The Malaysian experience

By ET Aldon

Integrated farming has long been practiced in Malaysia, basically to provide protein requirements needed by the family. It is also a source of income.

Integrated farming not only improves agri-aqua production but it also optimizes the use of land and water resources. Use of feeds is also minimized, thus reducing its effect on the environment.

With fish being promoted on a larger scale, the Malaysian government is providing farmers with financial assistance and hands-on training on fish culture and rice production. Socioeconomists suggest that consumer preference be considered when farmers decide on what crop to raise.

**Fodder-fish integrated farming**

Fodder-fish integration is widely accepted in Malaysia just like rice-fish farming because: (1) it is environmentally sound; (2) shrimp and fish are of high economic value; (3) seeds are easily available; (4) different niches are used in polyculture, thus minimizing competition for food among different species; (5) the fodder-fish can last for 5-7 years with minimum maintenance; (6) the system is open to the introduction of additional components at a larger scale; and (7) various combinations can be used to get the highest yield and income. Agri-aqua does not take much time and effort in terms of stock management.

The fodder-fish integration utilizes the most commonly used fodder species as feeds like the napier grass *Pennisetum purpureum*, the cassava *Manihot esculenta*, and the ipil-ipil *Leucaena leucocephala*. These have high dietary value, are highly palatable, and digestible.

**Fodder crops**

About 3/4 of the mature stems of napier grass and cassava are planted at 45°. Napier grass cuttings should have 3-5 nodes while cassava is 25-30 cm long. Ipil-ipil can be directly seeded or transplanted, usually at the start of the rainy season. The plants should be protected from animals and are fertilized every month.

After 6-8 weeks, napier grass are cut 7 cm from the ground to encourage vegetative growth, then cut every 2-4 weeks at 10-15 cm from the ground. First cutting of cassava is about 0.5 m from the ground, 8 weeks after planting and then regularly every 4 weeks. For legumes, first cutting at 0.3 m from the ground is done after 8-12 months then regularly every 8-12 weeks.
The leaves are chopped in small pieces for feed to hatchlings or fry or leaves may simply be placed in the pond for bigger fish. Cassava tuber can also be included.

**Fish culture**

The pond, usually 0.1-0.5 ha, should be near the water source. Bunds which are built to separate the ponds should be 2-3 m wide and can hold water 1-m deep. Screened inlet and outlet pipes are installed.

The usual pond preparation is done: (1) drain and dry the pond; (2) apply lime to condition the soil; (3) fill the pond with water 2 weeks after liming; (4) fertilize to promote growth of plankton -- chicken manure at 200 kg per ha for nursery ponds and 300 kg per ha for growout.

Fish are stocked, preferably in the evening. Two options may be tried:

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<th>Option 1</th>
<th>Option 2</th>
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<td><strong>Grass carp-bighead carp-tilapia at a 5:1:15 ratio</strong></td>
<td><strong>Grass carp-Javanese carp-shrimp at a 1:3:30 ratio</strong></td>
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<td>Introduce duckweed as carp feed in the first month, then use chopped cassava leaves and napier grass. For tilapia, cooked maize, leftovers and cassava are given.</td>
<td>Feed the fish with rice bran, bread, sago, cassava and napier grass.</td>
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<td>A farmer could earn M$6,950 against expenses of M$1,660 (maintenance, fish seeds, others), a profit of M$5,490 (US$1 = M$2.70).</td>
<td>A farmer could earn M$1,060 but will spend M$355, profiting M$705. Annual return is 2 cycles per year.</td>
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Kechik in 1994 also reported a successful integration of Chinese and Indian major carps with agriculture.

**Fish-livestock farming in mine pools**

Ahmad Fuad Bin Ahmad and Abdul Khalid Bin Hashim, Assistant Fisheries Officers of the Department of Fisheries in Malaysia were among the 14 trainees of AQD’s 1997 *Coastal Aquaculture and Resource Management* course. They have gone around Malaysia, providing technical assistance to farmers. Here, they discuss their compatriots’ ingenuity in using abandoned tin mine sites for integrated farming in Perak, west Malaysia.

The mine pool is about 5 ha wide and between 10-20 m deep (see illustration below). Farmers apply for a tempo-
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The study tests the stocking density (0.5 or 1 per m²) and feed (fish by-catch or mixed diet of 75% brown mussel flesh and 25% fish by catch) of mud crab stocked in the 200 m² pens.

Two months from stocking (initial body weight, 16-25 g; carapace length, 3-4 cm), the mud crab have attained a body weight of 65-106 g and carapace length of 5-6 cm.

The site is favorable to the study because of an enlightened population. The vast area (70 ha) planted to mangrove testifies to the successful cooperation between people, the government and a non-government organization (NGO). Mr. Frank Sotuniel, President of KASAMA, says that since the mangrove have been planted, people from other towns gather mud crab, rabbitfish, oysters, blood clam, gobies, etc.

“It is a major source of livelihood,” Mr. Sotuniel says. The people have learned to monitor and maintain the mangrove. They watch for cows that feed on the young planted trees, dead wood, plastic, and other debris that would disturb the site. He also said that the young mangrove are attacked by what they call rusak worms. When asked why there is an increase of fish, clams, and crabs in the planted mangrove areas, he said “I don’t know. Perhaps because they have found a shelter.”

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ration. About 10% of the area is covered by canals 80 cm deep for the retention of water at lowest tide. The height of the enclosure is 30 cm higher than the highest high tide.

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AQR’s mud crab-mangrove farm site in Kalibo, Aklan.

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