Marine Ethnobiology: A Foundation for Marine Science Education in the Pacific Islands

Randolph R. Thaman

It is suggested here that one of the most exciting possibilities for improving marine science education at all levels, could be to take our students into their marine environment to study marine ethnobiology and its relationship to marine biodiversity. If we do so it may make marine education much more interesting and much more relevant in the rapidly changing small island states of the Pacific Ocean. To examine this possibility we must first define the concepts of "marine biodiversity", "marine ethnobiology" and the "marine environment".

"Marine biodiversity" (short for marine biological diversity) is defined as: all ecosystems and plant and animal species, including humans, found in the marine environment. "Marine ethnobiology" is defined as: the study of uses, practices, knowledge, beliefs and language that a given culture has concerning its marine biodiversity. In more general terms, marine ethnobiology is the study of the interrelationship between a culture and its living marine environment. The "marine environment" is defined as those areas which are permanently under the direct influence of the sea. Such areas include: 1) entire atolls and small islands which are constantly affected by sea spray, tidal effects or wave action; 2) coastal areas and lower tidal reaches of rivers and streams of larger islands; and, 3) all marine ecosystems within the exclusive economic zones (EEZ) of Pacific Island countries. Examples of marine ecosystems include mangroves, algal and seagrass beds, beaches, a range of reef and lagoon types, estuaries, offshore slopes, terraces, shelves, canyons, sea mounts, abyssal plains and the open ocean, plus, subsets of these, such as seabird rookeries, sea turtle nesting areas, currents and upwelling systems in the ocean.

To truly appreciate what biodiversity really means to Pacific societies, it is useful to identify the main classes or categories of living things (organisms) that might be found in different ecosystems, and which could be the focus of study by our students. An attempt to do this is shown in Table 1. Although there are other types of living things and more "scientific" ways of classifying them, the system presented is an attempt at providing a basic system that could be used by students and teachers to focus their attention on the diversity of biological resources found in "their" ecosystems.

From such a perspective, it can be seen that the "biodiversity" of almost all island ecosystems would be considerable, and constitutes an educational resource that biologists in colder temperate countries or inland locations would love to have.

The educational possibilities and the relevance for Pacific societies that have depended on these resources for thousands of years become even more exciting, however, for both teachers and students if we incorporate ethnobiology into our teaching, i.e. if we also focus on the cultural uses, knowledge and beliefs that Pacific societies have of their marine biodiversity. One way of doing this is to have different students or groups of students focus on the ethnobiology of specific types of living things. For example, just as we can break down marine biodiversity into numerous categories, marine ethnobiology can also be broken down into many interesting subdisciplines. These subdisciplines include marine ethnobotany (the ethnobiology of marine plants) and marine ethnozoology (the ethnobiology of marine animals).

These ecosystems include some of the most interesting and most accessible areas found in the islands. They are ready-made living laboratories, at the doorsteps of many of our island schools.

Table 1

Class	Sub-Classes	Specific Types	Utility
Lower Lifeforms		Bacteria	E,s,c
		Viruses	E,s,c
Plants	Indigenous	Phytoplankton	E,s,c
	Aboriginal Introductions	Algae	E,S,C
	Recent Introductions	Fungi	E,S,c
	Wild Plants	Mosses	E,s
	Domesticated Plants	Other Lower Plants	E,s,c
	Food Plants	Ferns	E,S,C
	Non-Food Plants	Herbs/Forbs	E,S,C
	Terrestrial	Grasses/Sedges	E,S,C
	Freshwater	Vines	E,S,C
	Marine	Shrubs	E,S,C
		Trees	E,C,C
Animals	Indigenous	Protozoa	E,s,c
	Aboriginal Introductions	Zooplankton	E,s,c
	Recent Introductions	Sponges	E,s,c
	Wild Animals	Corals	E,S,c
	Domesticated Animals	Jellyfish	E,S,c
	Food Species	Worms	E,S,C
	Non-Food Species	Molluscs	E,S,C
	Terrestrial	Insects	E,C,C
	Freshwater	Crustaceans	E,S,c
	Marine	Echinoderms	E,S,C
		Holothurians	E,s,c
		Other Invertebrates	E,S,C
		Fish	E,s,c
		Amphibians	E,S,C
		Reptiles	E,S,C
		Birds	E,S,C
		Non-Human Mammals	E,S,C
		Humans	E,S,C

Classes, sub-classes, specific types and utility of resources found in Pacific Island marine and coastal ecosystems (Under "Utility", E, S and C = direct major Ecological, Subsistence or Commercial or Export utility to people at the community *and* national level in Melanesia, Polynesia or Micronesia, and e,s and c = minor or indirect ecological, subsistence or commercial/export importance, e.g. plankton is of indirect importance to commercial tuna fishing in terms of its importance in marine food chains; it must be stressed that organisms in some categories may also be harmful or have a negative impact on sustainable development, e.g. pathogenic virus or bacteria, malarial mosquitos, etc.)

These can be further broken down into more specialised fields of study, such as marine ethnophycology (study of algae or seaweeds), ethnomalacology (shellfish), ethnoornithology (sea birds), ethno-ichthyology (finfish), and ethno-herpetology (reptiles); groups of organisms, e.g., seaweeds, tunas, noddy birds, sharks or cowries; or the study of the cultural importance of an individual species, e.g., the edible seaweed or sea grapes, known in Fiji as *nama,* the octopus, the hawksbill turtle, the sperm whale or the reef heron.

Taking such an ethnobiological approach also opens the door, for the involvement in marine education, to older women and men, the traditional Pacific Island biologists and ethnobiologists, who are the holders of valuable knowledge accumulated over thousands of years in their marine environment. Such an innovative approach, which is so widely mentioned as a possibility, but so rarely employed, would not only make marine education more meaningful for our students, but would also serve to enrich the knowledge of urban-based and urban-educated teachers, as well as serving to give due recognition to traditional science.

In taking such a practical approach with my biogeography students at the University of the South Pacific, I have found that the students performed much better, were more enthusiastic, and began to understand, in concrete, familiar terms, what marine biodiversity is and why it is so important to the cultural integrity of their people. For example, preliminary results of community-level, MacArthur Foundation (Chicago)-funded studies by USP students in the coastal villages of Ucunivanua and Kumi in Verata Tikina, about 30 kilometres from Suva, revealed that the villagers eat or sell commercially 7 seaweed species, 199 invertebrate species, 210 finfish species and 3 turtle species. The invertebrates include 2 coelenterates, 1 annelid worm, 2 sipunculid sea worms, 18 echinoderms (17 sea slugs or bêche-de-mer and 1 sea urchin), 143 molluscs, 3 cephalopods and 25 crustaceans. The finfish include 17 sharks or rays (Class Chondrichthys) and 184 true finfish (Class Osteicthys). The turtles include the hawksbill, green and leatherback turtles.

The students also identified a wide range of bait species, which are important in the local food system and to the success of both small- and large-scale fishing. These include a wide range of bait-fish species so critical to the success of the pole-and-line tuna fishery, a range of small crustacea, including hermit crabs, and the blood worm or *sewasewa* (*Marphysa sanguinea*) one of the main species used as bait by women in nearshore linefishing.

Studies of the utilisation of marine resources in the same villages, by two USP post-graduate students Aliti Vunisea and Kelvin Passfield, show that the sale of marine foods is the main source of cash and non-cash (subsistence) income in the area. Passfield (1994) has estimated the resource to be worth in excess of F$500,000 annually, if account is taken of both the subsistence and commercial harvest of Ucunivanua and the other six settlements in the area, including an estimated F$190,000 which is harvested from the area by "licensed" outside fishermen. Vunisea (1994) has stressed the critical role that women play in fisheries production, particularly in the exploitation of the extensive shellfish resources of the area.

In short, this extensive range of marine food products and the knowledge relating to their acquisition constitutes only one example of how biodiversity is not only a vast economic and cultural resource, but also a vastly unexploited educational resource. It is, thus, suggested that the incorporation into our curricula at all levels, with particular emphasis on in-the-field, with-the-people studies of such marine ethnobiological knowledge, could significantly enrich and make more meaningful our attempts to incorporate marine education into the curriculum.

By involving women and men from local communities in the formal education systems we can both enrich the educational experience of Pacific Island students as well as protect and possibly preserve the wealth of traditional knowledge that is currently being ignored by most modern scientists.

The importance of preserving such knowledge is of particular importance because, whereas the classifications and knowledge of Western and Eastern taxonomists have been

committed to paper and will hopefully never be lost to humanity, as we sit here, similar knowledge for the rural peoples of the tropical Pacific Islands, who still maintain an essentially oral culture, is being lost forever as the old women and men of Nauru, Pohnpei, Marshall Islands, Kiribati, Tahiti, the Cook Islands, Niue, Samoa, Fiji and other Pacific Islands pass away, taking with them their ethnobiological treasure chests. Just as we can never bring back an extinct species, once lost, this biocultural inheritance is lost forever, and with it the potential for the sustainable management of marine bio-diversity in the Pacific Islands.

In the end, "biodiversity", as a concept, only exists in the human mind, and if the humans in the Pacific Islands lose their knowledge about, and language for their biodiversity, their rich island biocultures will be doomed to obsolescence and extinction. Moreover, it might also be argued that if marine ethnobiological knowledge is not included in the curriculum, Pacific Island societies will probably follow the same paths to BIOCULTURAL SUICIDE that other nearsighted and ecologically-blind societies have followed. In other words, they will lose their love for, links to and understanding of their rich marine environment.

References

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