

Peter Edwards writes on

Rural Aquaculture

The Dedanaw Project



Dedanaw village has extensive rice fields.

Background

Myanmar was hit by Cyclone Nargis in May 2008 with winds of 190km/hour and an enormous sea surge. It destroyed houses and even whole villages and caused massive flooding with an officially estimated death toll of 140,000 people and the livelihoods of 2.4 million people seriously affected. I outlined issues relating to small-scale aquaculture in articles in previous columns ('Myanmar revisited' in the January-March 2009 issue and 'Small-scale aquaculture in the Ayeyarwady Delta' in the April-June 2009 issue). Many agencies have been working since the disaster on the emergency distribution of food, non-food items and providing shelter, agriculture inputs and medical care to the victims in the affected areas to reduce their vulnerability and dependency on foreign food aid.

Among them the Ever Green Group (EGG), Social Enterprise Partnership for Development, a local NGO, has been facilitating the early recovery of the livelihoods of suffering families. EGG has a housing support project in Dedanaw village, Kungyangon Township, Yangon Division in the upper Ayeyarwady Delta about three hours drive south of the capital city Yangon and through this project we came into contact with small-scale fish farmers there. Following my second visit to the village I recommended that assistance be sought to help farmers to restart the aquaculture component of their livelihood portfolio. Staff from the national FAO office in Yangon, including those from the Emergency Rehabilitation & Coordination Unit (ERCU) set up to help Nargis victims subsequently visited the village and expressed interest in supporting the recovery efforts.



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The Chairman of EGG, Zaw Zaw Han, submitted a proposal to FAO, Yangon, 'Recovery Assistance for Small Scale Aquaculture Project, Dedanaw Village, Kum Gyan Gone Township' which was subsequently funded by SIDA through FAO and implemented by EGG. The project with a modest budget of US\$20,000 is being run from April 2009 to April 2010 and the beneficiaries are 27 small-scale farming households. I was invited by EGG in January 2010 to review the progress of the project and to suggest how to move forward which form the topic of this issue's column.

Dedanaw village

The village like most of the Ayeyarwady Delta comprises mostly extensive rice fields dissected by canals. There are a total of 700 households, 150 of which farm rice with the majority being landless, a typical pattern in the Delta. Fish farming was an established activity in Dedanaw village prior to the Cyclone with the knowledge of how to farm fish obtained by farmers from Twante, the major aquaculture area in the country to the west of Yangon. About 50 farmers in the village had constructed ponds in rice fields, dug with both family and hired labour, mostly initially to provide a source of water for domestic use and for watering rice seedlings but wild fish which entered unaided were harvested. Most of the ponds were dug about 10 years ago but the Government banned conversion of rice fields to fish ponds as discussed in my two earlier columns. Most of the ponds are not used today for domestic water as the water supply has been improved so most are abandoned ponds and used only to harvest wild fish.

On a previous visit to the village I was told by a villager that there were only four fish farmers in the village so imagine my surprise when I was later informed that 27 farmers are being assisted through the project to restart or develop pond aquaculture. On my latest visit I asked the same farmer about this apparent discrepancy and was told that the previous low number was that of farming households for which aquaculture had been a significant practice before Nargis. However, 27 farmers had renovated their derelict or idle fish ponds as the project provided them with assistance to get restart farming fish. Cyclone Nargis had flooded the village and washed away stocked fish and in some cases damaged the pond dikes. The rice farming villagers' first priorities following Nargis were to repair houses and to re-establish rice production, their major livelihood. Before the implementation of the project the fish farmers in the village had been unable to restart their fish culture businesses as they lacked funds for the start-up costs.

The project

The project is being coordinated by Zaw Zaw Han, Chairman of EGG. The technical aspects of the project were designed by Htin Aung Kyaw, National Consultant for ERCU, an Asian Institute of Technology (AIT) alumnus. Excellent advice on how to execute the project was provided by Rick Gregory, Fisheries Advisor for FAO, one of whose previous positions was Director of the AIT Outreach Program in Cambodia. Regular monthly supervision, monitoring and data recording of types and amounts of pond inputs and growth of stocked fish are being carried out by Win Maung Kyaw, Technical Specialist assisted by Ko Naing, a village farmer who serves as village-level Extension Agent.

The main project objective is to restart aquaculture as a livelihood for rice farmers in Dedanaw village. The 'traditional' fish species cultured in freshwater in Myanmar are the Indian major carps (IMC) (mainly rohu with much smaller numbers of catla and/or mrigal) and common carp. As IMC grow well in relatively large ponds such as the 1-2 acre (0.4-0.8 ha) ponds owned by many farmers, the culture of the smaller and shorter life cycle species Nile tilapia was introduced for the many smaller ponds less than 1 acre (0.4 ha) in size. Nile tilapia is also a more appropriate species for the poorest rice farmers. This project is thus demonstrating how to farm the smaller Nile tilapia and is providing an opportunity to compare first hand their established carp culture system with that of the novel culture of tilapia.

Twenty seven fish farmers are involved in the project with a total of just over 50 acres (20 ha) of ponds. It is expected that over 50 tonnes of fish will be produced which will improve the nutrition of fish farming households as well as that of the local community as well as provide income for the fish farmers.

Project experiences are being documented and will be circulated to other organisations.

Approach

EGG followed a farmer field school type of approach to working with the fish farmers that involves training and communal learning through regular experience-sharing



Large cattle introduced by the British over a 100 years ago to pull their cannon but used today to plough rice fields. Their manure is used to fertilise crops.



U Aung Sint the first rice farmer to build fish ponds in the village on swampy land unsuitable for rice more than 25 years ago.



U Win Maung Kyaw project Technical Specialist (left) and Mrs Ki Ti Aung (right) a project farmer.

opportunities. Field sessions involved test netting and technology demonstration and are facilitating discussion of the performance of carp and tilapia fish culture systems.

The first project activity was to form a fish farmers group with a Chairman and Secretary and it is being encouraged to meet on a regular basis. Training was provided on a range of topics during alternate months through the first 8 months of the project, starting with pond preparation and stocking in June 2009. Three one day long training sessions were held for the farmers on pond fertilisation, general grow-out and tilapia nursing and grow-out. The stocking of the fish ponds required a high level of cooperation between the farmers. It was important that stocking took place early in the wet season (June-July) before predatory fish species had a chance to repopulate the prepared ponds.



The project provided diesel for the farmers to pump water into their ponds.



Feeding rice bran which was not provided by the project.

It was explained to the Dedanaw village farmers at the outset that the Project would not pay for draining their ponds, removing excess mud and aquatic weeds which filled most of the ponds, or repairs to the dikes. Only ponds that had a high and complete dike and which had been drained, de-weeded and had predatory fish removed would be eligible for project support. The costs of these operations were to be met by the fish farmers themselves. The Technical Specialist verified the status of each pond to prevent fish seed from being wasted through stocking in under-prepared ponds. The project provided lime for pond preparation, diesel to cover the costs of pumping water to fill the ponds prepared for stocking fish, fish fingerlings and the initial fertilisation of the pond to create productive conditions for stocking. The farmers were told that only when their pond was predator-free and potentially productive would free fingerlings be provided through the project. This strategy served to separate out the approximately 50% of the farmers in the village with abandoned ponds who would only be interested in a 'free ride' from those willing to devote their own limited resources to ensuring that fish farming would be successful.

The project agreed to restock at least one pond of each of the 27 fish farmers in the village who prepared their ponds for stocking. Farmers also selected the type of fish culture that they wished to conduct. They were given the choice of stocking rohu or tilapia. Farmers with both large and small sizes of pond could choose to stock both rohu and tilapia, respectively. The procurement and distribution of fingerlings obtained from Khayan, the main seed producing area of the country, was to be done by the project Technical Specialist.

Farmers were provided with 10-12.5 cm carp rohu fingerlings, and/or 2.5-3.75 cm tilapia fingerlings which they were taught to nurse in a hapa suspended in the pond for 1 month to reach a size of 5.0-6.25 cm before they were stocked in the pond at a density of 0.5 fingerlings/m² for rohu and 3.0 fingerlings/m² for tilapia.

Farmers were provided with free chemical fertilisers to use in their ponds at the rate of 24.6 kg urea and 6.2 kg TSP/acre (0.4 ha)/2 weeks based on recommendations from the USAID-funded CRSP project based at AIT. No feed is being provided by the project as the farmers agreed to provide supplementary feed themselves for the fish.

No other inputs were provided under the project following stocking the ponds to increase the likelihood of sustainability at the end of the project. Farmers have to provide their own fertiliser and feed. Integration with existing livestock, especially ducks, was encouraged to provide manure to fertilise the ponds. One large high-quality seine net was provided to the fish farmer's group to facilitate harvesting fish by group members.

Figure 1. Gantt chart of project activities, July 2009-February 2010.

Activity	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
1. Formation of fish farmers group	•								
2. Training course on preparation and stocking	•								
2. Preparation of fish ponds and verification	•								
3. Purchase and stock of fingerlings		•	•						
4. Training courses and farmer field schools		•		•		•		•	
5. Harvesting of fish begins									•

Findings

I visited 9 project farms with ponds, a third of the project total of 27 farmers. The farmers unanimously expressed satisfaction with, and appreciation of, the benefits provided by the project. However, most commented that the fish were not growing fast enough as their ponds required more fertiliser and supplementary feed that they could afford to purchase.

One farmer said it was possible to borrow money to buy more fertiliser and feed but at an interest rate of 5%/month, equivalent to an exorbitant rate of 60%/year; and this is probably only half the rate at which some farmers would be able to obtain credit from loan 'sharks'. Future projects as advised by one of the farmers should either loan the farmers fertiliser and feed to be repaid after final harvest and sale of fish; or provide low-interest credit.

According to detailed project records 23 farmers had a total of 33 ponds ranging in size from 0.1-4.0 acres (400m² – 1.6 ha) stocked with 10-15 g rohu in July 2009 that ranged in average size from 35-290g by December 2009, 160 days after stocking. Furthermore, 5 farmers, some of whom had stocked one or more ponds with rohu, opted to stock monosex tilapia in a total of 6 ponds ranging in size from 0.2-0.8 acres (800-3,200m²) with 0.4g fingerlings in July 2009 and they had grown to an average size of 80-120g by December 2009, again 160 days after stocking.

The considerable range in fish growth was mainly due to variation in amount of fertiliser and supplementary feed used by individual farmers. Remember that the farmers were only given free fertiliser and not feed, and fertiliser was provided weekly only for the first month after stocking fingerlings although the initial dose was at double the weekly rate. Only about 25% of the farmers continued to fertilise their ponds when they had to purchase their own fertiliser. Some farmers also purchased rice bran as supplementary feed but usually insufficient to maintain high fish growth.

The farmers were unaware and were pleasantly surprised that chemical fertilisers could be used in fish ponds as their only previous experience had fertilising rice. Traditionally the farmers used mainly rice bran and occasionally oil cake as pond nutritional inputs.

The growth performance of tilapia was relatively higher and less variable than rohu which probably also reflects the selection of the new species, tilapia, by more adventurous and conscientious farmers.

Two of the farms visited had ducks which at the time of the visit were scavenging for food in the rice field. Partially housing the ducks over the fish pond is an effective way to fertilise the pond as one of the farmers with 170 ducks housed at night over a 0.3 acre (0.12 ha) fish pond or a duck stocking rate of about 12,000 ducks/ha had green pond water and the best growth of rohu among project farmers.

Some of the farmers had purchased and stocked a few grass carp to control vegetation in the ponds. Grass carp were smaller than rohu when stocked but after a few months were much larger in size.

Their degree of involvement in rice farming varied. Of the six farmers I enquired about their rice holdings, one household had none, a second only 2 acres (0.8 ha) and the other three sizable rice holdings of 14-23 acres (5.6-9.2 ha).

I reported on the only project family without a rice field in my two previous columns on the Delta. During my first visit all their fish had been washed out of their three 500 m² ponds on their 2 acre plot of land (0.8 ha) and their house had been destroyed by Nargis so they were living in a temporary



Feeding baskets.



Plankton-rich green water from partial confinement of ducks over the pond during the night.



Sampling rohu.

dwelling. At the time of my second visit Mr Hla Min who is a bus conductor and seasonal farm labourer and his wife Ki Ti Aung had rebuilt their house but still had insufficient money to purchase fish seed and feed and be able to restart the fish farming part of their livelihood portfolio. By the time of my visit this January the project had helped them to restart aquaculture. They had stocked two ponds with rohu and one pond with tilapia and were feeding rice bran as well as fertilising once/month. Mrs Ki reported that the main thing the project taught them was pond fertilisation which reduced the need to purchase costly rice bran.

In my previous column on small-scale aquaculture in Myanmar I reported on and photographed a landless family excavating soil from a 'borrow pit' on their small plot of land to raise the level of the house. The borrow pit could have been used as a fish pond but project staff informed me that the family was not interested in joining the project. This underscores the fact that it is difficult for the poorest households to spend their very limited resources on farming fish.



Ducks scavenging for feed during the day in the rice field.



Sampling tilapia.



A 350 g rohu from a well-managed project pond.



A 100 g tilapia from a well-managed pond.



Feeding rice bran which was not provided by the project.



A large abandoned pond.

The farmer who had only 2 acres (0.8 ha) of rice fields had three ponds with a total area of 3.1 acres (1.2 ha). He used to raise chickens and fish but they were both washed away by Nargis. Now he is developing fish culture as his main business. He inherited the land but worked as a rickshaw driver until he had saved enough to invest in poultry and fish.

I also observed a large abandoned fish pond of 3.5 acres (1.4 ha). When I enquired why such a resource was not being used to culture fish I was told that it belonged to a better-off rice farming family who also have 20 acres (8 ha) of rice fields. The farmer and his wife are getting on in years and their grown-up children have left the farm and are not interested in fish culture.

Some of the larger fish, some faster growing rohu and grass carp, had already been seined out and harvested in December after 5 months of growth. They were able to sell 350g rohu for kyats 1,700/viss (1.6 kg) or about US\$1/kg.

I was told that the farmers had organised themselves into six farmer groups rather than one, each with a leader, to avoid problems, especially staging fish harvests to avoid flooding the local market with fish, thereby lowering the price. Clearly the project is working well and farmers reported that they would be able to continue farming fish without further support at the end of the project.

Rationale and future

The project was conceived as a pilot to provide learning opportunities within Dedanaw village for both farmers and project staff, with the intention of extending the experience later within Dedanaw Village (witnessing the success of the project should lead to interest by some of the other farmers in the village with abandoned ponds to farm fish), elsewhere in the Delta and in other areas in the country. Efforts are currently underway to locate other villages with abandoned fish ponds in the Delta and funding will be sought to replicate the successful project experience in other villages.

I also visited Khayan, the major fish seed producing area in Myanmar, to investigate the availability of seed for future expansion of aquaculture in the Delta. I was informed by U Aye Ko, the Leader of the Khayan Fish Farmers' Association that they would be able to supply sufficient fry and/or fingerlings. The total seed production last year was 1 billion 3cm and 700 million 10-15 cm fingerlings. They sell seed to nursery and grow-out farms throughout the country.



A small abandoned pond.

Many families depend on small-scale aquaculture in Yangon Division and northern Ayerwaddy Division and there is considerable potential for this activity to spread to new areas, particularly those with less than abundant wild fish stocks. In some areas, aquaculture is an important means of food and income generation, as well as providing significant employment opportunities for casual labourers. Very few organisations to date have supported the rehabilitation of small-scale aquaculture in Nargis affected areas although several have shown an interest in piloting aquaculture approaches.

As there is considerable wild vegetation on and around farms, grass carp should be stocked also in the ponds in polyculture with either carps or tilapia. Grass carp stocked at 12.5 cm can control growth of vegetation in the pond and after only 6 months is large enough to be harvested.

To maximise profit in fish culture it is necessary to effectively use pond space and volume by stocking large fingerlings in the grow-out phase, as was done in the project. However, some farmers should be taught how to nurse fry to fingerlings, perhaps in hapas suspended in the ponds as most of the ponds are too large to be prepared for nursing by small-scale farmers. As well as it being easier and cheaper to transport fry than fingerlings from the main seed producing area of Khayan near Yangon to the Delta for grow-out, nursing fry to fingerlings would thus become a livelihood option for some farmers.

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