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# The state of our mangroves

Aquaculture Department, Southeast Asian Fisheries Development Center

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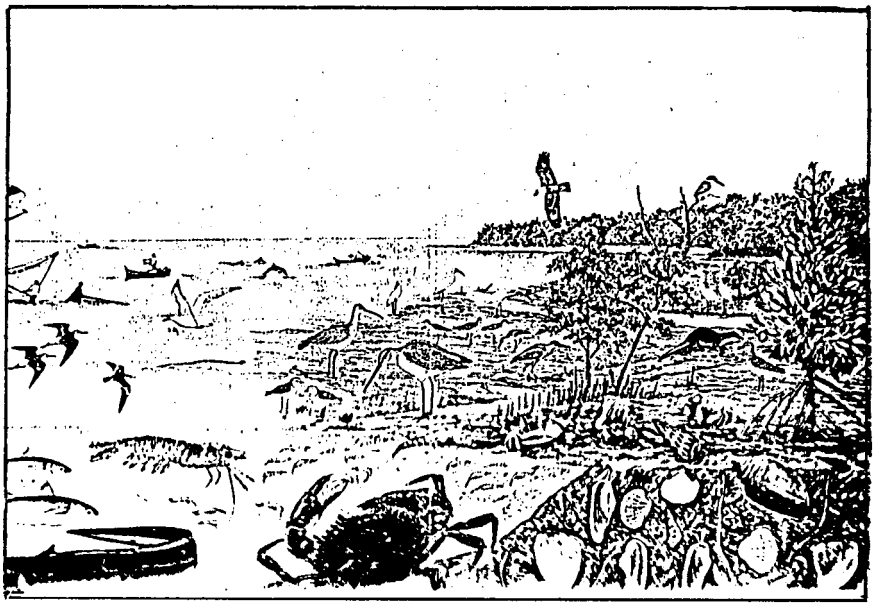

*"If only we can have this back".* **From a full color poster "A Mangrove Must Live" by the ASEAN-US-CRM/ICLARM.**

Like corals, mangroves thrive in the Tropics. They grow abundantly in Pakistan, India, Burma, Malaysia, Thailand, Indonesia, Korea, and the Philippines. The total area of mangrove forests in the whole of Asia is about 2.5 million hectares.

The mangrove forest is one of the most important and productive ecosystems found along coastal zones and islands. Ecologically, mangrove swamps are beneficial to coastal dwellers in various ways. Exporting detritus and nutrients which contribute to nearshore and offshore productivity, they serve as feeding and/or nursery grounds for many economically important fish, shellfish and crustaceans. They protect valuable properties from storm surges and strong winds associated with tropical typhoons. They perform a flood reduction function in estuarine flood plains which may be lost if the mangrove swamp is converted into other uses.

For centuries, mangrove swamps have been beneficial to the socioeconomic well-being of coastal communities in the ASEAN region.

In Southeast Asia, mangroves are often converted into aquaculture ponds inspite of the many benefits they provide. In Malaysia, shrimp farms have encroached onto mangrove reserves. In Indonesia, most of the estimated 200,000 hectares of shrimp ponds have been converted from former mangrove forests. Their conversion to milkfish and shrimp culture ponds have contributed to a very significant denudation in Java, Sulawesi and Sumatra. In the Philippines, a combination of milkfish and shrimp culture is responsible for reducing the mangrove area from 448,000 hectares in 1968 to 139,000 hectares in 1988, with 60% of this decrease thought to be due to conversion to milkfish ponds. The Philippine Fisheries Code which disallowed private ownership of mangrove forests and placed them under the joint administration of the fisheries and forestry bureaus slowed down the conversion but shrimp culture during the 1980's removed an additional 30,000 hectares for new ponds.

In Thailand, 38.8% of mangrove areas lost between 1979 to 1986 were used for aquaculture; this means 38,000 hectares or 13% of the 287,000 hectares of mangrove resource in 1979. Prior to 1961, mangrove exploitation was generally for charcoal-making. In the Mekong Delta in Vietnam, clearance of mangroves for timber and shrimp farming has been serious, estimated at 60,000 between 1985 and 1988 and still continuing, adding to the catastrophic loss of mangrove forests during the Viet Nam war.

Conversion of mangrove forest into aquaculture and other uses means loss of habitat of many mangrove-dependent species

of fish and shrimps. This will further compound stock recruitment and production problems in many overexploited fishing grounds.

Mangrove destruction consequently affects coastal areas depending on prevailing local conditions. In typhoon-prone areas, it increases the risk of coastal erosion from storm surges. Along estuarine systems, it accelerates the erosion of river banks. When large areas of mangroves have been converted to fishponds, acid sulfate are exposed leading to poor production and mass mortality of stocks, as well as the discharge of toxic substances to nearby waters.

Destruction of mangroves for coastal development (residential, industrial) affects freshwater supply through salt intrusion upstream, particularly under low-rainfal conditions. On the other hand, flooding occurs under high-rainfal condition. Conversion into salt ponds also changes soil structures and increases salt content, thereby rendering the area difficult to reclaim for agriculture and silviculture. Conversion into mining areas not only affects coastal waters, beaches, coral reefs, and fisheries, but could also render the areas irreversibly damaged, if not costly to reclaim for more productive purposes.

Inspite of their rapid destruction, large tracts of mangrove forests still exist in Southeast Asia: Brunei Darussalam, Sabah, Sarawak, Indonesia, the Upper south of Thailand and Peninsular Malaysia. Except for Peninsular Malaysia, where a mangrove reserve has been instituted in 1904 in Perak, most countries in the ASEAN region established some mangrove management measures only in 1960.

In the Philippines, since 1970, numerous decrees, proclamation and orders have been issued to preserve the country's remaining mangrove forests but enforcement has been wanting. This has been due to several factors: ineffective and inefficient implementation of programs among others.

In 1989, the Department of Environment and Natural Resources (DENR) adopted a conservation method derived from the successful practice of contractual reforestation in the upland communities. Called the "Mangrove Stewardship Agreement", rural families, qualified individuals, or communities were granted the privilege of developing and maintaining their mangrove forest areas. In return, they gain the exlusive right to utilize the stewardship area and enjoy all its produce on a sustainable level.

In 1990, the DENR issued Order No. 15, banning the conversion of mangrove areas into fishponds, allowing only community-based sustainable activities within these areas. Under this

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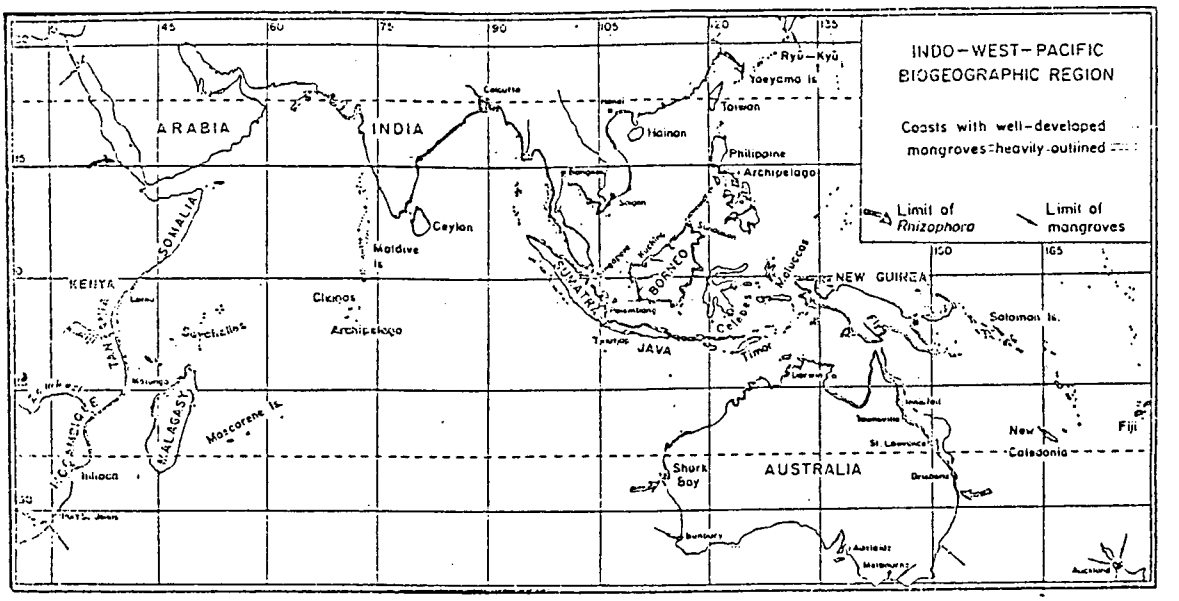


***Map of the Indo-west-Pacific biographic region. Coastline where mangroves occur have been heavily outlined in Mcnae W. 1986. A general account of the fauna and flora of mangrove swamps and forests in the Indo-West Pacific Region. Adv. Mar. Biol., 6:73-270.***

***"It is not intensive shrimp farming per se but the widespread conversion of mangroves to brackishwater culture ponds that has had the greatest impact on the ecology and economy of the Philippines"*** -J.H. Primavera, SEAFDEC/AQD Scientist

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rents indicates that the fishpond owners have the capacity to pay higher fees, which could be ploughed back into the fisheries to rehabilitate the mangrove areas and hence, the ecosystem of both inland and capture fisheries.

It is possible to calculate a whole schedule of rents by varying the assumptions on technology and prices. Rents can be calculated assuming the best technology available and given input-output prices and this will result, theoretically to higher values than those shown in the table. The major causes of mangrove depletion are cutting of mangroves for fuelwood and charcoal and clearing for fishpond development.

The economic rent is significantly greater than the current FLA fee of ₱50. There is then justification for the government to increase the fee which could be used to rehabilitate the inland-coastal fisheries to improve productivity and ensure sustainability of the ecosystem.

The government could charge ₱3,296/ha/year (US$130). This rent corresponds to the shrimp-shrimp system for a five-year lease and a 10% discount. This would compel the fishpond owners to shift to the more profitable cropping system or may motivate them to use better technology to improve productivity and income.

One important consideration in the implementation of a revised FLA fee is that the rent should be location-specific. Although the technology may be applicable from one place to another, environmental conditions and input-output prices are likely to differ from one region to another.

*Sources: (1) Paw JN and Chua TE. 1991. An assess ment of ecological and economic impact of mangrove conversion in Southeast Asia. p. 201-202. In: LM Chou et al. (eds.). Towards an integrated management of tropical coastal resources. ICLARM Conf. Proc. (2) Evangelista LD. 1992. Management of Mangrove Areas in Calauag Bay, Quezon Province, Philippines. AFSSRNews Section. April 1992.*

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policy, the government stopped issuing permits and immediately set out to convert abandoned and unused mangrove swamps back to their forest land classification.

The order also allows the establishment of mangrove plantation in sparsely vegetated mangrove forest lands and in alienable and disposable forest areas. As of 1990, 8,705 ha. of mangroves have been replanted throughout the country with funding from the World Bank, Asian Development Bank, Overseas Economic Cooperation Fund of Japan, and the national government.

Inspite of these measures, however, the conservation of the country's remaining mangrove appears to be a losing battle because of ineffective law enforcement and the entry of powerful political and business interests in the pond industry.

Environment-friendly fisheries methods can be another solution to the problem of mangrove forest depletion. Culture ponds may not necessarily preclude the presence of mangroves. Dikes and tidal flats fronting early Indonesia *tambak* (fishponds) were planted with *Avicenna, Rhizophora* and other species for firewood, fertilizer (from decaying leaves), and protection from wave action. **Alfredo Nathaniel L. Marte**

*Sources: Paw, JN and Chua, TE.. 1991. An assessment of the ecological and economic impact of mangrove conversion in Southeast Asia. pp. 201-205. In: LM Chou et al. (eds.). Towards an integrated management of tropical coastal resources. ICLARM Conf. Proc. (2) Zamora, P.M.1989. Philippine Mangroves: Their depletion, conversion, and decreasing productivity. (3) Primavera, JH. 1995. Mangroves and brackishwater pond culture in the Philippines. Hydrobiologia. 295 Wong YS & Lam BFY (eds.). Asia-Pacific symposium on mangrove ecosystems. pp 303. (4) Primavera, JH. 1994. A critical review of shrimp pond culture in the Philippines. Reviews in Fisheries Science 1(2):151-201. (5) Philipps, MV. 1995. Shrimp culture and the environment. Towards sustainable aquaculture in Southeast Asia and Japan. pp. 39-40.*