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Third world aquaculture systems: Environmental impacts and benefits for producers

Aquaculture Department, Southeast Asian Fisheries Development Center

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study has identified at least eight other bays and ten other coastal areas equally in need of rehabilitation and management. Another $200 million may be needed for these areas.

While it is difficult to quantify the benefits that would accrue to the areas targetted by the program, experiences in similar projects may provide some indications. In Lamon Bay, for example, where a comparable fisheries program was implemented, small-scale fishermen have reported a 75% increase—from P2,000 to P3,500—in their monthly incomes. This was accomplished without overfishing and without causing trauma to the environment. The Department hopes that the FSP for 1990-1994 will produce similarly happy results.

Source: Excerpts from speech of Dept. of Agriculture Secretary Senen C. Bacani at the Closing Ceremonies of the ASEAN/US CRMP Policy Conference on **MANAGING ASEAN'S COASTAL RESOURCES FOR SUSTAINABLE DEVELOPMENT** on 6 March 1990 in Baguio City, Philippines.

THIRD-WORLD AQUACULTURE SYSTEMS

Environmental Impact and Benefits for Producers

Extensive systems are defined as having no feed or fertilizer inputs; semi-intensive systems as having some feed and/or fertilizer inputs; and intensive systems as being mainly reliant on external feed inputs. The possible consequences of exotic breed transfers apply to all systems listed here.

System	Environmental impact	Benefits
EXTENSIVE		
1. Seaweed culture	May occupy formerly pristine reefs; rough weather losses; market competition; conflicts/failures, social disruption	Income; employment; foreign exchange
2. Coastal bivalve culture (mussels, oysters, clams, cockles)	Public health risks and consumer resistance (microbial diseases, red tides, industrial pollution); rough weather losses; seed shortages; market competition especially for export produce; failures, social disruption	Income; employment; foreign exchange, improve nutrition
3. Coastal fishponds (mullets, milkfish, shrimps, tilapias)	Destruction of ecosystems, especially mangroves; increasingly non-competitive with more intensive systems; nonsustainable with high population growth; conflicts/failures, social disruption	Income, employment; foreign exchange (shrimps); directly improve nutrition
4. Pen and cage culture in eutrophic and/or rich benthos (carps, catfish, milkfish, tilapias)	Exclusion of traditional fishermen; navigational hazards; conflicts, social disruption; management difficulties; wood consumption	Income; employment; directly improve nutrition

Sytem	Environmental impact	Benefits
SEMI-INTENSIVE		
1. Fresh and brackish-water ponds (shrimps and prawns, carps, catfish, milkfish, mullets, tilapia)	Freshwater: health risks to farm workers from waterborne diseases. Brackishwater: salinization/acidification of soils/aquifers. Both: market competition, especially for export produce; feed and fertilizer availability/prices; conflicts/failures, social disruption	Income; employment/ foreign exchange (shrimps and prawns); directly improve nutrition
2. Integrated agriculture-aquaculture (rice-fish; livestock/poultry-fish; vegetables - fish and all combinations of these)	As freshwater above, plus possible consumer resistance to excreta-fed produce; competition from other users of inputs such as livestock excreta and cereal brans; toxic substances in livestock feeds (e.g., heavy metals) may accumulate in pond sediments and fish; pesticides may accumulate in fish	Income; employment; directly improve synergistic interactions between crop, livestock, vegetable, and fish components; recycles farm residues and other resources
3. Sewage-fish culture (waste treatment ponds; latrine wastes and septage used as pond inputs; fish cages in waste-water channels)	Possible health risks to farm workers, fish processors; consumer resistance to produce	Income; employment; directly improve nutrition; turns waste disposal liabilities into productive assets
4. Cage and pen culture especially in eutrophic waters or on rich benthos (carps, catfish, milkfish, tilapias)	As extensive cage and pen systems above	Income; employment; directly improve nutrition
INTENSIVE		
1. Freshwater, brackish-water and marine ponds (shrimps; fish, especially carnivores - catfish, snakeheads, groupers, sea bass, etc.)	Effluents/drainage high in BOD and suspended solids; market competition, especially for export produce; conflicts/failures, social disruption	Income; employment; foreign exchange
2. Freshwater, brackish-water and marine cage and pen culture (fin-fish, especially carnivores; also omnivores - common carp)	Accumulation of anoxic sediments below cages due to fecal and waste feed build-up; market competition, especially for export produce; conflicts/failures, social disruption; consumption of wood and other materials	Income; foreign exchange (high priced carnivores); a little employment
3. Others - raceways, silos, tanks, etc.	Effluents/drainage high in BOD and suspended solids; many location-specific problems	Income; foreign exchange; a little employment

Source: **FISH-HEALTH MANAGEMENT IN ASIA-PACIFIC**, Asian Development Bank/Network of Aquaculture Centres in Asia-Pacific, ADB Agriculture Department Report Series No. 1, June 1991.