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Management of mangrove areas

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Recommendations

Management of mangrove areas

The rapid conversion of mangrove forests to alternative economic uses inevitably reduced the fish catch in the nearby coastal waters.

Baseline information on the mangrove ecosystem is still insufficient, especially on its relationship with other ecosystems and resources within the coastal zone.

In managing mangrove forest they must be allocated for conservation purposes to protect the mangrove ecosystem, conserve genetic biodiversity and provide areas for scientific research and aesthetic considerations.

Areas for the sustainable management of mangroves have been established in many countries to ensure the ecological balance of the ecosystem.

Population and economic development pressures is partly responsible for the conversion of mangroves to various land uses.The indiscriminate clear-cutting of mangroves for aquaculture, salt ponds and other uses - especially those within privately owned lands - must be minimized. The conversion should be restricted to areas that do not adversely affect the environment like flooding, salt intrusion in aquifers, erosion and others.

To prevent further negative effects of mangrove depletion on the income of coastal fishers, the conversion of mangrove areas should be regulated by means of land lease. The fishpond lease fee depending on whether one wants to encourage or discourage conversion. If it is set high, this may compel the producer to employ better technology rather than converting additional mangrove areas to fishpond. This pricing policy would lead to induced-innovation and greater resource use efficiency.

The basis for the lease fee is resource rent, which is the surplus value over and above the opportunity cost of all factors of production. The rent will be the basis in setting the lease fee for mangrove areas converted to fishponds.

The rent is important to the local authorities regulating the use of mangrove areas to sustain the productivity of the ecosystem (i.e., the fishpond production and coastal fisheries).

The residual method is the resource rent which is the total revenue minus all costs excluding the fishpond lease fee. Total revenue includes normal profits as farmers will sell at a price that incorporates the profit mark-up.

To determine the annual rent per hectare, the present value (PV) of the stream of rents for the period of the fishpond lease are divided by the lease period. The rationale behind the net present value (NPV) is to incorporate society's valuation of the opportunity cost of money or their preference between present and future consumption.

The rents calculated are based on a technology using low levels of chemical inputs and low stocking density of about 2,000 fingerlings/ha/crop and 5,000 milkfish fry and shrimp, respectively. This technology results in low yields. In the aquaculture industry, high stocking density and heavy dosage of chemical inputs results in high yields and better profits.

The annual discounted rent using 10 and 5% social rates of discount using three types of cropping system: milkfish-milkfish, milkfish-shrimp and shrimp-shrimp. Each type uses a combination of species grown in a pond sequentially in a given year, e.g., milkfish is grown in the first half of the year followed by shrimp in the second half. The rents are highest with the shrimp-shrimp system. These rents are much higher than the fishpond lease agreement (FLA) fee of ₱50/ha/year (US$2). The size of the

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Economic rent (discounted) of mangrove areas by period of lease, discount rate and cropping system.

	Item	Cropping System: Milkfish-milkfish	Milkfish-shrimp	Shrimp-shrimp
		Pesos/ha/year		
10%				
	5 years	1,247	1,195	3,296
	10 years	1,011	968	2,672
	20 years	700	671	1,851
15%				
	5 years	1,103	1,056	2,916
	10 years	825	791	2,182
	20 years	515	493	1,362

"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.