Protection of Sea Turtle Habitat and Prevention of Exploitation: A Philippine Emphasis

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The Philippine Islands have traditionally provided an extensive habitat for sea turtles. Taylor (1921), quoting seventeenth-century Spanish accounts, infers dense populations of sea turtles of "great size." The 7000-island archipelago with its 18,000 km coastline is endowed with beaches, mangrove lagoons, protected reef areas, and estuarine lagoons, all suitable for use by sea turtles for nesting, mating, feeding, and basking (See Fig. 1).

Sea turtles and their products are known throughout the archipelago; yet today turtles are rarely observed in coastal waters of the central Philippines, aquatic researchers from Silliman University have found. Interviews of coastal residents and turtle sightings by only one of every ten scuba divers contacted confirm their scarcity (Alcala, 1980). There are still a few locations where turtles are numerous, for example, in the Turtle Islands of the Sulu Archipelago. Domantay (1953) reported for five years following World War II 433,223 to 963,473 eggs per annum gathered from the Turtle Islands. Current egg harvesting is not recorded but thought to be reduced. Lesser numbers of turtles occur around Palawan Island and its many islets, Negros Island, parts of Mindanao, and other small island groups in the southwestern region (Gomez, 1979).

Normally, small numbers or single turtles are sighted. The Green Turtle, *Chelonia mydas*, is most commonly observed; the Hawksbill Turtle, *Eretmochelys imbricata*, is much more rarely encountered. The Leatherback Turtle, *Dermochelys coriacea*, while occasionally observed, is not known to nest in the Philippines. Domantay (1953) indicates *Chelonia mydas* accounted for 99% of the turtle nests checked during his survey in the Turtle Islands. Alcala (1980) observed at least equal numbers of *E. imbricata* in the central Visayas but with infrequent sightings. An early (1624) account from Taylor (1921), "the fisheries of fine-shelled turtles [Hawksbill?] are also abundant...," may be evidence for a larger Hawksbill population, compared to present Green Turtle domination.

Turtles are actively hunted for their meat, eggs, and shell. An extensive export industry once thrived on turtle shells, stuffed turtles, handcrafted products from turtle shells, and turtle oil. Since 1980, the killing of sea turtles, collecting of their eggs, and exporting turtle products have all been illegal. The current scarcity of turtles makes most of these illegal activities economically unfeasible, but nesting turtles continue to

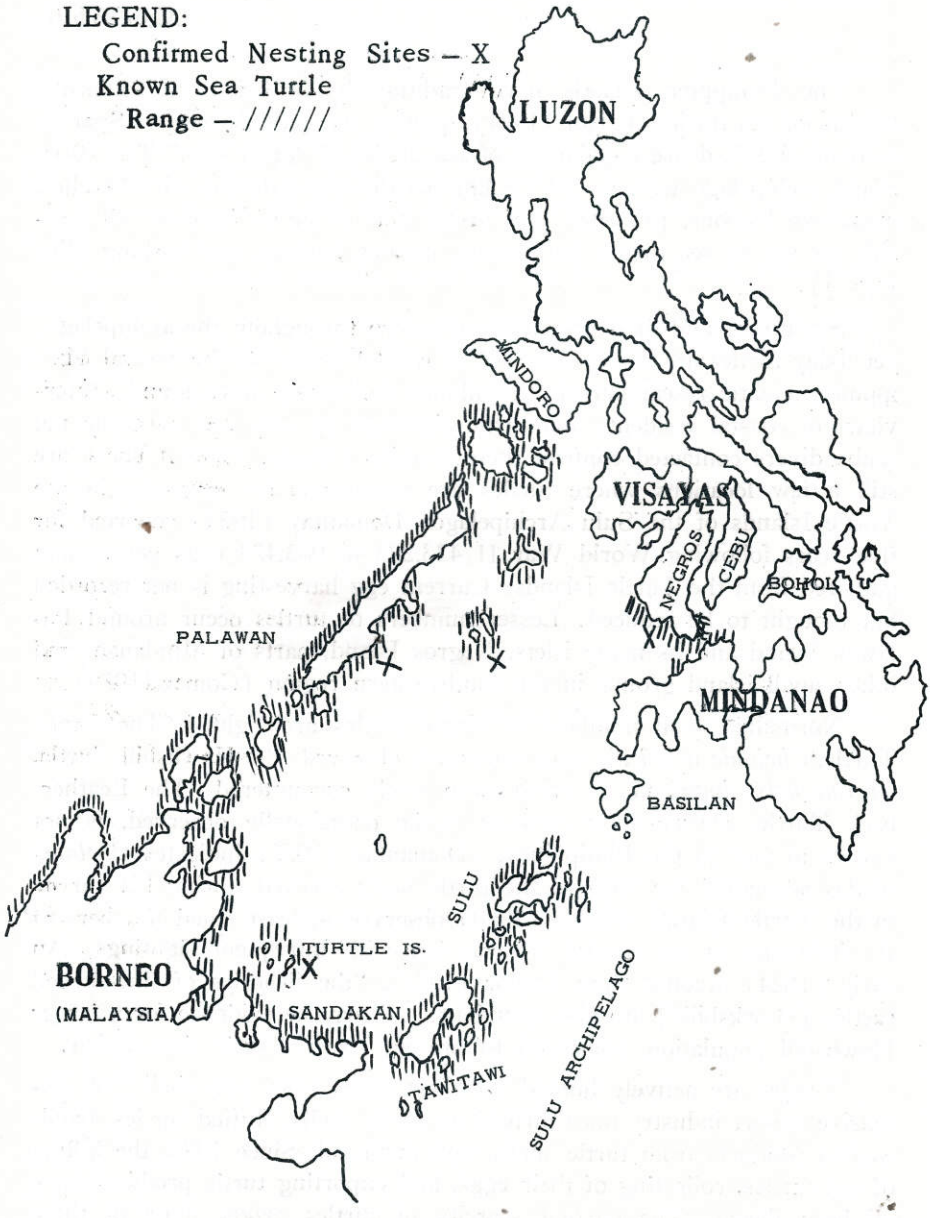

Figure 1. Map of the Philippines showing prime sea turtle nesting areas.

be collected for local consumption and possibly as sale items for the tourist market (personal observation; Alcala, 1980).

Sea Turtle Habitat Characteristics and Requirements

The Green Turtle, *Chelonia mydas,* occupies an oceanic and estuarine habitat and appears to prefer shallow water inside reefs, shoals, and lagoons with marine grasses and algae. The Green Turtle has also been shown to be a long distance migrant (William, 1976). The Hawksbill Turtle, *Eretmochelys imbricata,* is found in shallow or oceanic waters, coral reefs, shoals, lagoons and lagoon channels, and bays, and appears to be a regional animal rather than a migrant. Alcala (1980) emphasizes this turtle's association with coral reefs, The Leatherback Turtle, *Dermochelys coriacea,* is an open-ocean, deep-water species occasionally found in bays and estuaries, and is considered the most oceanic of the marine turtles. All marine turtles are linked to the shore, where nesting occurs (Shabica, 1979b).

The Green Turtle will be used here as an example of nesting habits. This most common Philippine turtle is also the most observed in other parts of the world. Bustard (1972) has personally observed hundreds of these turtles and noted the following habits. Green Turtles lay their eggs in soft sand, choosing a site above the high tide line where the sand is dry. They excavate a deep pit, and lay an average of 110 eggs before covering the eggs with sand; average nesting time is three hours. This turtle normally only emerges from the water under cover of darkness, coming ashore one hour before to two hours after high tide. The turtles appear nervous upon leaving the water but as they climb the beach become more tolerant to the presence of other animals or man. The Green Turtle markedly favors beaches with a deep-water approach and which lack bands of beach rock. On its first approach, a turtle may wander all night without finding a suitable spot, or may eventually encounter a log or obstruction near which a pit is excavated. Gibson (1979) suggests that the attractiveness of a beach might be related to its size as seen from the sea. The amount of energy required and level of exertion to accomplish nest excavation must be high; it is not uncommon for a female to die, presumably of heart failure, during the nesting process (Bustard, 1972).

Basking and mating of these turtles usually occurs in quiet water, inside reef areas, in mangrove lagoons, or in open water on calm days. They usually copulate at the water's surface. This activity is evident to

the on-looker by the disturbance of normally smooth water (personal observation).

Threats to Habitats

In the Philippines, as in most parts of the world, the primary threat to turtle habitat is from the direct and indirect actions of man. Man is not only a part of the environment, but he is inextricably linked with all ecosystems. Unfortunately, this close relationship with nature in which man participates is not a balanced one. Man often does not fully comprehend his role in an ecosystem, unaware that his actions may be detrimental, however innocent they are from his own perspective. The direct exploitation of sea turtles by man is a case in point. The only negative implication man perceives in overharvesting sea turtles is that he has to expend a little more time and effort to find the next turtle. He rarely thinks in terms of the depletion of total sea turtle populations or of ecological relationships among populations.

Simple turtle-by-turtle harvest at the subsistence level is exemplified in "The Tragedy of the Commons" (Hardin, 1968), which shows that the individual exploiter has nothing to lose; he can only gain by taking additional turtles—or even an egg clutch—when these are encountered. As people encroach on turtle nesting sites and on coastlines where turtles rest, it is inevitable that slow-moving, shallow-water sea turtles will decrease in numbers. In the Philippines, they are being sighted in alarmingly low numbers (personal observation; Alcala, 1980).

Reports from other areas have implications for Philippine turtle conservation. Dean and Talbert (1975) observed that increasing development along South Carolina beaches in the United States has resulted in the displacement of Loggerhead females to more protected nesting grounds. Shabica (1979a) cited several examples of similar displacement of turtles to park beaches along the southeastern United States seaboard. Clark (1977) suggests that while there are no standards quantifying ". . . tolerable losses of habitat," it is obvious that "the loss of vital habitat area must be presumed to be adverse." This statement may apply equally to sea turtle nesting grounds, hibernation sites, lagoons, bays, and even migration routes where sea turtles nest, congregate, feed, grow, and disperse (Shabica, 1979a). In Australia, Bustard (1972) sees the establishment of national parks as a means of protecting sea turtle nesting grounds from habitat degradation, although the exploitation rights granted aboriginal populations wihin these areas remain a problem. In the Gala-

pagos Islands, where existing laws prohibit any harvest of turtles or eggs excepts by locals in selected sites and for their consumption only, poaching still continues by foreign vessels which anchor during the turtle mating season. The limited patrol capacity of the Ecuadorean National Park Service is not able to prevent the harvest of large numbers of turtles (personal observation and communication with park officials).

Primary turtle nesting grounds in the Philippines normally occur on the larger islands, where sand beaches are extensive enough to meet the needs of a nesting turtle. But sufficient sandy areas above the high tide line coincide with the increasing incidence of human settlements. The smaller coral-limestone islands often lack sand of sufficient depth, quality, and quantity. Thus, it is not surprising that the rate of turtle survival has decreased substantially.

Habitat Protection

According to Shabica (1979b), "Planning for habitat protection includes two steps: the identification of the habitat upon which the resource is dependent, and the elaboration of criteria and implementation of regulations to insure habitat degradation will be prevented and/or habitat improvement will occur."

Many attempts are now being made to protect turtle habitats and to regulate the harvest of turtles. The World Conference on Sea Turtle Conservation in Washington, D.C. in 1979 discussed such management efforts as the creation of national parks or reserves and simple limitation of access or of activities in specific areas at specific times. Habitats to be protected include the following: Terrestrial: (1) concentrated nesting beaches, (2) diffuse nesting beaches, (3) basking sites; Aquatic: (1) inter-nesting areas, (2) migration routes, (3) feeding grounds, (4) hibernacula.

In developed countries with resident sea turtles, national parks and reserves provide unmolested sea turtle habitats. On the southeastern coast of the United States, in the Virgin Islands, on certain beaches in Australia and in a few developing nations, successful reserve efforts have lessened somewhat the decline of sea turtle habitats. These efforts are dependent on the effective implementation of legislation which enforces, at the local level, management guidelines. The creation of parks and reserves is a small step at best, in attempting to protect sea turtles, with their diverse habitat requirements and so large a geographical disbursal. Carleton Ray (1976) notes that "...what...reserves cannot do is sur-

vive intact outside...the ecosystem of which they are only a part." A buffer zone, therefore, "must be established to include the support systems which usually derive largely from outside [the reserve] . . .," to provide protection to the habitat. Normally small reserves, Ray suggests, "... are a series of fragile, simplified habitats in an otherwise altered land or seascape, that is, islands which are highy unstable and which can hardly be called natural at all. . .." This is because ". . . natural communities which we seek to protect are not stable in time or space, nor are they independent of their ecosystems."

Sea turtles have such a wide range of habitats—a very large ecosystem linking a series of more specialized ecosystems— that their successful protection and management requires a wide perspective. A site manager cannot do it on his own. It is appropriate to look toward changing the attitudes of the people who adversely affect these complex ecosystems.

Habitat Protection in the Philippines

The Philippine Ministry of Natural Resources is in the process of setting up a Marine Park program in which a few smaller islands will be completely or partially protected from all forms of exploitation or destruction. Of the numerous sites being considered, probably only one, Apo Reef, Mindoro, is an actual turtle nesting ground. The Turtle Islands in the Sulu Archipelago have been recommended repeatedly as a reserve, but no active management has as yet begun. Furthermore, the principal large-island nesting sites in the Philippines have not been protected in any form, and for a number of reasons. These areas generally do not meet the criteria for marine parks; people are present and the environmental condition is generally poor.

Laws exist protecting the turtles, but they are relatively meaningless without a comprehensive educational campaign informing residents of what is illegal and, more importantly, educating them to the ecological consequences of sea turtle exploitation. Workable protection for turtles which frequent these sites can come only if local residents take it upon themselves to leave them alone. Policing can help prevent major infractions, but the true desire to protect these reptiles must come from the people themselves. The national government in the Philippines, and in other developing countries, has generally failed at this task, yet municipalities, universities, local voluntary organizations can begin to act as educators. The process has already begun in the Philippines. A

few municipalities have begun to set up marine reserves to prevent overfishing and coral destruction to preserve habitat for fish (White, 1980). Such local conservation programs could easily be extended to include sea turtles as well.

Management Recommendations

Successful management and protection of sea turtles in the Philippines will depend on the solution of a variety of general problems. Among current needs are the following:

1. Better basic biological and habitat data on distribution and frequency of sea turtles in the Philippines is needed, especially surveys to identify critical areas and buffer zones upon which these critical areas depend. Included should be nesting beaches, hibernation lagoons and bays, growing lagoons and bays, and migration routes. A tagging program should yield valuable information in this regard.
2. Legislation must establish reserves which will actually benefit sea turtles, as in the Turtle Islands where a joint effort of the State of Sabah, Malaysia and the Philippines is needed. Other reserved areas should include the northern Palawan Islands and southern Negros Island. Municipal and provincial government and private institutions should be involved in the reserve system. Local beliefs and customs concerning turtles should be included in the conservation context as well.
3. A comprehensive educational campaign should inform coastal residents of their responsibility to their environment, and explain what resources management can mean to them. Sea turtle management might be only part of a broader presentation. Educational techniques previously used with success include the following:
   a. nonformal educational workshops conducted by community workers in the local language;
   b. posters, stickers, T—shirts, leaflets, and comic books with an appropriate message;
   c. news media coverage;
   d. outdoor movies and slide shows.
4. Communities already showing an interest in marine conservation should be identified, for possible use as pilot projects using these non-formal educational techniques to raise awareness of

what sea turtles mean as a resource—why and how they should be protected.

5. There is room for much more communication with foreign resource persons and agencies. International support for specific projects should also be sought by national experts who have a grasp of the problem but no funds to implement a project or to do adequate research.
6. Tourists should be educated against the purchase of sea turtles and other marine products.
7. Enforcement of the 1980 ban on selling turtle products should be strict, to show government with a consistent attitude toward conserving sea turtles in particular and marine organisms in general.

Summary

The most effective long-term solution to protecting and preserving sea turtle habitat in the Philippines will involve the very people who are now exploiting the resource. The Philippine government and local institutions involved with sea turtle conservation should approach these people in a positive manner so that they come to see the benefits from their efforts at protection. An approach to the people themselves may sound idealistic, yet it must be considered an integral part of any long-term management scheme. Observation of marine conservation on the municipal level (White, 1980) indicates that this approach is feasible in the Philippines.

While working toward a satisfactory conservation system at the local level, we must not see the program in isolation. Coordination of various governmental and private agencies at national and local levels is mandatory. A broad perspective is required of all individuals involved, to avoid petty conflicts and to maintain open channels for innovative solutions.

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