

Opportunities and challenges in Myanmar aquaculture

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The coastline of Myanmar faces the Indian Ocean in Rakhine State, the Bay of Bengal in Ayeyarwady Division, and the Andaman Sea in Tanintharyi Division. These long stretches of coast provide 213,720 km² of continental shelf with water rich in nutrients and marine life. Myanmar is also endowed with large rivers and huge networks of their tributaries that are rich in freshwater fisheries resources.

Myanmar's inland water bodies consist of 8.2 million hectares of lakes, rivers and reservoirs, producing more than 53 million tons of fish and prawns in 2002-3 including catch from 3,742 lease fisheries. During the monsoon season from May to September, inundated flooded plain are breeding and nursery grounds for freshwater fishes. At this time of year, DOF is stocking fish seed and broodstock in natural and man-made water bodies to enhance and sustain commercially important species.

Fisheries have a major role in social and economic development; the people of Myanmar are largely rice and fish eaters. Annual per capita fish consumption was 26.18 kg in 2002, and fisheries are the country's third largest sector in export earnings, after agriculture and forestry.

Aquaculture has been the fastest growing sector for over a decade, registering a growth rate of over 40 percent per year since 1988, compared with 5 percent for capture fisheries. By



Large-scale fisheries of 10s to 100s of acres are leased, via auction, to those with means to operate and sustain them. Lease holders are required to manage these as culture-based fisheries.



Sub-leased lake-based fishing, such as the unique 'saung' trap (opposite) used by Intha fishers on Inle Lake in Shan State provides a livelihood for canoe owners for an annual fee of K1000. Fishers can fish every day and sell their catch at K600.

1988 there were only 6,300 acres (2,550 hectares) of fishponds. As fish is the staple diet for the people and one of the potential growth industries in the national economy of Myanmar, the State Peace and Development Council promulgated Aquaculture Law No. 24/89, which lead to a substantial increase in the number of fishponds in the country.

The Department of Fisheries plays a vital role in National Aquaculture development. There are 14 fisheries stations for fish seed production, located in Mandalay Division in the upper Myanmar region, Bago Division, Ayeyarwady Division, and Yangon Division in the lower part of the country. In line with the three-year fish culture development special project, 19 new stations are being established throughout the country. These stations will:

- produce quality seeds;
- provide fish seed to fish farmers and stock replenishing activities and culture-based fisheries;
- impart technical knowledge on aquaculture and expertise to fish farmers through extension services;
- conduct aquaculture research and training.

Status and targets

Freshwater fish culture has been practiced since the early 1950s and currently almost 50,000 hectares of freshwater fishponds are under operation. However, marine finfish culture has only recently begun to take hold as a commercial venture by private companies and is only present in a few places at present. Local communities have not previously been interested in farming seabass (*Lates calcarifer*) and groupers (*Epinephelus* spp.) as they are abundant and easy to catch. Recently, due to high foreign market demand, groupers and seabass have become more popular for fisheries trade, which has encouraged farmers to begin trials on their aquaculture.

A three-year fish culture expanded plan (2000-2003) has been prepared to accelerate the development of the aquaculture sector. The plan's targets include: Development of 26,315 hectares of fishpond and establishment of 19 new fishery stations, including three stations for mariculture. The DOF mariculture fishery station is under construction at Chaungtha in Ayeyarwady Division. Two others are to be constructed at Taungok



This canoe owner at Inle Lake claims hook and line gear provides a better return for the same K1,000 annual fee. This man will leave his 200 m line (with hooks at meter intervals baited with shrimp) overnight every day of the year. Best catches are in April.

Township in Rakhine State and Kyun Su Township (Myeik area) in Taninthayi Division respectively.

The area of aquaculture in 2002-2003 was 127,204 hectares including 80,000 hectares of freshwater prawn (*M. rosenbergii*) and marine shrimp (*P. monodon*) ponds.

Mariculture

Commercial scale net cage culture of groupers is found in Kyun Su Township (Myeik area) in Taninthayi Division. It is a pioneering farm run by private sector, which has some 300-350 net cages of 3 x 3 x 3 meters in size. It on-grows *Epinephelus coioides* and *E. tauvina*. Grouper juveniles are collected from the wild during May through November. Different sizes of juveniles of 10 cm to 25 cm are stocked. According to initial stocking size, culture period varies from three to twelve months to reach marketable size. Generally stocking rate is 800-2,500 fishes per cages depending on the fish size and the survival rate is about 30% at harvest.

Similarly grouper juveniles are collected at Thandwe and Gwa Township, in Rakhine State for holding in net cages before marketing. Fish are

fed with small trash fishes for some period until they attain size and strength for transport to grow-out farm and restaurants, as well as for export. The most common species in that area is *E. coioides* but commercial-scale culture is not yet practiced in that area.

Regarding sea bass farming, hatchery management techniques are urgently needed for its development into commercial culture. Inadequate seed supply due to lack of skills in hatchery technology is now the major constraint for the development of marine finfish aquaculture.

Grouper cage culture near Myeik



Freshwater culture

Freshwater pond fish culture is a major source of aquaculture production. The dominant species is Rohu (*Labeo rohita*). Most farmers practice polyculture, using major carps, and common carps. Farmers in upper Myanmar prefer to stock fingerling 2 to 5 cm but those in lower Myanmar especially in Yangon and Ayeyarwady Division, prefer stocking yearling of 12 to 15 cm so that the fish can reach marketable size in a short time.

A common practice is to put 3,000 yearlings into an acre of pond. Culture period is 10-12 months and the average yield 5 tons per acre (or 12 tons per hectare).

The most successful culture industry is found in Twantee Township, near Yangon where 50% of the total fishpond area is situated. The sizes of the ponds vary from four to eight hectares with an average water depth of 1.5 meters.

Tilapia cage culture has been demonstrated successfully by DOF in the Ayeyarwady River in Magwe Division, situated in the dry zone where there is not only poor soil condition but also scarce water resources for fish culture. Altogether over 300 cages of 5 x 5 x 3 metre size are stocked with 2,000 fish seed per cage. One company, the Yuzana Company has cage culture operations in Ayeyarwady River in the delta region. *Pangasius* species are grown in cages of 2 x 8 x 8m at a rate of 110,000 fish 10 cm size per cage.

Culture species

Twelve freshwater fish species are being cultivated, Rohu (*Labeo rohita*), Catla (*Catla catla*), Mrigal (*Cirrhinus*

mrigala), Common Carp (*Cyprinus carpio*), Grass carp (*Ctenopharyngodon idella*), Big head carp (*Aristichthys nobilis*), Silver carp (*Hypophthalmichthys molitrix*), Red tilapia (*Tilapia mossambica*, *T. nilotica*), Hybrid catfish (*Clarias gariepinus x Clarias macrocephalus*), Rohtee (*Rohtee cortio*), Striped catfish (*Pangasius hypophthalmus*). DOF has recently succeeded in breeding three new species, freshwater pomfret (*Pitratus brachypomum*), feather back (*Notopterus chitala*), and silver barb (*Puntius gonionotus*).

The stations under the Department are producing quality fish seeds by applying various breeding techniques. Fish seed production in 2000-2001 was over 300 million out of which 85 million fish seed were stocked into natural water such as lakes reservoirs and big rivers. To expand the industry a good number of seeds are distributed freely to potential fish farms and institutions as an incentive.

Experiences and culture techniques of some species such as eel (*Anguilla* spp; *Synbramchus* spp.), Soft shell turtle (*Tryonix* spp and *Lyssemes* spp.) are also to be introduced. Therefore training course on culture and propagation techniques of commercially importance species is needed.

Feeds

Most of the aquaculture feeds are made up of locally available agricultural by-products such as rice bran, boiled broken rice, and oil cakes of groundnut, sesame, and coconut and cotton seed. Rice bran and groundnut cake are a major source of fish feed and pellet feed are commonly used in catfish farms. To attain one kilogram of fish about 4-5 kilograms of bran are feed. So food conversion ratio is 4-5, depending on quality and type of rice bran FCR is significantly improved when it is mixed with other ingredients, vitamin and minerals.

Several feed factories have been established recently. They are producing thirty to fifty tons of formulated fish or shrimp feed per day in pellet form. Apart from these bigger ones, medium size feed mills with daily production capacity of five to ten tons of aqua-feed either in mixed powder or

pellet form are also supporting the fast growing industry.

Challenges

The aquaculture sector faces a number of constraints despite its seemingly bright prospects and high potential for expansion and continued growth. There is also an urgent need to consider the practical foundation on which to establish a sustainable aquaculture sector to ensure sustainable development. Awareness of environmental responsibilities in the aquaculture industry is growing and farmers and investors are increasingly practicing improved management practices.

The following issues face Myanmar's fast growing aquaculture sector:

- Technologies and farming systems
- Environmentally friendly technologies, which have benign impact on the community. Due consideration should be given in selection of farming system applied, i.e. traditional, extensive, semi-intensive, intensive, super intensive.
- Improved management practices and codes of good practice for aquaculture sector.
- Minimize the harmful effects of farm-bred species to the ecosystem.
- Improved culture-based fisheries.

Species

Selection and improvement of species feeding low on the food chain.

- Appropriate use of genetic resources and biotechnology.
- Careful introduction of exotic species.
- Diversification of animal and plant species for aquaculture.

Socio-economics

Better awareness of responsible aquaculture concepts and practices.

- Mitigating the impact of industrial aquaculture in rural areas.
- Improving the contribution of small-scale aquaculture to rural livelihoods.
- Defining property rights and access to resources.
- Mitigate conflicts among common resource users.

Fish seeds

- A consistent supply of high quality and healthy seeds.
- Deterioration of quality seed due to inbreeding, limited number of captive and wild breeders, lack of techniques in broodstock manipulation and poor hatchery technologies.

Feeds

- Improving the efficiency of food through good aquaculture feed manufacturing practice and feeding techniques.
- Cost effective feed.
- Research on the dietary nutrient requirement and feeding habits of cultured species.
- Culture of species that can utilize good farm made feed rather than require high quality protein rich feed.

Conclusion

There are considerable opportunities for further development in aquaculture, especially mariculture in Myanmar. Joint efforts of the government and the private sector would realize for the nation and people the huge aquaculture potential. To do so without the adverse side effects and impacts on the environment and social harmony, the government is taking measures to encourage, with appropriate incentives and assistance, the investors, farmers and other stakeholders to practice responsible production practices. It has, for instance, tasked the Department of Fisheries with the responsibility of promoting the conservation of biodiversity and habitats and providing assistance to all forms of aquaculture.

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