronesian languages of Oceania applies primarily to birds and secondarily to birds and land animals. Significantly in this regard, *oloko* is *maunu* in Vangunu, a language which is spoken on the south coast of the large island of Vangunu in central Marovo, and which is closely related to

the Marovo language. It is interesting, moreover, that flying insects are subsumed under the general term *ololoko*, formed by reduplication from *oloko* and signifying smallness compared to birds.

- *Mademaheledi* (four-legged being): All four-legged animals – mammals and reptiles – that move on the land and climb in trees, including both indigenous and introduced ones.
- *Noki* (snake): All snakes of land and sea, including certain eels with a snake-like appearance. As for *oloko/ololoko*, there is also the duplicated term *nokinoki*, which refers to small worms that burrow in the ground or infest garden crops.
- *Chebechebe* (insect): All ants, beetles, and other small insects that move on the ground and climb in the vegetation, except insects that fly (which are *ololoko*).

Organisms are distinguished or grouped together in various additional ways, with habitat and means of locomotion as particularly important criteria. These somewhat more flexible criteria for classification provide the basis for several chapters of the Marovo *Environmental Encyclopedia* (Hviding 2005). There are no equivalents in Marovo classification for many western scientific higher order taxa in the animal kingdom, such as mammals, reptiles, crustaceans and molluscs. Nevertheless, Marovo people do recognise that similarities exist among, say, molluscs – at least bivalves (shells) and gastropods (snails). This leads, for example, to the inclusion of the “living things” in both these larger categories of invertebrates in the Marovo gloss of *ria tingitonga pu mea, doku oro napata pa saghauru, pa rarusu oro pa petupetuanani* (the creatures that move as if by tongue across, perch on, or are attached to, the reef, the coastal zone and the mangroves).

Similarly, crustaceans (which in Indo-Pacific beach biotopes live on land as well as in the sea) are subsumed under the expression *ria tingitonga pu ko maheledi madi ene oro reresu pa rarusu, pa petupetuanani oro pa mati katigae* (the creatures equipped with legs that walk or run in the coastal zone, in the mangroves, and some even on land). This implies that land crabs are different from other land-dwelling creatures mainly by their perceived relation to crabs of the sea. In this respect, the most inclusive chapter in the *Environmental Encyclopedia* contains the

names and stories of *tongania tingitonga todi pu haba oro ene pa puava oro keba pa hae* (all living things that creep or walk on the ground or climb in trees), exemplified as *noki, erebachi, moa, binahere, oro na paragoa* (snakes, monitor lizard, pig, cuscus, and frogs). From the Marovo perspective there is an inherent logic in classing together categories such as *noki* and *mademaheledi* (see above), since they are all creatures of some significant size that move about on the land or in trees and are, above all, distinguishable from the myriad of smaller creatures of land and trees (exemplified as *deri, lipata oro na pepele* “mosquitoes, centipedes, and butterflies”, covered by the subsequent chapter of the book).

For plants, Marovo classification is very rich in taxa, but follows a rather more simple structure, with four general categories that relate fairly well to similar domains of western botany:

- *Hae*: tree
- *Rikiroko*: leafy shrub
- *Adoso*: vine (both climbing and creeping species)
- *Checheu*: grass (low herb)

These general categories of growing things (a domain which itself is included in that of “living things”) are to varying degrees subdivided. For example, important categories of *hae* (tree) are:

- *Hae piropiro* (gingers): literally, “tree of *piropiro* type, i.e. *Alpinia* spp.”, referring to *piropiro* as the essential prototype of tall woody gingers.
- *Huhua hae ivu* (bamboos): literally “tree similar to *ivu* ‘*Bambusa vulgaris*’”, referring to the large *ivu* as the essential prototype of bamboos.
- *Huhua hae pijaka* (palm tree): literally “tree similar to *pijaka* ‘*Areca catechu*’”, referring to the *Areca* betel-nut palm as the local prototype of palm trees.

Marovo people’s knowledge of the environments of sea, reef and rainforest is dynamic and constituted in an ongoing process of transmission, individual learning and collective wisdom. For example, through the wealth of terms and concepts relating to the marine environment, the people of Marovo organise their knowledge of the migration patterns and seasonal aggregations of important food fishes. A pattern thereby

emerges of rotational exploitation of fishing grounds and target species that may have a long-term conservation potential (this was precisely the issue addressed by the work I carried out in 1987 with the late R.E. Johannes on local knowledge of spawning aggregations, referred to above).

Land-related terms for forest zones and topography guide the hunter and crop cultivator in their search for game, wild honey, medicinal plants, and good plots for new gardens. Environmental knowledge is rather equally distributed in terms of both gender and age, since both men and women work on both sea and land, but experienced men possess more fishing-related knowledge, and experienced women more plant-related knowledge. Certain subfields of environmental knowledge are less widely distributed. Few men know nearly as much as the average adult woman about the shellfish resources of mangrove swamps and shallow reefs. The highly sophisticated knowledge and ritual practice that provide the foundations for the seasonal capture of sea turtles, dugong, and open-sea tuna – all highly prestigious ceremonial foods (and “flagship species” on the international biodiversity conservation scene) – are kept (and sometimes rather jealously guarded) by a few senior men only. Similarly, the detailed knowledge of food crop cultivars and of herbal medicine tends to be the privilege of renowned female experts.

Marovo Lagoon is a place of extraordinary biodiversity and remarkable cultural history, and the latter implies that the area is not in any sense “pristine” in terms of human effects on the ecosystem. In the Marovo example, an environment perceived by environmentalists as pristine may actually be man-made. One prominent case in point is the lowland forest now exploited by logging companies and quite often referred to by authors of environmentalist documents on the Marovo Lagoon as being virgin rainforest. Until the early twentieth century the Marovo Lagoon was the scene of large-scale maritime exchange and predatory warfare and the hub of a regional economy based on irrigated agriculture and inter-island trade (Hviding and Bayliss-Smith 2000). It is likely that populations of past centuries were far higher than the 13,000 people or so who inhabit the lagoon villages today, and recent multidisciplinary research in fact indicates

that what conservationists view as pristine virgin rainforests are in fact old secondary forest, conspicuously dominated by certain large forest trees (particularly *Camposperma brevipetiolata*) notable for their ability to take advantage of canopy disturbance, and enriched by centuries of human intervention from large inland populations in the islands of New Georgia, Vangunu, and Gatokae (Bayliss-Smith *et al.* 2003).

Local stakeholders, knowledge and biodiversity conservation: conflict or convergence?

Biodiversity is not only a scientific construct but also a perception that is locally, and differently, constituted in terms of indigenous environmental knowledge. Given a post-colonial political climate where it is not often feasible for conservation projects to ignore the interests and entitlements of the people living in, using and knowing the area in question – in common jargon of today they have become “local stakeholders” – the need to take into account local ways of looking at the physical environment and what lives there, and the manifold local utilities of all this, becomes all the more urgent. From a view of recent and current relationships in the Marovo Lagoon between local development agendas and the introduced agendas of biodiversity management, there appears to be a potential for much conflict, often based on an ignorance or disregard of the complexities of local people’s environmental knowledge, resource management practices, and economic aspirations. However, the argument may also be made that in this field of encounter between the local and the global, there is at least as much potential for convergence.

There is, for example, a high degree of agreement between local and scientific ways of classifying the living things of land and sea. In fact the majority of Marovo names for marine invertebrates, fishes, reptiles, birds, and plants correspond to a significant degree with Linnaean taxonomy on the levels of family, genus, and even species (Hviding 2005). A prominent group of trees of the forest of the lowland slopes are strangler figs or banyan trees (*Ficus* spp.,

Moraceae). They are all called *kalala* in Marovo, with a further binomial level of eight local taxa defined on the basis of the characteristic shapes of leaves or trunks (such as *kalala labe*, “broad-leaved banyan”, and *kalala johoro*, “stilt root banyan”) or human uses (such as *kalala kuvi*, “loincloth banyan”, whose bark was used to manufacture cloth). Important families of medium-sized to large food fish such as Carangidae (jacks) and Serranidae (groupers) are termed *mara* and *pajara*, respectively; generic terms that correspond completely with the family level of Linnaean taxonomy.

There are no less than 35 different Marovo taxa classed under the *mara* group, and 21 different Marovo taxa are classed as varieties of *pajara*. All fall under the families Carangidae and Serranidae, respectively. In this respect, the local point of view seems to be about as preoccupied with species distinctions as its western scientific counterpart: there is epistemological convergence. However, this is not to say that Marovo views of the coral reef environment, for example, share the interests and preoccupations of marine scientists in every way.

While marine biodiversity in the eyes of the latter, and as presented in standard reference works on the fish of the area (Randall *et al.* 1990), abounds in numbers of distinct species of small colourful reef inhabitants such as butterfly fish (Chaetodontidae), the Marovo system of fish classification lumps all similarly looking small fish of this overall type under the term *kepe*. As they say, it really does not signify to give the endless number of differently coloured varieties of *kepe* different names, because in any relevant sense they are really much the same. Yet Chaetodontidae may safely be said to equal *kepe*, and vice versa.

In another interesting case, the fish family Scaridae (parrotfish) is not given a generic family-level term in Marovo; instead there is a rather chaotic Marovo repertoire of names assigned to some 20 parrotfish, most of which are locally viewed as distinct species, rather similar but, as it is said, “about as differently-looking as people are”. In terms of Linnaean classification, however, many of the distinct Marovo “species” actually refer to differently coloured growth stages or sexual forms of one and the same fish. Admittedly, parrotfish also seem to be a subject of some confusion among taxonomy-oriented marine biologists.

The biodiversity of the reefs and rainforest of Marovo is constructed by the people who live there as an infinitely interesting, complicated world of environmental “affordances” (Ingold 1992) that provide for human needs, given that one has the knowledge and understanding required to find, capture, gather, or otherwise obtain them. The intense empirical interest shown by many men, women, and even children of Marovo in reaching such understanding of the land and sea and the living things in them is representative of a cultural preoccupation that is more widespread, certainly among the peoples of Melanesia, where a profoundly empirical attitude (Ernst 1991) has been noted by several observers. Scientists, managers, and environmentalists engaged in biodiversity conservation are well advised to engage in such fields of potential epistemological convergence and everyday enthusiasm (Hviding 2003b). That outside agents reach an informed appreciation of, and healthy respect for, the ways in which local stakeholders view the environments and resources “at stake” would seem to be a precondition for reaching a meaningful level of dialogue about how conservation may take place with the support and participation of those who know and use, and in many places also own, the diverse biotope(s).

As reported by anthropologist Shankar Aswani and his associates, successful recent implementation of conservation measures for marine resources in the Roviana and Vonavona lagoons (on the opposite side of New Georgia from Marovo), focused on selected “flagship species” and on a number of marine protected areas, has required not just a project leader with solid linguistic and cultural competence acquired through years of field research. It has also involved the active integration of existing traditional management measures, and close dialogue with local knowledge about the species and biotopes concerned, as well as scientific tools such as GIS and – perhaps most importantly – the long-term backing of locally powerful leaders (Aswani and Hamilton 2004; Aswani and Lauer 2006).

Certainly in the Melanesian situation, there appear to be few short-cuts to such multi-level collaboration, and since social life on the ground is inherently complex and unpredictable (at least in the eyes of those with ambitions of consistent scientific rigour), conservation plans that involve the screening-off of part of people’s

resources are by necessity embroiled in local fields of dispute.

My own long-term observation over two decades of the often bewildering scene of contested conservation initiatives for the Marovo Lagoon has enabled me to watch how major international environmentalist organisations have risen and then fallen as their simplistic concept of “community” proved soundly incompatible with the Marovo people’s time-honoured ways of organising themselves (Hviding 1996, 2003a; Hviding and Bayliss-Smith 2000). I have also had the opportunity to follow a twisting and tangled path of negotiations concerning the possible UNESCO World Heritage status for the lagoon and its surrounding lands (a goal never reached, since the issues of local autonomy over the lagoon and rainforest, and of alternative incomes to rival timber royalties from logging companies, were never taken up seriously).

Until this day, the troubled biodiversity hotspot of Marovo Lagoon continues to see an influx of new, well-funded conservation projects and research teams from overseas institutions. Since the international scene for funding biodiversity conservation (at least, if it is proposed for places where people already live) requires a politically correct commitment to “community collaboration”, the land-and-sea-holding groups that reside in some Marovo villages have over the years developed into shrewd “communities”, some even with their own written policy documents on conservation and “sustainable community development”, and are open to hosting a never-ending succession of imported biodiversity-focused projects of research and conservation. Such enthusiasm for new projects actually reflects a prominent trend in the area’s cultural history (see Hviding 1996, chapter 3), whereby dwellers of the lagoon seashores have tended to receive more or less expected arrivals of people, objects and ideas not with xenophobia (fear of strangers) but rather with what might be termed “xenophilia” (affection or desire of the unknown).

It should be noted here that some of the most highly profiled “project-friendly communities” (Hviding 2003a) are actually the villages of *butubutu* whose territorial holdings are predominantly marine, not terrestrial: so-called salt-water people who have limited rights to land, are only minor stakeholders on the logging scene, and are concerned that logging on the

lands of their neighbours threatens their lagoon and reefs with sedimentation.

On this contemporary scene, new internationally funded projects “inherit”, as it were, “host communities” from failed international projects, as exemplified most recently by a high-profile marine ecosystem health programme launched in central and southern Marovo Lagoon by the University of Queensland, Australia, which superseded a largely defunct UN-funded activity in marine conservation. In a conversation I had in September 2005 with the newly elected Premier of the Western Province of Solomon Islands (himself a man from Marovo), he expressed the concern that so many overseas initiatives continue to be launched in the Marovo Lagoon, yet still with so few tangible results, and that maybe new proposed projects should now be channelled into other, more needy corners of the province, localities in which no research or conservation has so far been launched but where the environmental effects of logging operations are just as bad.

From wide experience of participating in, as well as studying, conservation projects in the Pacific Islands and elsewhere, Foale and Macintyre (2004, p. 1) comment in a article entitled “Fujichrome green” on the influential role played by colourful photographic images in the quest for funds among environmentalist organisations:

Colour photography is perhaps the most important funding tool for the biggest environmental NGOs. From the breathtakingly beautiful portraits of colourful or endangered fauna, to quaint thatch-roof villages and ceremonially painted natives, to confronting scenes of logging, or polluted seascapes, these dense and evocative images, with all their implicit assumptions, are skilfully deployed to manipulate donors and subscribers into handing over the cash for the good cause. But the images frequently hide less glamorous realities and play upon racist and profoundly unscientific ideas about people and ecosystems. They also form part of an anti-development agenda that opposes and actively subverts the aspirations of the owners of the ecosystems being represented. In many ways the images are no less disingenuous than a Coke advertisement.

The alternative to an appreciation of local ways of looking at things and to attempts at immersion into a messy social environment – much less controllable than the natural one – will be a superficial, romanticised (or demonised) view of “traditional” peoples living in areas deemed to

have biodiversity conservation value, or alternatively, the outright filtering-out of human presence from one's perception of areas of conservation value. A case in point is a major study (commissioned by the Australian Parks and Wildlife Service) of Solomon Islands rainforest biodiversity that recommended the establishment of more than 20 forest reserves in the country, while largely failing to deal with the fact that all the forests proposed for reserves were already owned by Solomon Islanders (Hviding and Bayliss-Smith 2000, pp. 291–300; Lees *et al.* 1991). Granted, the senior author of the study does take a somewhat more informed view of local land owners, and dilemmas faced by them in development, in a later publication (Lees 1993).

To return to my introductory remarks: unlike Needham's blind person who, given sight, is exposed to a chaos of new impressions and challenged to sort them out, the specialised scientists or morally motivated environmentalists who descend on a tropical locale with pre-existing

views that hold little room for new (and possibly chaotic) influences reach but little expansion of their understanding, whether scientific or moral. They also deny themselves a mutual engagement with the people of the place in the kind of deep empirical quest alluded to above, in which local knowledge and western science have a potential for convergence in their shared interests in and different, yet complementary classifications of that which constitutes biodiversity (see Hviding 2003b). Let me express the hope that the *Environmental Encyclopedia* (Hviding 2005) now available to the people of Marovo (and to non-Marovo speakers who wish to gain entrance into this complex and fascinating view of the tropical island environment) will promote such dialogue and convergence, exemplifying more general potentials for meaningful connections between western science and environmentalist agendas and the knowledge and aspirations of the people whose environment and resources are the target of biodiversity conservation.

References

- ASWANI, S., AND HAMILTON, R. 2004. "Integrating indigenous ecological knowledge and customary sea tenure with marine and social science for conservation of bumphead parrotfish (*Bolbometopon muricatum*) in the Roviana Lagoon, Solomon Islands", *Environmental Conservation*, 31 (1), 69–83.
- ASWANI, S., AND LAUER, M. 2006. "Incorporating fishers' local knowledge and behaviour into geographical information systems (GIS) for designing Marine Protected Areas in Oceania", *Human Organization*, 65 (1), 85–101.
- BAINES, G. B. K., AND HVIDING, E. 1992. "Traditional environmental knowledge from the Marovo area of the Solomon Islands", *In*: Johnson, M., ed. *LORE: Capturing traditional environmental knowledge*. Ottawa: International Development Research Centre, 92–110.
- BAYLISS-SMITH, T. P., HVIDING, E., AND WHITMORE, T. C. 2003. "Rainforest composition and histories of human disturbance in Solomon Islands", *Ambio*, 32 (5), 346–352.
- BERLIN, B. 1992. *Ethnobiological classification: principles of categorization of plants and animals in traditional societies*. Princeton, NJ: Princeton University Press.
- BIODIVERSITY, SCIENCE AND GOVERNANCE 2005. Available online at <http://www.recherche.gouv.fr/biodiv2005paris/en/atelier13.htm> (Accessed 27 October 2006).
- BROSIUS, J. P. 2003. "The forest and the nation: negotiating citizenship in Sarawak, East Malaysia", *In*: Rosaldo, R., ed. *Cultural citizenship in island Southeast Asia: nation and belonging in the hinterlands*. Berkeley, CA: University of California Press, 76–133.
- CONKLIN, H. C. 1957. *Hanunóo agriculture: a report on an integral system of shifting cultivation in the Philippines*. Rome: Food and Agricultural Organization of the United Nations.
- DURKHEIM, É., AND MAUSS, M. 1903. "De quelques formes primitives de classification. Contribution à l'étude des représentations collectives", *Année Sociologique*, 6, 1–72.
- ELLEN, R. 1993. *The cultural relations of classification: an analysis of Nuaulu animal categories from central Seram*. Cambridge Studies in Social and Cultural Anthropology, 91. Cambridge: Cambridge University Press.
- ERNST, T. M. 1991. "Empirical attitudes among the Onabasulu",

- In: Pawley, A., ed. *Man and a half: essays in Pacific anthropology and ethnobiology in honour of Ralph Bulmer*. Auckland: The Polynesian Society, 199–207.
- ESCOBAR, A. 1999. "After nature: steps to an anti essentialist political ecology", *Current Anthropology*, 40 (1), 1–30.
- FOALE, S. 2001. "Where's our development? Landowner aspirations and environmentalist agendas in Western Solomon Islands", *The Asia Pacific Journal of Anthropology*, 2 (2), 44–67.
- FOALE, S., AND MACINTYRE, M. 2004. "Fujichrome green: the photographic fetishization of biodiversity by environmentalists", *Resource Management in Asia–Pacific Working Paper*, 54. Canberra: Research School of Pacific and Asian Studies, Australian National University.
- HVIDING, E. 1996. *Guardians of Marovo Lagoon: practice, place, and politics in maritime Melanesia*. Pacific Islands Monograph Series, 14. Honolulu: University of Hawai'i Press.
- HVIDING, E. 2003a. "Contested rainforests, NGOs and projects of desire in Solomon Islands", *International Social Science Journal*, 55 (4), 439–453.
- HVIDING, E. 2003b. "Between knowledges: Pacific studies and academic disciplines", *The Contemporary Pacific*, 15 (1), 43–73.
- HVIDING, E. 2005. *Kiladi oro vivineidi ria tingitonga pa idere oro pa goana pa Marovo|Reef and rainforest: an environmental encyclopedia of Marovo Lagoon, Solomon Islands*. Knowledges of Nature Series, No. 1. Paris: UNESCO.
- HVIDING, E., AND BAINES, G. B. K. 1994. "Community-based fisheries management, tradition and the challenges of development in Marovo, Solomon Islands", *Development and Change*, 25 (1), 13–39.
- HVIDING, E., AND BAYLISS-SMITH, T. 2000. *Islands of rainforest: agroforestry, logging and ecotourism in Solomon Islands*. Aldershot: Ashgate.
- INGOLD, T. 1992. "Culture and the perception of the environment", In: Croll, E. and Parkin, D., eds *Bush base, forest farm: culture, environment and development*. London and New York: Routledge, 39–57.
- JOHANNES, R. E. 1981. *Words of the lagoon: fishing and marine lore in the Palau district of Micronesia*. Berkeley, CA: University of California Press.
- JOHANNES, R. 1989. "A spawning aggregation of the grouper, *Plectropomus areolatus* (Rüppel) in the Solomon Islands", In: Choat, J. H. et al., eds *Proceedings of Sixth International Coral Reef Symposium*. Townsville, 751–755.
- JOHANNES, R. E., AND HVIDING, E. 2000. "Traditional knowledge possessed by the fishers of Marovo Lagoon, Solomon Islands, concerning fish aggregating behaviour", *Traditional Marine Resource Management and Knowledge Bulletin*, No. 12, 22–29.
- LEES, A. 1993. "Melanesia's sacred inheritance", In: Kemf, E., ed. *Indigenous peoples and protected areas*. London: Earthscan Publications, 69–76.
- LEES, A., GARNETT, M., AND WRIGHT, S. 1991. *A representative protected forests system for the Solomon Islands*. Nelson, New Zealand: Maruia Society, for Australian Parks and Wildlife Service.
- MAJNEP, I. S., AND BULMER, R. 1977. *Mnmon yad Kalam yakt: birds of my Kalam country*. Auckland and Oxford: Auckland University Press and Oxford University Press.
- NEEDHAM, R. transl. and ed. 1969. "Introduction", In: Durkheim, É., and Mauss, M., *Primitive classification*. 2nd edn. London: Cohen and West, vii–xlvi.
- NEUMANN, R. P. 1997. "Primitive ideas: protected area buffer zones and the politics of land in Africa", *Development and Change*, 28 (3), 559–582.
- RANDALL, J., ALLEN, G. R., AND STEENE, R. C. 1990. *Fishes of the Great Barrier Reef and Coral Sea*. Honolulu: University of Hawai'i Press.
- WALLEY, C. J. 2004. *Rough waters: nature and development in an East African marine park*. Princeton, NJ: Princeton University Press.