

Mangroves and Community Aquaculture



AQUACULTURE DEPARTMENT

Southeast Asian Fisheries Development Center

February 2000

Background

Mangroves are tropical trees and shrubs that grow in intertidal areas. They can also refer to the forest communities with their associated microorganisms (bacteria, fungi, algae) and fauna (molluscs, crabs, shrimps and fish). Because they are exposed to extreme environmental factors of high salinity, alternating water saturation and desiccation, and anaerobic substrates, mangroves have developed coping mechanisms such as salt glands on their leaves, varying root structures such as prop roots and pneumatophores, and viviparous (germinating) seeds.

True mangrove species number around 54 worldwide. Mangrove areas cover some 18 million hectares globally with 35% found in Southeast Asia.

An aquasilviculture pond/pen tests the integration of mangrove conservation with aquaculture production in Manalo, Honda Bay, Puerto Princesa (right) and in Bugtong Bato, Ibabay, Aklan (bottom)



Functions and Values

The value of mangroves is related to their information, regulatory and resource functions. Information may be religious, cultural or historical. Many towns and villages in the Philippines are named after mangrove species including

Dungon and *Bakhaw* in Jaro, Iloilo City after *Heritiera littoralis* and *Rhizophora*, respectively. Even the name of the country's premier city comes from Maynilad, in reference to the abundant nilad (the mangrove *Scyphiphora hydrophyllacea*) lining the Pasig River and Manila Bay in preHispanic times.

The regulatory functions of mangroves, commonly referred to as 'services,' include coastal protection, erosion control, sediment stabilization, flood regulation, nutrient supply and regen-

eration, treatment of dissolved and particulate wastes, and habitat for wildlife. Flood control is particularly critical in

TABLE 1. True mangrove species in Ibajay, Aklan.

SPECIES	LOCAL NAME
1. <i>Acanthus ilicifolius</i>	—
2. <i>Aegiceras corniculatum</i>	saging saging
3. <i>Avicennia alba</i>	api-api
4. <i>Avicennia marina</i>	api-api
5. <i>Avicennia officinalis</i>	bungalon
6. <i>Avicennia rumphiana</i>	api-api
7. <i>Bruguiera cylindrica</i>	pototan
8. <i>Bruguiera sexangula</i>	—
9. <i>Camptostemon philippinense</i>	gapas gapas
10. <i>Ceriops decandra</i>	baras baras
11. <i>Ceriops tagal</i>	tangal, tongog
12. <i>Excoecaria agallocha</i>	alipata
13. <i>Heritiera littoralis</i>	dungon
14. <i>Lumnitzera racemosa</i>	—
15. <i>Nypa fruticans</i>	nipa
16. <i>Rhizophora apiculata</i>	bakauan lalaki
17. <i>Rhizophora mucronata</i>	bakauan babae
18. <i>Rhizophora stylosa</i>	bakauan
19. <i>Sonneratia alba</i>	pagatpat
20. <i>Xylocarpus granatum</i>	tabigi
21. <i>Xylocarpus mekongensis</i>	tabigi

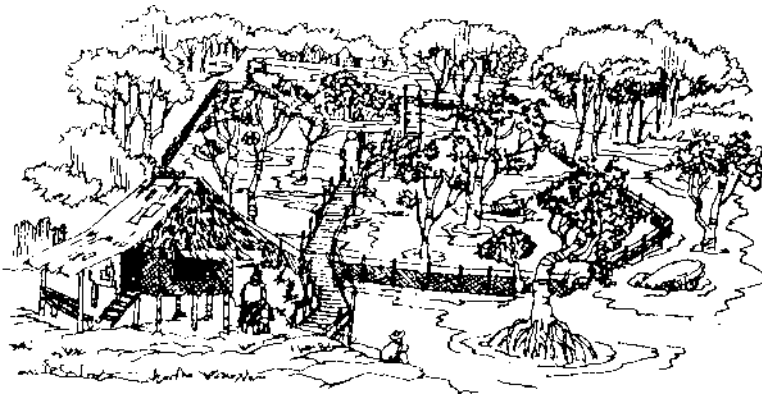
With its high biodiversity and pristine growth, the Ibajay mangrove forest serves as field site of the training course on Sustainable Aquaculture and Coastal Resource Management



the case of the Ibajay mangroves – hence the villagers of Naisud resorted to People Power to stop a large developer from converting the mangroves to culture ponds sometime in the 1980s. In contrast, the shoreline at the mouth of Naisud River has eroded some 300 meters in the last 10 years (at a rate of 30 meters per year). Because the loss of mangrove and beach vegetation has exposed the area to strong wave action especially during typhoons (an average of 20 per year) and the *amihan* or northeast monsoon winds.



Net enclosure pond for shrimp and mud crab culture in Aklan



Design of nylon net enclosure for mudcrab culture in mangroves

The provision of resources or goods from both forest and fishery is the most well-known function of mangroves. Fisheries products include fish, shrimp, crabs, molluscs, and other invertebrates. The forest yields charcoal, firewood, timber, fishing poles, fodder, honey, etc. The estimated value of all these mangrove goods and services can be as high as US\$10,000 per ha per year.



The mudcrab pens in Buswang, Kalibo, Aklan were jointly established by SEAFDEC and KASAMA, a local people's organization.



The president of Manalo Multi-Purpose Cooperative briefing the members about the aquasilviculture project at Brgy. Manalo, Honda Bay, Puerto Princesa, Palawan

Mangrove Decline

Nevertheless, rates of mangrove loss in the Philippines have been high – from 450,000 hectares in 1918 to only 120,500 hectares in 1994 – and may be traced to overexploitation by coastal dwellers, and conversion to settlements, agriculture, salt beds and industry. However, aquaculture remains the major cause – around half of the 279,000 ha of mangroves lost from 1951 to 1998 were developed into culture ponds. Ninety-five percent of Philippine brackishwater ponds in 1952-1987 were derived from mangroves.

At present, the Western Visayas region has only 3,000 ha of mangroves, among the least in the country. Aklan province has a few hundred hectares including the 75 ha patch mangrove that straddles the villages of Bugtong Bato and Naisud in Ibajay, unique as the largest contiguous forest on Panay island. Despite their limited area, the Aklan mangroves are remarkably diverse with 22 of the 40 or so tree mangrove species in the Philippines (Table 1). Palawan, on the other hand, still has 42,300 ha of mangrove, the biggest in the country.

Given the importance of Philippine mangroves and their alarming rate of destruction, there is an urgent need for preservation of pristine forest for biodiversity and scientific studies, massive rehabilitation of degraded areas and conservation and sustainable development of remaining mangrove areas. The last option includes mangrove-friendly aquaculture or aquasilviculture that integrates the rearing of aquatic organisms and maintenance of healthy mangrove trees.

The mangrove aquasilviculture project in Palawan seeks to develop technologies as a contribution to the mangrove conservation and rehabilitation program



SEAFDEC AQD and Mangrove-Friendly Aquaculture

Amidst growing criticism of the role of aquaculture in mangrove destruction and other negative impacts, the Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC AQD) initiated a Mangrove-Friendly Aquaculture (MFA) Project in 1997. This includes aquasilviculture (the integration of aquaculture with mangroves in pens and ponds) of the mud crab *Scylla* in field sites in the provinces of Aklan and Palawan.

The construction and operation of mangrove pens in newly colonized mangrove areas in New Buswang, Kalibo were a joint effort of AQD and KASAMA, a local cooperative. In the Palawan site, AQD specialists teamed up with Manalo MultiPurpose Cooperative, Inc. and the City Agriculture Office of Puerto Princesa. In Ibaday, Aklan, pens (made of bamboo and nylon netting) and a pond were constructed by deepening the natural canals and adding the soil to lobster mounds in old growth *Avicennia* forests. Seedlings of the mud crabs *Scylla serrata*/*S. olivacea*/*S. tranquebarica* stocked in the ponds and pens are from AQD hatcheries in Tigbauan, Iloilo or sourced from the wild. This method, the use of net enclosures in man-

British
Broadcasting
Corporation
interviewing Dr.
Jurgenne H.
Primavera, AQD
mangrove
specialist, in
Aklan for its Blue
Planet Program



groves or intertidal zones offers a better alternative to culture of crabs in ponds.



A mangrove treehouse in Brgy. Bugtong Bato, Ibajay, Aklan, provides visitors an aerial view of the forest canopy

land in Carles, Iloilo and in Brgy. Bulata, Cauayan, Negros Occidental is presently being demonstrated.

The Aklan and Palawan experiences demonstrate how aquaculture can be integrated with rural development as a strategy for poverty alleviation and environmental conservation. The collaboration with local cooperatives and people's organizations strengthens the capacity for management. Lastly, the adoption of aquaculture as a tool in coastal management enables the efficient use of limited resources.

Proceeds from the sales of crab harvest (and shrimp byproducts) are turned over to the cooperative or used to fund the next grow-out trial. Future refinements are needed to address the problem of some tree damage (due to elevated water level during impoundment), high construction costs relative to the financial capacity of villagers and the use of "trash fish" which is consumed by local people.

Following the successful performance in the Aklan and Palawan sites, pen culture of king crabs in mangrove areas in Gigantes Is-



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