

Peter Edwards writes on

Rural Aquaculture

Small-scale aquaculture in the Ayeyarwady Delta, Myanmar

During my visit to Myanmar in September last year (see my column in *Aquaculture Asia* Volume XIII, Number 4, pp.3-12), I was only able to spend one day in the Ayeyarwady Delta, briefly visiting two villages with small-scale fish farms. Four months before my visit last May, Cyclone Nargis had moved across the delta for over two days with a 3-6 m high storm surge of seawater and wind speeds up to 250 km/hour, causing widespread death and destruction. Rohu had been farmed in both villages, in ponds or in rice/fish integrated systems, but the fish had been washed away by the cyclone and the aquaculture facilities damaged.

The extent of occurrence of small-scale aquaculture in the Ayeyarwady Delta is unknown. Government support has concentrated on the large scale commercial aquaculture sector and had neglected to document the contribution that aquaculture made to rural society prior to Nargis. However, it seemed too much of a coincidence that the only two villages I was able to visit on my previous trip both had small-scale aqua-

culture, implying that it was much more prevalent than commonly assumed. This March I was invited by Zaw Zaw Han, Chairman of the local NGO, Ever Green Group - Social Enterprise Partnership for Development, to make a longer visit to assess the role that small-scale freshwater fish culture might have played in the livelihoods of Nargis affected farming households before the cyclone. We spent five days visiting farms in the township of Kungyangon, Yangon Division, and the townships of Bogale, Dedaye and Pyapon in Ayeyarwady Division with the aim also to identify possible donor-funded project activities in small-scale aquaculture to help to re-establish and secure the livelihoods of farmers previously raising fish and possibly those of potentially new entrant aquaculture farmers.

Official assessment and monitoring

The Tripartite Core Group (TCG) comprising representatives from the Government of Myanmar, ASEAN and the United Nations carried out a needs



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assessment through a survey of 108 communities impacted by Nargis (Post-Nargis Periodic Review 1, December 2008) and subsequently monitored 40 villages (Post-Nargis Social Impacts Monitoring, January 2009). The questionnaires used to assess the impact of Nargis asked 'what are the three main sources of household income at this time'... as well as '..... before Cyclone Nargis', and included 'aquaculture (shrimps, prawn, crabs, etc.)' as a possible livelihood option. However, the data in the reports do not include aquaculture for any of the surveyed households, possibly partly because freshwater fish culture was not specifically mentioned in the questions although the text states that 'the people of the Delta and rivers traditionally engage in a diverse range of fisheries activities from deep sea fishing to aquaculture in ponds'.

Delta villages have diverse occupations. Most villages have a mix of farmers and fishers, with agriculture dominating in some villages, fishers in other villages. Landless labourers make up a high proportion of people in most villages, often at least 50%. According to the TCG assessment report, relief and recovery assistance had reached even the most remote villages. Food aid had reached all surveyed communities although a high proportion of households still had inadequate shelters with only plastic, tarpaulin or canvas roofs and walls.



Farmed freshwater fish on the market in Pyapon township, striped catfish and rohu.

However, livelihoods had been disrupted with agriculture, fishing and livestock suffering heavy losses which may take households several years to recover from. People lost assets and savings which has reduced their capacity for self recovery and increased indebtedness. According to the TCG monitoring report, today's challenges are different as the people need assistance to re-start their livelihoods. There is 'the need for much greater support for recovery of livelihoods in order for cyclone-affected populations to regain the level of self-sufficiency that they had prior to Cyclone Nargis'.

However, relief and recovery are interconnected. The slow pace of livelihoods recovery means that many people do not have sufficient resources to buy food; food insecurity still exists, especially for the poorest people within villages. Livelihoods recovery has been slow because of the immense damage as well as insufficient aid. There has been a major reduction in crop yields, loss of livestock and disruption of fishing. Landless labourers are particularly affected as fewer casual labourers are being employed by large farmers who lost their assets and have been unable to recapitalise. Many large-scale farmers who lost their assets now only differ from the poor in their ownership of land which they are having difficulty using as they did before the cyclone.



A small-scale farm couple with their rice-fish system in a second village visited in Dedaye township.

Revisiting the villages

Dedanaw Village

The farmer, Hla Min and his wife, Kay Thi Aung in Dedanaw village in Kung Yangon Township, Yangon Division, who I interviewed last September, had now rebuilt their house but still have insufficient money to restart aquaculture to renovate their ponds, and to purchase seed and feed. They had been raising fish for six years before Nargis washed away the rohu stocked in their three 500 m² ponds which were now derelict and partially filled with mud and weeds. Their 1.2 ha of land is not suitable for growing paddy and the husband is a seasonal worker on neighbouring rice farms and a bus conductor. They used to buy 2.5 cm fingerlings of rohu but the season before Nargis had nursed fry for 5-6 months to 5 cm before releasing them into another pond for grow-out which took another 1 year. Fish had been fed with boiled broken rice mixed with rice bran and manually made into balls to feed the fish. Partially harvested rohu led to a production of 300 kg, ranging in size from 0.5-1.2 kg which they sold for about US\$1/kg, a significant contribution to their household income.



A commercial-scale fish farm converted from rice fields in a village in Dedanaw township.

A major concern is the increasing debt burden of villagers. Before Nargis credit drove the Delta economy with better-off farmers and fishers who had collateral borrowing money from moneylenders in nearby towns at 5-10%/month and marginal farmers and fishers and landless labourers without collateral borrowing money at 10-20%/month. Although these high interest rates stifled capital accumulation and thus stunted the development of village economies, paying back debt was not normally a problem before the cyclone. Villagers are now, however, concerned about being able to service their debts and falling into a vicious debt trap as they have lost their assets. During the TCG surveys they repeatedly gave livelihoods assistance as their top priority. As villagers already face such a serious problem of indebtedness, the TCG recommended that cash injections should be in the form of grants rather than loans or micro-credit.



Zaw Zaw Han, Chairman of the NGO Ever Green (right) and Htin Aung Kyaw, an AIT alumnus currently working for the Myanmar Fisheries Federation (left), guided me into the Delta.



Farmer Win Oo in Thee Gone Lay village next to the trench in his rice field.

Most of the 740 households in Dedanaw Village are rice farmers. As the local authorities in Kung Yangon Township do not allow even domestic water supply reservoirs to be built in the village rice fields, if rice farmers are to build a fish pond then it would need to be constructed on the relatively limited land surrounding the households. This would also be the only option for the landless to build a pond. This may be feasible as we observed a poor household excavating a nearby area for soil to raise the level of the land immediately beneath and surrounding the land. Hla Min and his wife expressed willingness to help to teach some of the other households with sufficient land near their houses to farm fish and possibly form a village fish farmers group.

Thee Gone Lay Village

During my previous visit to this village in Dedaye Township, Ayeyarwady Division, I was unable to see any aquaculture facilities as the village was still flooded, with all cultured fish washed away, but was told that two farmers had been culturing fish in integration with rice. During this most recent visit I interviewed both these farmers, Win Oo and Myint Aung, and was able to see their integrated systems which comprised trenches in their rice fields. Although both farmers with rice/fish systems are better-off farmers who each own a small village rice mill, one of the two rice mills had not been

put back into operation because Nargis had caused a major decline in rice production in the village. The two farmers had also not restocked their trenches with fish as they were short of money. Current rice/fish integrated systems in the Delta should be studied to see if they would provide a model that could be more widely disseminated to help to improve small-scale farming household welfare. Both farmers said that many villagers would be interested in raising fish in their rice fields, which the local government allows, if they had money to get started.

Both Win Oo and Myint Aung reported that rice/fish culture is more profitable than farming rice alone. Win Oo has constructed a 7 m wide, 0.5 m deep trench for 100 m along one side of his 10 hectare rice field for integration with the monsoon rice crop. He learned how to raise fish seven years ago from a friend, a large-scale fish farmer in another village. He stocked 2,000 of 5.0-7.5 cm fingerlings purchased from his friend. The fish were fed only rice bran as he believes that it is not necessary to use fertiliser. Survival was 80% and the fish of 1.0-1.6 kg were sold in the village and a local town. These are relatively large sized for a system integrated with rice, possibly because the trench approaches a pond in dimensions.



Landless labourers in Thee Gone village about to leave the village take up temporary work elsewhere.

Myint Aung has an 8 m wide, 0.5 m deep trench around his 0.6 hectare rice field in which he stocked 30,000 of 5 cm fingerlings bought from a seed trader. Fish were able to swim into the rice field as the water was 10 cm deep there during the dry season when a short stem variety of summer rice was grown and was about 1 m deep in the rainy season when a long stem variety of rice was grown during the monsoon rice crop. Fish were again only fed rice bran but the rice field was fertilised with chemical fertilisers, leading to green water in the system. Myint Aung reported that he only used to get 30 baskets of rice per acre but with integration with fish he got 50 baskets of rice per acre as well as fish. He got about US\$2,000 gross return from selling fish compared to a total of \$700 for rice (\$400 for the summer rice crop and \$300 for the monsoon rice crop). As fingerlings cost \$750 and rice bran \$700, the net return on the fish was \$550.

Thee Gone Lay village has 60 households, 30 of which are rice farmers with the remaining households being landless labourers and fishers, although many rice farmers catch fish after rice harvest. Rice holdings range in size from 1.0-1.5 up to 24 ha but are mostly 4.0-8.0 ha. Fifteen of the rice farming households also have small multi-purpose ponds near their houses for washing clothes and bathing, 4 or 5 of which had also been stocked with fish before Nargis.

I interviewed two of these farmers. Tun Win had learned to farm fish six years ago. He used to stocked 250 rohu and in a 150 m² pond which he obtained from a seed trader. Partial harvesting provided fish for domestic consumption and sale in the village, with about 25 fish remaining at final harvest. Before Nargis he sold fish for \$0.90/kg but the price had gone up after the cyclone to \$1.25/kg. After Nargis he had not renovated and restocked the pond because he had no money.



A rice mill damaged by Nargis in Thee Gone Lay village.

Myint Aung who also had a rice/fish system described above had a 450 m² pond. The year before Nargis he had stocked tilapia which he had travelled to Twantey near Yangon himself to purchase. The fish were again washed away by Nargis although he found some of the tilapia in the rice fields which he restocked in his pond.

Brackishwater aquaculture

Nargis cause major loss of life in Byat Kwal Gyi Village in Bogale Township near to the southern tip of the Delta, with only 50 survivors in 100 households from a pre-cyclone population of 650 people from 200 households. There are now only 18 rice farming households with the remaining being fishers and seasonal labourers. The former village headman (he and his entire family lost their lives) had been raising tilapia for two years, nursing in a small pond in the village with grow-out in a 2.4 ha fish pond constructed far away in his rice field. He fed the fish with rice bran. The fish were sold for almost \$1/kg in the village and in Bogale Town. Rather surprisingly the villagers said they found tilapia as well as rohu to be more tasty than marine fish, indicating that freshwater fish probably find a ready market even in the lower Delta where brackishwater and marine fish are plentiful.

Four of the villagers had constructed small crab ponds on the river bank to fatten crabs before Nargis. Female crabs 130-160 g in size are purchased from fishers for about \$0.25-0.30/ crab and are stocked for about 2 weeks and fed with small fish twice a day costing \$0.30/kg until they develop eggs after which they are sold for \$0.50/crab. Other villagers would like to fatten crabs which are abundant but have insufficient money.

I also visited a middleman in Hline Bone town in the south of the Delta which used to be surrounded by villages in which crabs were fattened. Male crabs sold for \$1.2/kg but females for \$4.0/kg. They were sent to Yangon and then mostly exported to China. Most of the crab fishers who caught crabs and the collectors who used to stock female crabs individually in small cages perished in the 5-6 m storm surge as the villages in this area had about a 60% mortality rate. There used to be 20 collectors who fattened crabs in small cages before Nargis but there were none during my visit. While the town suffered little damage during the cyclone, crab fattening had not yet restarted.

Small-scale aquaculture in the Delta

Prevalence

Small-scale inland aquaculture, defined as a third sub-system in a family-level rice dominated farm with buffalo for ploughing and small numbers of scavenging pigs and poultry, appears to be widespread in the townships visited in the Ayeyarwady Delta. Rohu and sometimes catla, common carp and tilapia are grown in small ponds near the farmer's house, and in integrated rice/fish systems as well as in ponds constructed in rice fields ranging in size from 0.2-2.0 ha based on farmer interviews. Fish are fed rice bran either solely or mixed with boiled broken rice. Fertilisation is neither practiced nor understood as in large-scale carp culture although one farmer interviewed previously integrated 500 chickens with fish in 1.2 ha of ponds constructed in the rice field before they



A borrow pit in Dedanaw village that could possibly be developed into a small fish pond.



The flooded rice-fish system belonging to farmer Myint Aung in Thee Gone Lay village.

were washed away by the cyclone; this farmer drained his three ponds to irrigate his rice which eliminated the need to purchase fertilisers for the rice.

Proposed project intervention

It is proposed that the small ponds near the households in the two above villages be renovated and the farmers provided with seed and feed for a growing season to enable them to restart aquaculture which is currently constrained by lack of money. As existing fish farmers in both villages expressed a willingness to form a fish farmers club to help each other through a donor funded initiative. Other farmers expressing an interest in raising fish and with land available should be included and provided with a pond, seed and feed. This proposed project would be based mainly on existing local knowledge and experience and would thus be highly likely to succeed. Fish seed is readily available in at least some parts of the Delta as there are more than 200 fish hatcheries in Ayeyarwady and Yangon Divisions; and villagers reported purchasing fingerlings from seed traders travelling in water filled boats.

It is also proposed that farmers be taught to raise fish in a more cost effective way. Rice bran should be used to supplement high-protein natural plankton food produced by



Excavated soil from the borrow pit being used to raise the level surrounding a house in Dedanaw village.

pond fertilisation rather than as the rather poor sole feed as is current practice. There is heavy demand for rice bran to feed poultry and pigs and to a lesser extent buffaloes so use of fertilisers would take some of the pressure off the rice bran for use as a fish feed. Chemical fertilisers would be required as village livestock comprise buffaloes with nutrient-poor manure and scavenging pigs and poultry.

It is also suggested that consideration be given to at least partially integrating ducks with fish by enclosing them at night on a fish pond so that at least some of their manure may provide natural food for fish.

The TCG recommended, as discussed above, that assistance should be provided to large as well as to small-scale farming households as most also require assistance to restart their livelihoods. It is the larger farmers who hire the large numbers of landless in the villages as seasonal labourers who cannot benefit directly from farming either crops or fish.

Rice/fish integration

It is also proposed that a research study be carried out on rice/fish integration in the Delta to assess the production and profitability of rice and fish grown separately and integrated. The Government is concerned about growing sufficient rice for national food security but experience elsewhere as well as from one of the farmers interviewed indi-

cates that rice production is increased through integration with fish. Furthermore, as discussed in my previous two columns on Myanmar, diversification of small-scale rice-dominated farms through conversion of a small area of rice field to a fish culture facility would help to increase the welfare of poor farming households by providing fish for domestic consumption as well income through sale of some of the fish; and it would provide fish for local rural and urban populations. Farmers reported preferring freshwater to marine fish. But the supply of fresh marine fish is also low in the dry season as observed during the visit in township markets where dried marine fish predominated with a small amount of carp, silver catfish and tilapia being sold which had been imported from large commercial farms in Tawantey near Yangon.



Farmer Hla Min and his wife and son in their newly constructed house in Dedanaw village.