Why Conserve and Manage Coral Reefs and Seagrass Beds?

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This session focuses on the conservation and management of Philippine marine ecosystems. It may be useful at the outset to have an idea of the types of marine ecosystems found in the littoral and the sublittoral or continental shelf zones from a depth of 0 to 200 meters (Smith and Heemstra 1986). These are the mangroves, estuaries, seagrass, coral reefs, soft-bottom ecosystems and pelagic or open water ecosystems. Two of these ecosystems, seagrasses and coral reefs, have been discussed. My assignment is to comment on the paper on coral reefs by Dr. Edgardo D. Gomez and on the paper on seagrasses by Dr. Miguel D. Fortes, with primary emphasis on the natural and human impacts on these two ecosystems. Since the theme of the 13th NAST Annual Scientific Meeting is "Managing Ecosystems for Long-Term Human Survival," my discussion will stress the consequences of the impacts on sustainable productivity of these marine ecosystems and on the conservation of biodiversity.

CORAL REEFS

Dr. Gomez has discussed the problems and issues in coral reef conservation and management in his brief but comprehensive paper. He has identified the major problem as the destruction of coral reefs through the relentless exploitation of coral reef resources by an ever-increasing number of people. A substantial number of papers published since the late 1970s, including those by Dr. Gomez and myself, have documented the status and the specific natural and human-induced stresses on coral reefs. There is no question that the coral reef is the most heavily stressed marine ecosystem in the Philippines with the possible exception of the mangroves. All Philippine coral reefs, irrespective of location,

are undergoing degradation. This includes even those far from centers of human population, such as those in the middle of the Sulu Sea.

The stresses on coral reefs are of course man-induced and caused by natural occurrences. Natural occurrences, which include typhoon and volcanic eruptions, have affected us for eons, and coral reefs have adapted to these occurrences. Dr. Gomez has commented on our work dealing with the recovery of coral reefs in the Central Visayas (Alcala and Gomez 1990), which is fairly fast provided no human interference occurs. From the scientific point of view, natural occurrences may be useful in providing natural experiments against which the effects of human disturbance may be measured or compared. The Pinatubo eruptions, which have affected the coral reefs of Zambales, will surely give us a better understanding of coral reefs in the same way that typhoons have been useful in studies of natural recovery. Human-induced stresses, however, belong to a different category, as they are geometrically increasing in severity without let-up, giving no time for the reefs to recover.

This brings us to two major points I would like to comment on. These are: (1) the long-term effects of coral reef destruction on the fisheries component; and (2) the issue of coral reef management.

Dr. Gomez has pointed out that coral reefs are a source of a number of materials that are harvested for food and for commerce. Research has also shown that a number of reef organisms produce a variety of chemicals useful to man. I would like to focus on the fisheries aspect. Coral reefs have been a source of fish for our people. There was a time when our coral reefs were teeming with fish and it took only several minutes perhaps to gather a kilogram. Now, our studies of a protected island in the Central Visayas show that the average catch per two-to three-hour trip ranged from 1.6 - 2.0 kg (Alcala 1988). In healthier reefs in southwest Philippines, the catch is a little better -- 2 to 3 times this much. What I am trying to say is that the fishery production of coral reefs has definitely been decreasing.

In terms of the national significance of coral reefs as a source of food fish, some workers have estimated that they supply 15% of the marine fishery production. This may be a low estimate. If all reefs of the Philippines were of the good to excellent quality, the potential fish production of 27,000 km^2 would be about 540,000 tons/yr, one km^2 producing 20 tons/yr (Alcala 1981,

1988). And this would be a sustainable yield. But the fact is that the majority of Philippine reefs, as Dr. Gomez has pointed out, are of the poor to fair condition, producing only 4-5 tons/km^2/yr (Luchavez et al. 1984). It is thus easy to see that the continued degradation of coral reefs has already decreased the supply of coral reef fish used for food. Evidence has been accumulating that some species useful in the aquarium trade are present in much diminished numbers if not totally absent in certain collecting sites (Pajaro nd).

On the issue of coral reef management, Dr. Gomez has recommended the strategy of limited access to allow recovery of coral reefs and the restoration of their normal productivity levels. If combined with another strategy, the establishment of protected areas (parks, reserves), degraded coral reefs will most likely return to their normal conditions within a fairly short period of 5-10 years. This has been demonstrated in this country by our experiments at Sumilon Island (Alcala 1981, 1988; Alcala and Russ 1989; Alcala and Russ 1990). However, it is necessary to have a strong enforcement mechanism to sustain the positive effects of protection. It has been found that, for small fringing reefs near centers of population, organized communities can provide a sustained management mechanism (Savina and White 1986). Its drawback would seem to be the large expense and the relatively long period of time needed to organize communities before they become effective managers. Obviously, different management mechanisms are needed for reef systems away from human population centers. An example of such reefs is the Tubbataha National Marine Park, which lies in the Sulu Sea, about 12 hours away (by boat) from land. Here, enforcement measures involving a strong political will on the part of the government and non-government agencies charged with its protection are required. This is the only way to stop the violations which as of May 1991 were observed to be rampant in the park (Silliman Marine Laboratory Report to PCAMRD; observations by G. Hutchinson).

The establishment of many protected marine areas (parks, reserves and sanctuaries) is important for at least two reasons. First, they export adult fish biomass to areas being fished by fisherfolk (Alcala 1988; Alcala and Russ 1990). Second, they serve as replenishment areas or recruitment sources for larvae and fry of marine organisms, including fish, thus maintaining

biodiversity. Protected areas serve as replenishment areas for artificial habitats now being constructed. Without natural reefs, artificial reefs would probably not be productive, as only coral reef fish seem to colonize artificial reefs (Alcala nd).

As I see it, in this country we no longer have the luxury of choosing large areas for such protected areas; we have to be content with small ones. The many such small protected areas, the greater the probability of fishing areas receiving recruits to sustain the fishery. It is known that coral reef fishes produce long-lived larvae that could be carried by water currents through long distances (Williams et al. 1984; Frith et al. 1986).

Because most of our fringing reefs have been destroyed, we are left with no alternative but to protect relatively inaccessible but good to excellent reefs like the Tubbataha reefs and the adjacent ones on the Cagayan Ridge. It should be pointed out that these reefs, which are about 150 kilometers from Puerto Princesa, Palawan very likely export fish larvae and fry to the island of Palawan. Some evidence based on fish larvae and the favorable currents moving westward favor this hypothesis. What is needed is more oceanographic research to provide the needed critical evidence. If this hypothesis is confirmed, the role of Tubbataha reefs as a fishery replenishment area will become evident and should provide a relevant reason for their total protection.

SEAGRASS BEDS

Seagrass meadows are a distinct ecosystem dominated by 15-16 species of marine flowering plants collectively called seagrasses. Dr. Miguel D. Fortes has exhaustively discussed the ecology, conservation and management of the seagrass ecosystem. I shall focus my brief remarks on the conservation and management of this ecosystem.

Seagrasses, which generally lie adjacent to coral reefs, share with coral reefs a number of marine organisms. The two ecosystems also interact in terms of not only living organisms but nutrients as well.

As Dr. Fortes points out, there is an immediate need to conserve and manage seagrass meadows. But first of all there is a need to map the seagrass beds of the country as there are no estimates of the area of this ecosystem.

Why should seagrass beds be conserved and managed? One of the reasons is that seagrass beds serve as nursery areas for a number of important marine species.

The second reason is that seagrass beds have potentials for fishery production (Alcala 1990). Their relative accessibility to fisherfolk (they are found in intertidal flats and in shallow water) is an advantage. Sea ranching of such organisms as fish, clams, sea urchins and abalones are feasible. PCAMRD (1990) has documented the successful use of seagrass beds as sea ranching sites for finfish, including the highly-prized groupers, using a simple technology termed "rock mound." The technology has been adopted by fishing villages of an island off northern Negros.

The third reason is that seagrass beds produce organic matter and may, like mangroves, contribute substantial amounts of carbon to the shallow benthos and are thus important in food chains. Our studies in the ASEAN-Australia Living Coastal Resources Project should in time provide us good information on this function of seagrasses.

The fourth reason is that seagrass meadows which grow in intertidal areas located along the flyways of migratory birds serve as feeding areas for these birds. Example are the seagrass meadows between Cebu and Bohol. The excreta of these birds fertilize the sea bed. The bird-seagrass interaction is an interesting research area.

With the foregoing discussion, at least we know what we stand to lose if we do not conserve and manage seagrass beds.

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