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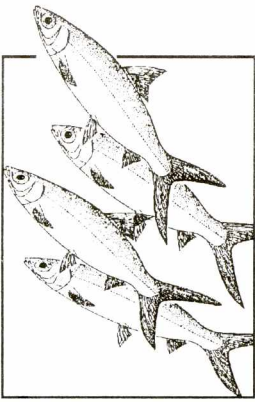
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## Milkfish ponds from mangroves

By **Teodora Bagarinao, PhD**  
*AQD Scientist*

Important as the milkfish industry has been to the Philippines, it has also been responsible for the significant loss of valuable mangrove swamps and forests. Early this century, the Philippines had about 450,000 ha of mangroves. In the 1920s, fishponds were concentrated around mangrove-lined Manila Bay: 3,193 ha in Rizal, 16,700 ha in Bulacan, 14,200 ha in Pampanga and 4,000 ha in Bataan. In 1926, the Bureau of Forestry issued 390 permits to operate 3,042 ha of fishponds in mangrove areas. Just before the Second World War, about 61,000 ha of brackishwater ponds already existed. After the war, the Bureau of Fisheries was established to take charge of the development of both fisheries and

aquaculture. In 1950, about 418,382 ha of mangroves still existed, together with 72,753 ha of fishponds. But over the next 25 years, the pond area increased some 3,980 ha/yr and the mangroves decreased about 6,416 ha/yr (Fig. 1). Figure 2 shows the distribution of milkfish ponds, all in mangrove areas, in 1969 (new maps are not available).

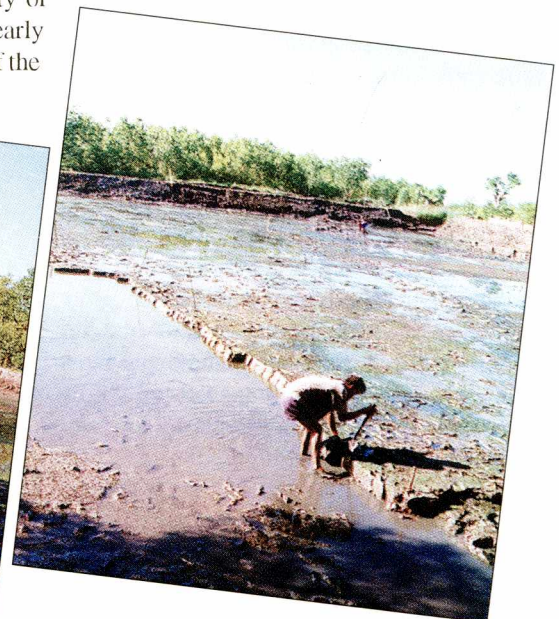
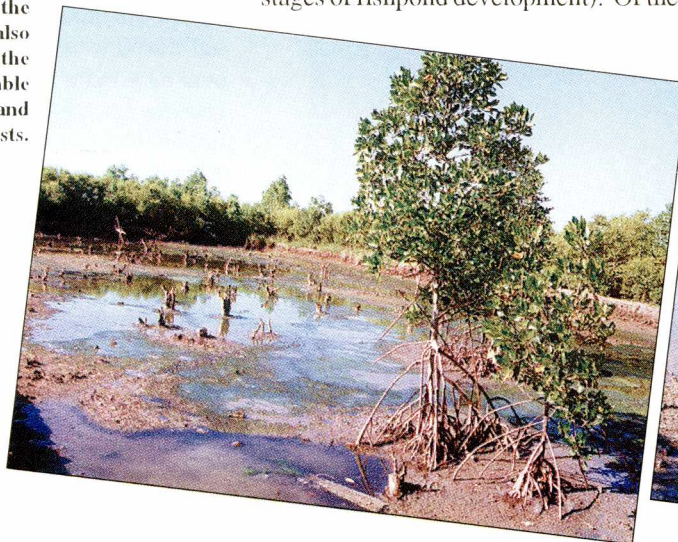
In every issue of the Fisheries Statistics of the Philippines until 1984 was a section called "Swamplands Available for Development" that promoted the wrong notion that mangrove swamps were wastelands or idle lands that required conversion into fishponds to be productive. The Bureau of Forest Development (BFD) estimated the area of mangroves at 249,138 ha in 1977 based on ground survey, aerial photography, and statistical projections. But based on LandSat multispectral imagery, the mangrove area of 220,243 ha was found to comprise 146,140 ha of pure mangrove stands and 74,103 ha of low-density or logged-over mangroves (mostly the early stages of fishpond development). Of the

140,000 ha of remaining mangroves, the government proclaimed 78,000 ha as preservation and conservation areas, but opened the other 62,000 ha for fishpond development.

Milkfish ponds remained at 176,232 ha from 1976 until 1982, then decreased about 4,726 ha/yr to 114,796 ha in 1995. In the meantime, the total pond area increased at 4,732 ha/yr to 261,402 ha in 1993 and mangroves shrank at 7,121 ha/yr down to about 117,700 ha in 1995 (Fig. 1). In the 1980s, many ponds were diverted from milkfish farming to shrimp farming. Other shrimp ponds were built anew from mangrove swamps, or from agricultural lands previously planted to rice and sugarcane. In its 1995 Philippine Fisheries Profile, the Bureau of Fisheries and Aquatic Resources (BFAR) still cites BFD's 1984 figure of 232,065 ha of mangroves, double the 1995 estimate.

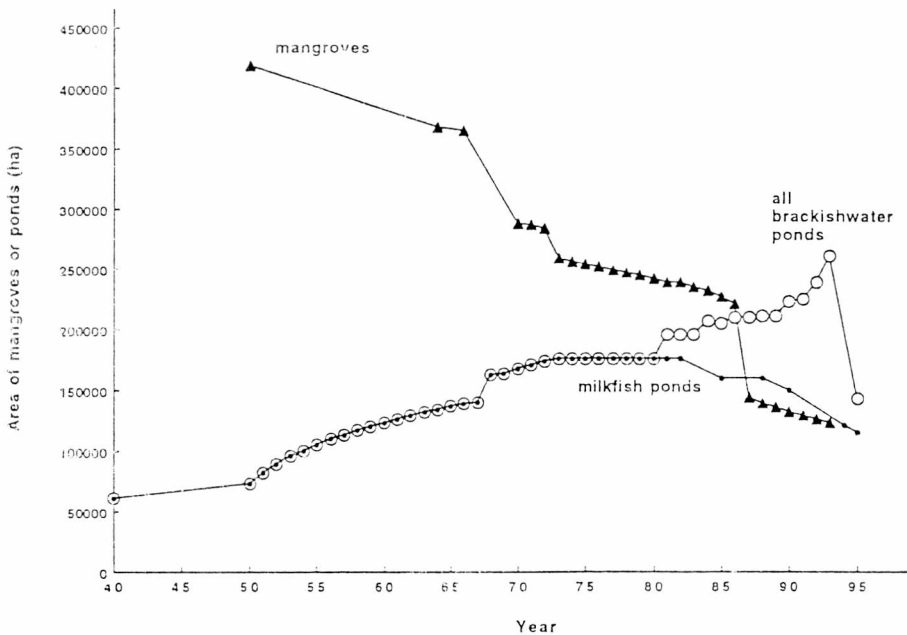
Dr. Bagarinao is a marine biologist on AQD's milkfish R&D team.

Important as the milkfish industry has been to the Philippines, it has also been responsible for the significant loss of valuable mangrove swamps and forests.



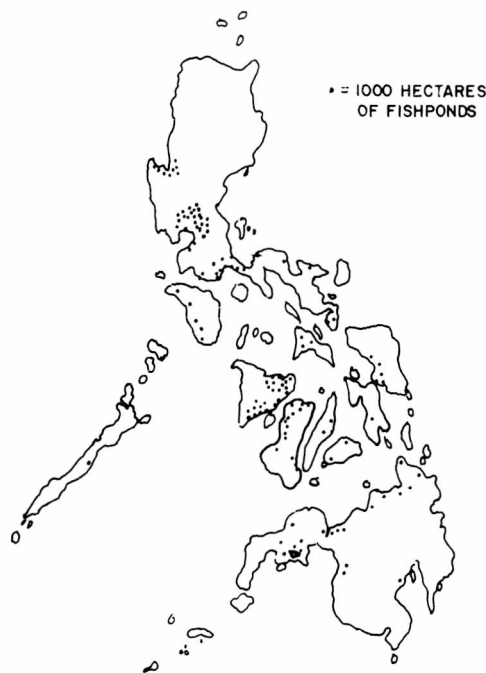
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Figure 1



Loss of mangroves means loss of habitats and biodiversity including nursery grounds for feeding and refuge of commercial fishes, shrimps, crabs, and molluscs. Loss of mangroves also means loss of fishery and forestry products, income, and livelihood for many coastal inhabitants, and loss of protection against storm surges, coastal erosion, and excessive nutrient loading. Major fishing grounds in the Philippines are in or adjacent to extensive mangrove forests and swamps. The average annual catches (from 1976 to 1982) from municipal fisheries in 50 provinces were positively correlated with the areas of existing mangrove swamps, and 49% of the variation in catches may be explained by the mangrove area. Other studies have shown that mangrove forests and swamps left alone can be as productive as the better shrimp farms.

Figure 2



Milkfish ponds in the Philippines are either privately owned or leased from the government under a renewable 25-year Fishpond Lease Agreement. Brackishwater fishponds are valuable real estate, and good management adds to their value. In the 1970s, values rose by 10% each year, and in the 1980s, brackishwater ponds were valued at P50,000-100,000 per hectare. Yet, the lease for government-owned ponds has long remained at a very low P50 per ha-yr. Recent estimates of the economic rent of ponds range from P515 to P3,296 per hectare per year. BFAR increased the lease for government-owned ponds to P1,000 per ha-yr effective 1992 but the pond operators have successfully lobbied for a deferment of this new lease rate.

Both mangrove areas and aquaculture ponds have been converted to other uses or lost to natural disasters. Rizal province, which includes much of Metro Manila today, had 3,193 ha of milkfish ponds in 1927, down to 1,933 ha in 1963, and only 752 ha in 1981. In the mid-1970s, the Dagat-dagatan Salt-Water Fishery Experiment Station in Rizal closed after 35 years of research in milkfish farming techniques — due to industrial pollution, siltation, and urbanization. Ponds, especially those without a mangrove buffer zone, are destroyed by several of the 20 typhoons that hit the Philippines each year. Widespread damage has also been caused by the volcanic eruptions of Mt. Pinatubo in 1991. Some 6,942 ha of brackishwater fishponds in central Luzon were partly or completely covered by ashfall, lahar flow, or volcanic debris; the loss of the farm stock and facilities has been estimated at P273 million and 824 pond operators were displaced.

Literature citations are given in the original paper entitled *Historical and recent trends in milkfish farming in the Philippines*. In: S.S. de Silva (ed) *Tropical Mariculture*. Academic Press, London.