

Session 2: Seafood Security and Marine Ecosystem Sustainability

Integration of Mangroves and Aquaculture

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Because aquaculture is centuries-old in Southeast Asia, brackishwater ponds have been a major factor in mangrove loss. Are mangroves and aquaculture compatible? A review of “mangrove-friendly aquaculture” or MFA shows that while some technologies are traditional, others are government-driven (rather than research-based, to mitigate social conflict). MFA maybe in subtidal waterways (e.g., seaweeds, bivalves) or the intertidal forest -- Hong Kong gei wai, Indonesian tambak tumpang sari, Vietnam mixed mangrove-shrimp farm systems and mangrove pens for mudcrab in Malaysia.

The SEAFDEC Aquaculture Department conducted studies following two models: a) mangrove filters where separate mangrove stands process effluents from adjacent shrimp ponds, and b) mudcrab pens where aquaculture systems and mangroves are physically combined. The first study reports decreased nutrient (NH₃-N, NO₃-N, PO₄-P, sulfide) levels within 6 hr after daytime draining of effluents into the mangrove stand, but only nitrate reduction was statistically significant. Based on nitrate loss, water volume drained, mangrove area etc., calculations show that 1.8-5.4 ha of mangroves are required to remove nitrate wastes from one ha of shrimp pond. Longer nipa palm leaflets and faster mangrove seedling growth (but not mangrove biomass) of experimental mangroves suggest N uptake by the mangrove macroflora. Previous studies give a range of 3-9 ha of mangroves needed to treat nitrogen wastes from one ha of shrimp pond. These figures approximate the earliest recommended ratio of 4: 1 (Saenger et al., 1986). [In contrast, the Philippines has the reverse ratio of 0.5 ha mangrove: 1 ha pond.] The use of mangrove filters reflects a major paradigm shift from the present practice of releasing untreated pond wastes to cleaning up before release, and will improve aquaculture sustainability. These ratios should be refined according to site hydrodynamics, whether nutrients are released to subtidal waterways or intertidal basin forests, etc. Adding mangrove services like coastal protection and fisheries could increase ratios. Therefore the aquaculture industry should conserve/rehabilitate mangroves as potential pond biofilters following protocols (e.g., non-use of antibiotics/chemicals and prior sedimentation of effluents), in the process implementing legally mandated 20-/50-meter greenbelts.



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Academic Degrees

- 1995 Ph.D., Marine Science, University of the Philippines (Diliman, Q.C.), The Philippines
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Field of Study

Aquaculture, Mangroves