Review of Knowledge on Mangroves in Southeast Asia and the Southwest Pacific, with Emphasis on Management Applications

Hansa Chansang[1]

I. *The mangrove ecosystem and how it relates to fisheries*

The mangrove ecosystem is an open system in respect to nutrient flow—plants receive nutrients from land, freshwater runoff, and tidal flooding. The plant litter is exported to the estuarine area and becomes the base of a complex detrital food web.

When leaves fall from trees, they decompose and are colonized by bacteria and fungi which increases the nutrient value of the leaves. In the meantime, they may be mechanically broken down and transported into the estuarine areas or left decomposed in the mangroves depending upon other physical factors such as tide and topography. The plant detritus becomes food for primary consumers such as worms, small crustaceans, shrimps, crabs, and small fishes. These animals, in turn, are the food for their predators which are mainly fishes, mammals, birds and reptiles.

Although this complex food web is formed in estuarine areas, some animals involved in the food web may spend only part of their lifetime in those areas. This is the case for several commercially important species of fishes and shrimps.

II. *Distribution of mangroves in Southeast Asia*

The total mangrove areas in Southeast Asian countries excluding Papua New Guinea are about 5 million ha. About 3.5 million ha are in Indonesia, mainly in Sumatra, the southern part of Kalimantan, and Irian Jaya. In general, mangroves are abundant around the deltas of big rivers such as Irrawady delta in Burma, Mekong, Gulf of Papua, and eastern coast of Sumatra. Much of the mangrove area in the Gulf of Thailand has been converted into salt pans, shrimp ponds, and rice paddies. The same situation obtains in Java and to a lesser extent in the Philippines where mangroves have been converted into fishponds.

III. *Exploitation of mangroves*

It is common to see fishing villages in or near the mangrove swamps. The villagers rely on the swamps for a living. They harvest food from estuaries and obtain wood for housing construction, boatbuilding, firewood, and fishing poles from the forests. The mangrove trees also protect the communities from tidal waves and prevent erosion of the waterways.

At present, mangrove forests are under heavy exploitation as are other natural resources. The exploitation can be categorized as:

(1) Conversion to areas for agriculture, aquaculture, and urban development. This conversion is the major problem. Due to the population increase, the pressure in reclaiming the mangrove swamps for other forms of land use is going to continue, especially if decision makers still view the swamps as wastelands. Fish and/or shrimp-raising countries are converting mangroves to fishponds as they try to expand their aquaculture programs. Reclamation for agriculture and urban development is being carried out in almost every country to different extents. The biggest project now is the transmigration program in Indonesia. In many cases, reclamation for agriculture was not successful and lands were abandoned after a certain period of time.

(2) Logging. Logging has been quite extensive in Southeast Asia. Without proper management, it can transform swamp into wasteland and encourage other kinds of land use. It has been shown that logging can be done quite successfully on a sustained yield basis. The woods obtained are mainly for charcoal production, firewood, and pulp wood.

(3) Mining. The mining problem exists in southwestern Thailand, but it may occur in any coastal area in which mineral resources are abundant. In Thailand, tin mining in mangrove areas generally destroys the swamps. Replanting is possible and should be encouraged. Tailings from land-based mines near mangroves often fill up the swamp.

(4) Indirect effects of manmade activities. Diversion of freshwater or modification of the water regime. There is actually no extensive diversion of freshwater in this region as compared to that in other parts of the world. However, there are some small-scale diversions in different areas. Decreasing the freshwater supply reduces the nutrient input and also changes the salinity regime which will eventually change the community structure. Improper road construction through the swamps creates water-logging in some area which kills the mangrove trees.

Pollution. Pollution is expected to become a more common problem as industrial development increases along the coasts. In some areas, there are even suggestions of using mangrove swamps as sewage dumping grounds. Although effects of pollutants on mangrove trees are not well known, the effect on the food web in the mangroves could be quite serious.

As it is certain by now that the mangrove forests in Southeast Asia are exploited or are going to be in one way or another, it is up to us to decide how to make use of the swamps effectively so that they can be beneficial to man on a long-term basis.

In considering alternative uses of mangrove swamps, it is desirable to determine the economic value of the undisturbed state as well as of logging, mining, aquaculture, agriculture, or even urban development. However, up to now, we lack the information for deriving economic value of those fisheries depending upon the mangrove ecosystem. It is known that some commercially important species of fishes and shellfishes live in mangrove swamps. However, the actual importance of the swamps as the essential habitats for these species is yet to be demonstrated. Information on present catches and potential yields of these species is needed. Cultivation of fishes and shellfishes in natural estuarine areas deserves more attention, for this practice can increase production without any serious

→

4. ICLARM consultant. Present address: Phuket Marine Biological Laboratory, Phuket, Thailand.

competition with the natural stocks. Oyster, mussel, and clam cultivation has been a success in some parts of the world and it is worthwhile.

IV. *Research program on mangrove resource management*

(1) Inventory of existing mangroves in Southeast Asia and Southwest Pacific by remote sensing. The existing information on the extent and location of mangroves in this region is still incomplete. Remote sensing can provide information on the status of the forests and changes by man or nature. The information obtained will be useful for informing decision-makers in those countries of the situations and realities facing them in planning utilization of mangrove resources.

(2) Study the alternative uses of the mangrove resources. Information is needed on the role of mangroves in fisheries and socioeconomics of artisanal fishermen who depend upon fishing in mangrove/estuarine areas for their livelihood.

(3) Evaluation of existing knowledge on mangrove ecosystems with the aim of searching for parameters to predict fishery potential.

ICLARM Library Opens

The new ICLARM Library is now open for business under the capable direction of its new librarian, Mrs. Rosalinda Temprosa.

The library's major holdings deal with natural resources, with major emphasis on fisheries. Broad interest areas include agricultural economics, food, nutrition, ecology, resource development and management, freshwater and marine resources, sociology as applied to natural resource development and management, education and training, information, and technology. Library services available include current awareness services (distribution of accession lists and contents pages of periodicals), interlibrary loans, retrospective literature searches, production of specialized bibliographies, and provision of photocopies. Anyone interested in using the library is welcome to settle into one of the comfortable reading chairs or make use of the carrels available during library hours, 8:00-12:00 and 1:00-5:00 Monday through Friday.

ICLARM Librarian "Linda" Temprosa arrived in early September to develop ICLARM's capabilities in documentation and retrieval of scientific and technical information as part of ICLARM's Information Services. Already an experienced librarian, Linda's initial task is to gather and catalog basic reference material on fisheries and allied disciplines, building upon and adding to ICLARM's existing collection as a first step in building a documentation and retrieval center. Before joining ICLARM, Linda spent 7 years with the International Rice Research Institute, beginning as an indexer and eventually becoming the Circulation Librarian. She holds a B.S.E. from the National Teacher's College, Manila, and is working towards her M.S.L.S. at the University of the Philippines.

Linda Temprosa

To assist Linda in organizing the new library, ICLARM drew upon the the experience and expertise of Mrs. Hazel Nishimura, Librarian for the U.S. National Marine Fisheries Service, Honolulu Laboratory, who spent 2 weeks as a consultant to ICLARM in September, helping to institute basic library services and drawing up recommendations to guide the library's future development. During her career Mrs. Nishimura has been Librarian at the Library of Hawaii, the Library of San Jose State College (California), and the National Marine Fisheries Service's Honolulu Laboratory Library, ably directing the latter for the past 18 years. Besides holding a M.S.L.S. degree from Case Western Reserve University (Ohio), as well as professional membership in the Americal Library Association, Special Library Association, and the Hawaii Library Association, Mrs. Nishimura has an enviable command of fisheries literature dealing with the Pacific.

As part of its desire to facilitate information transfer in the region, ICLARM is committed to fostering cooperation among libraries and to mutual library building through exchanges. A program of instituting new exchanges and strengthening old ones will be vigorously pursued by the ICLARM Library in 1979.

Chong Joins ICLARM Staff

Kee-Chai Chong

ICLARM is pleased to announce the arrival of its second postdoctoral fellow, Dr. Kee-Chai Chong, who joined the staff on December 11, 1978. Dr. Chong holds a B.S. and M.S. in agricultural and resource economics from the University of Hawaii and has recently received his Ph.D. in the same field at Oregon State University for his thesis entitled, Resource Combinations and Product-Mix in Oregon Seafood Processing.

While with ICLARM, Dr. Chong will undertake a regional study on complementarities and conflicts between aquaculture and agriculture.