Brackishwater Pond Development in Sumatra

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In 1976 the Government of Indonesia began a brackishwater pond (tambak) development project on the east coast of the northern Sumatra provinces of Aceh and North Sumatra. The U.S. Agency for International Development (USAID) was asked to assist the project with the provision of commodities, off-shore training opportunities and technical assistance. Auburn University, which has had experience with a similar project in the Philippines, was contracted by USAID to provide technical assistance, with two resident advisors and short-term specialists.

At the beginning of the project the province of Aceh had approximately 16,000 ha of tambak, nearly all of which were managed according to traditional methods, with consequent low production. The project goal for Aceh was to intensify production in existing ponds through utilization of technical extension services, credit, purchased inputs such as fertilizers and pesticides, renovation and repair of ponds where necessary to permit good management, and deliberate stocking and selection of milkfish fry and penaeid shrimp post-larvae and juveniles, both of which occur in abundance in the coastal waters of Aceh. Project production goals in Aceh were achieved (an increase from 7,765.5 to 12,073.3 t/yr) and technical assistance terminated as scheduled in September 1978.

Early in the project, efforts were made to more fully exploit the milkfish fry resource of Aceh and market the large surplus. At the present time, fry collector associations routinely ship surplus milkfish fry by air to Jakarta where demand is high. Previously, demand for fry within the province during peak season would sometimes drop too low for collection to be profitable.

Tambak aquaculture is not a traditional activity in North Sumatra province. Part of the reason for this is the absence of milkfish fry in the coastal waters, and an appreciably smaller quantity of penaeid shrimp post-larvae and juveniles. At the beginning of the project, there were an estimated 300 ha of tambak in the province. However, most of these are abandoned, primarily because of poor siting and construction, and the inability to obtain construction capital. Those tambaks that are producing are doing so at traditional levels of management, which, in many cases, is not culture but simply trapping whatever enters the ponds at high tide.

The overall AID project goal for North Sumatra was to establish a basis for tambak area expansion activities. This goal was found to be unattainable in the original 2-yr project period. The period of technical assistance was thus extended to September 1981, and the goal expanded to include tambak expansion methodology, and the development of a tambak area expansion pilot project to test the methodology.

The strategies for tambak improvement and area expansion in Aceh and North Sumatra are similar to a point beyond which differences in strategy reflect different goal emphasis. Strategic outputs for the two-province project include the following:

1. Off-shore (Philippines), short-term (3-mo) training for two

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2. In-country, short-term (3-mo) training for demonstration pond staff, and training at project location for extension agents.
3. Construction of eight demonstration pond complexes averaging 6 to 8 ha each. The demonstration pond complexes were constructed in eight targeted regions, with a staff complement of two technicians, five extension agents and two or three laborers for each demonstration pond complex.
4. The conduct of field trials, demonstrations and farmer training at each of the demonstration pond units.

The original project proposal emphasized milkfish culture. However, it soon became obvious that there was a greater interest in shrimp. This was due largely to the much higher profitability of shrimp culture and the relative ease of marketing. It was also evident that the higher returns provided by shrimp culture would be necessary to pay for the high cost of pond construction, even though ponds are sited at land elevations with sufficient tidal inundation to make excavation unnecessary.

It was thus decided that polyculture of milkfish and shrimp would be promoted as the most realistic of several possibilities. Field trials at North Sumatra demonstration pond units have provided evidence that sufficient returns can be expected from shrimp *(Penaeus monodon)* culture to make payment of development costs possible, even though conducted on semi-intensive scale.

Three field trials conducted in ponds ranging from 0.7 to 1.4 ha and stocked directly with an average of 14,652 *P. monodon* post-larvae/ha yielded an average of 96.7 kg/ha (with mean shrimp weight of 52 g) during an average culture period of 136 d. Survival during these trials was low, averaging 10.5%. In future trials nursery ponds will be utilized with the expectation that survival will be significantly improved. The average pondside price received was Rp. 3935 (US$6.30) per kg. In addition to *P. monodon,* an average of 37.5 kg of wild shrimp *(Metapenaeus* sp., *P. merguiensis/ indicus)* was obtained from each culture trial. They made up 10.8% of the total crop value.

The basic question facing the tambak development project in North Sumatra is how can tambak expansion be conducted in a way that is orderly and both technically and economically sound?

The first attempt to answer this question involves a 68-ha "mini-estate" pilot project operated cooperatively by 17 families (former small-scale fishermen and laborers on fishing boats), each of which will eventually hold title to a 4-ha pond. Construction of this pilot project was done by a government contractor with the participation of the pond owner/operators, and was finished in June 1980.

All development costs (about US$2720/ha) were financed through a credit program of the Indonesian Peoples Bank over 5 yr and 10.5% interest. Modest production rates are projected through the first 5 yr of operation, beginning with 600 kg of milkfish and 125 kg/ha/yr of shrimp for the first year. If these are realized, it is expected that the return on investment will exceed 20%. The experiences gained from this pilot project will influence the future of tambak area expansion, certainly in Sumatra, and perhaps in other areas of Indonesia as well.

Several problems must be solved if tambak area expansion is to be successful. Among the most important of these are pond engineering and construction skills and experience. These skills have been notably lacking in the past with the consequences to be seen in ponds abandoned or not operating fully because of design, construction and siting problems. There is also an immediate need for a shrimp hatchery development program for the northern Sumatra region, if a regular and year-round supply is to be assured for shrimp producers. A shrimp hatchery will also be important in stimulating tambak area expansion activities. Tambak farmers' associations or cooperatives will also need assistance with organization and the conduct of their collective affairs, from the technical aspects of production to marketing of their produce. These problems, and others, are being tackled with optimism. The brackishwater pond potential for Indonesia is large, and rational exploitation will also require informed government policy with respect to conservation, land utilization and decisions as to who shall participate in the exploitation of these resources.

Above: *Penaeus monodon,* grown for 122 days from post-larvae, in a field trial at the North Sumatra demonstration brackishwater pond unit.
Opposite: aerial view of the demonstration unit.