The broodstock floating cages of AQD

By **MB Surtida**

SEAFDEC / AQD established a marine research station in 1974 in a protected cove in Guimaras Island for studies on breeding the tiger shrimp in pens. Soon after, floating netcages were constructed, and marine fishes were added to the list of research priority. Today, the Igang Marine Substation maintains broodstock and nursery cages for milkfish, grouper, red snapper, and sea bass.

The IMS floating cage showing the egg collector being moved for collection.

The floating broodstock cages

The original design of the floating cages at AQD's Igang Marine Substation in Guimaras Island was made by Yu et al. in 1979. In the late '80s, an egg collector was designed when researchers found it difficult to harvest milkfish eggs. This egg collector has now become a unique feature of the Igang floating broodstock cages (Fig. 1-2)

The floating broodstock cages now consist of a square frame which serves as walkways and working area. The net bag is attached to a ring fastened to this frame. Cover net is placed at the top ring. Since it has no projecting structure, space was made available for the egg collection gear.

In 1988, the egg collection gear to collect naturally spawned milkfish eggs was described in a technical paper by AQD researchers to address the ineffective methods of collecting milkfish eggs. When presence of eggs is confirmed, the egg sweeper is "rotated 3-5 times around the cage. After splashing the sides of the egg sweeper to gradually collect eggs to the detachable conical net bag, the net bag is gently lifted and immediately transferred into a pail of seawater. Collected eggs in the pail are suspended by mild aeration. When no more eggs can be collected from the cage, the egg collector is lifted and secured on one side. The conical fine mesh net is rinsed and then air-dried. Two technicians can operate the collecting gear."

The floating cages for grouper (1990) and sea bass (1986) are similarly installed with egg collectors that line the cages. To retain spawned eggs, a "hapa" net (0.4-0.6 mm) mesh size with dimensions 4 x 4 x 3 m (same as the cages') is set up everyday about 1-2 hours before expected spawning (late afternoon). The hapa net is removed and cleaned every morning by slowly raising the hapa net to gather the spawners and spawned eggs. The spawners are transferred to the netcage while the eggs are scooped out and placed in aerated tanks with ambient seawater. The hapa net is removed and cleaned every morning to permit water exchange during the day. This egg collection gear provides an alternative to the existing methods of breeding the sea bass. It is simple, cheap, and minimizes stressful handling of the spawners.

Size. The IMS floating cages are sized 6 m and 10 m diameter for milkfish broodstock and 4 x 4 m, and 4 x 5 m and 5 x 5 m floating cages for other species, i.e., sea bass, groupers, snappers, with a net depth of 3.5 m including freeboard.

Materials. The walkways are made of 2-4 x 15 cm wooden planks placed side by side with a gap between that runs along the framing. The planks are attached to 5x7 cm wooden joist by 8 cm long concrete nails (this has more grip compared with other nails). Wooden parts are painted with black coal tar as protection from weather element. The joist is then tied to the framing with 160 lbs monofilament twine.

The framing is made of 5cm diameter GI pipe S40. It is painted with epoxy primer paint and finished with weather resistant roofing paint. Braces are provided to maintain the distance between longitudinal pipes. These are spaced so as not to obstruct the placement of buoys. The width of the framing is carefully selected to hold the empty plastic drums and to provide space

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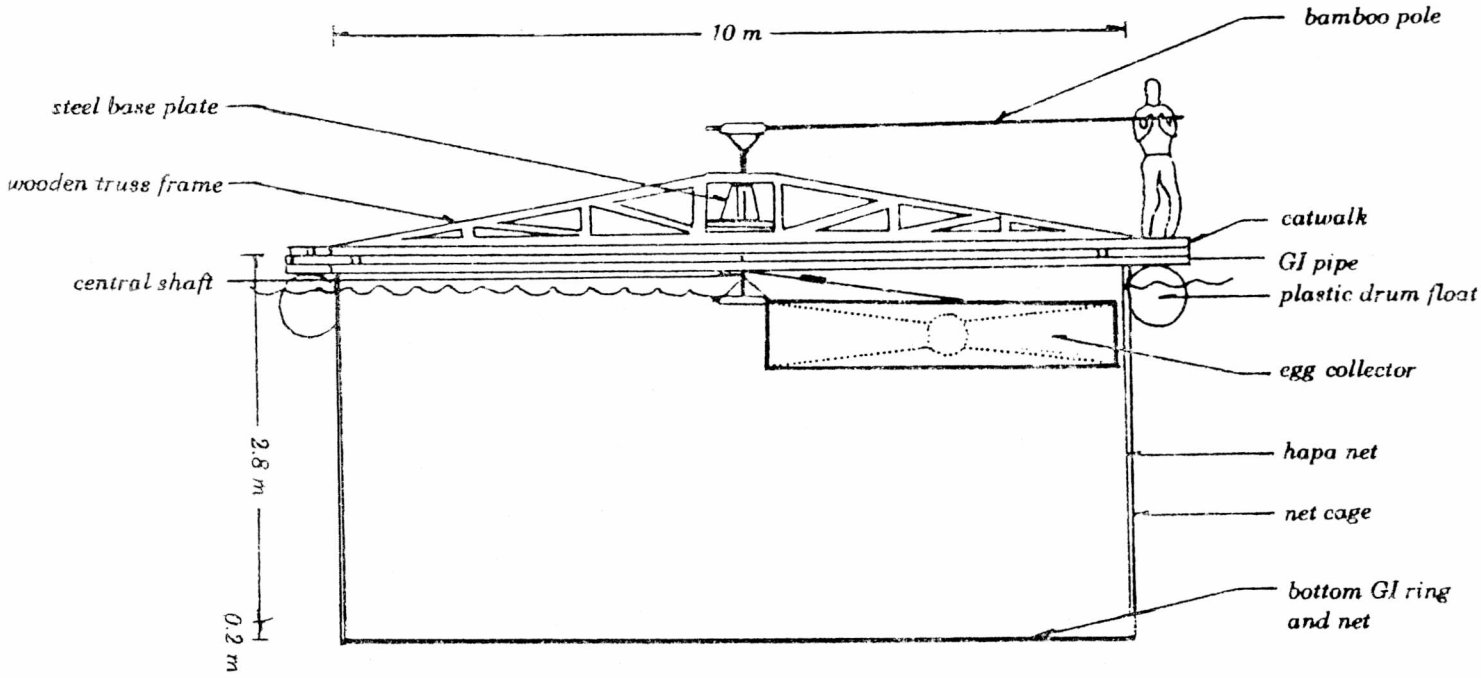

Figure 1 Set-up of the wooden truss frame, egg collector, and hapa net in a 10-m diameter x 3-m deep floating net cage (from Emata et al. 1992)

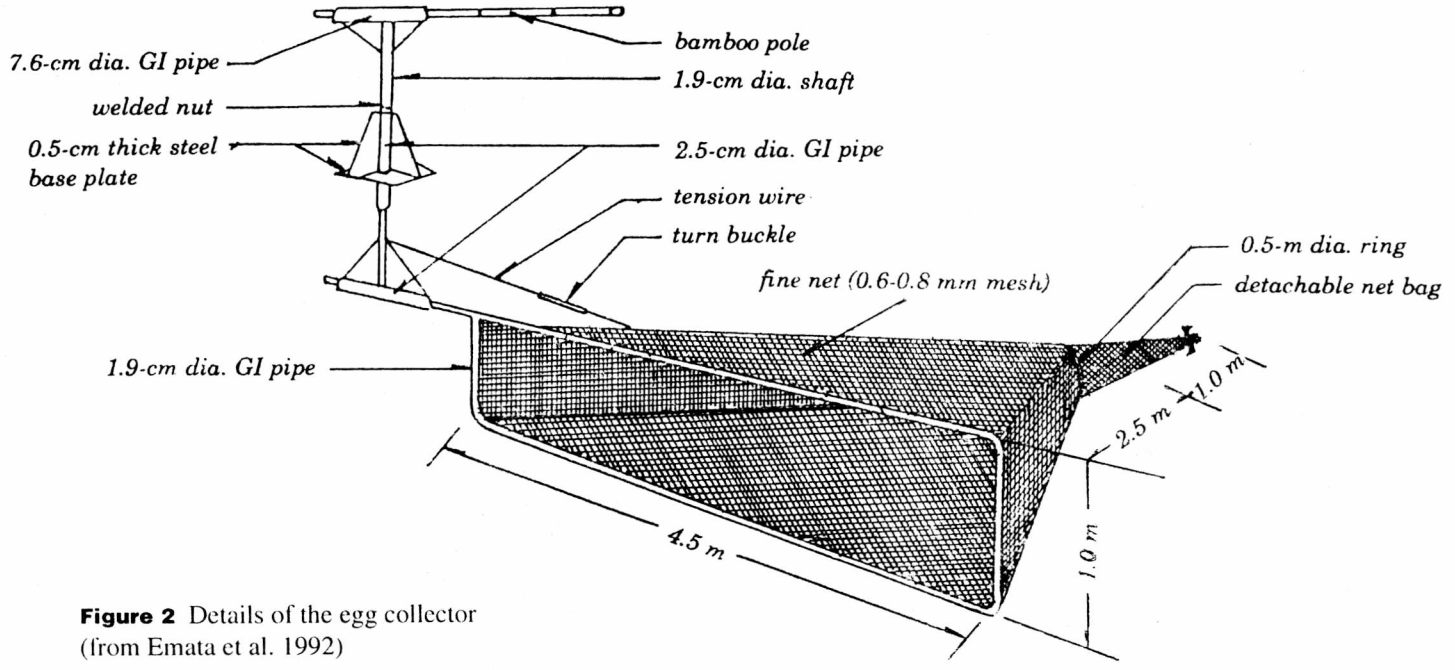

Figure 2 Details of the egg collector (from Emata et al. 1992)

At IMS, AQD demonstrates the feasibility of growing fishes (milkfish and grouper) commercially in floating net cages.

for walkways. The framing is joined at the corner with four (4) sets of custom-made stainless steel U-bolts provided with flat bar, nut, plain and lock washers, and flatbelt. The flatbelt is provided to avoid metal to metal contact.

Bouyancy is provided by 200 liters capacity empty plastic drums. Drums with small hole opening to minimize adhesive sealant for sealing the opening must be selected. Black color drums are preferred because they are more weather resistant than the blue colored plastic drums which are abundant in the market.

Net riggings for the cages are two GI pipe rings attached to maintain the shape of the net bag from top to bottom.

The netting is 210 d x 42 knotted nylon treated with black resin and with a mesh size of 5 cm when stretched. Each cage is provided with a net cover to prevent fish from escaping.

Fabrication and installation. Fabrication is carried out by making the framing, walkways, and other wooden parts in segments. This allowed easy transport of the cage structure for assembly at Igang.

Maintenance and repair. Since the floating cages are exposed to seawater, it is unavoidable that the net bag will be covered with fouling organisms such as barnacles, oysters, mussels, algae, and others. Their growth can be minimized by regularly (once every two weeks) scraping the fouling organisms clinging to the nets with a rounded triangle (about 20 cm on each side) with a long handle. The net bags are changed annually for cleaning, mending, and repair. These are again treated with black coal tar and dried. Similarly, the plastic drum floats are routinely rotated to minimize growth of fouling organism. Fouling organisms reduce life span and buoyancy of the drum floats.

The wooden walkways are maintained by applying coal tar into the planks and joists with rotten sections regularly replaced. AQD's experience shows that it is necessary that ties of joists to the framing must be regularly checked. Replace the ties when broken. The GI framing must be chipped off with rust severely occurring at welded joints. The joists must be cleaned by brushing or sanding prior to repainting. For the circular cages, the top and bottom GI pipe rigging (ring) are also replaced annually. Mooring lines and anchorages should also be checked regularly.

Present research studies conducted at IMS

Milkfish. At present, a study on dietary supplementation of vitamins C and E is being conducted in the broodstock cages. A homogenous stock of 12-year old milkfish initially from wild-caught fry are reared in 4 units of 10-m diameter floating cages. They are fed daily at 3% ration size diets supplemented with 0.1% Vitamin C, 0.05 % Vitamin E, both Vitamins C and E, or no vitamin supplementation (control). The production and quality of eggs and larvae from spawns of broodstock from each treatment are used to evaluate reproductive performance.

Red snapper. Another study being conducted is on fry production of red snapper. The study aims to generate a breeding program so that a sustained production of high quality seeds can supply hatchery operations of mangrove red snapper. Adult mangrove red snapper are fed trash fish or formulated pellets every other day at 5% of their total body weight. Fish are sampled at periodic intervals throughout the year to monitor gonadal development. Fish are induced to spawn naturally to determine egg production cycle and evaluate reproductive performance.

Technology verification and extension project (TVE)

AQD has started mariculture projects at Igang. Floating netcages (24 units) of size 5 x 5 x 3 m currently hold grouper, siganids and seaweed stocks.

Grouper (E. coioides) broodstock development. Grouper broodstock (32 pcs weighing 3- 5 kg each and 8 pcs weighing 10 to 15 kg) have been procured from Capiz and Guimaras. These are fed trash fish and mollusc meat at the rate of 5% of the total biomass every other day.

Another cage holds grouper and red snapper broodstock caught from the wild using bamboo fish traps ("bobo").

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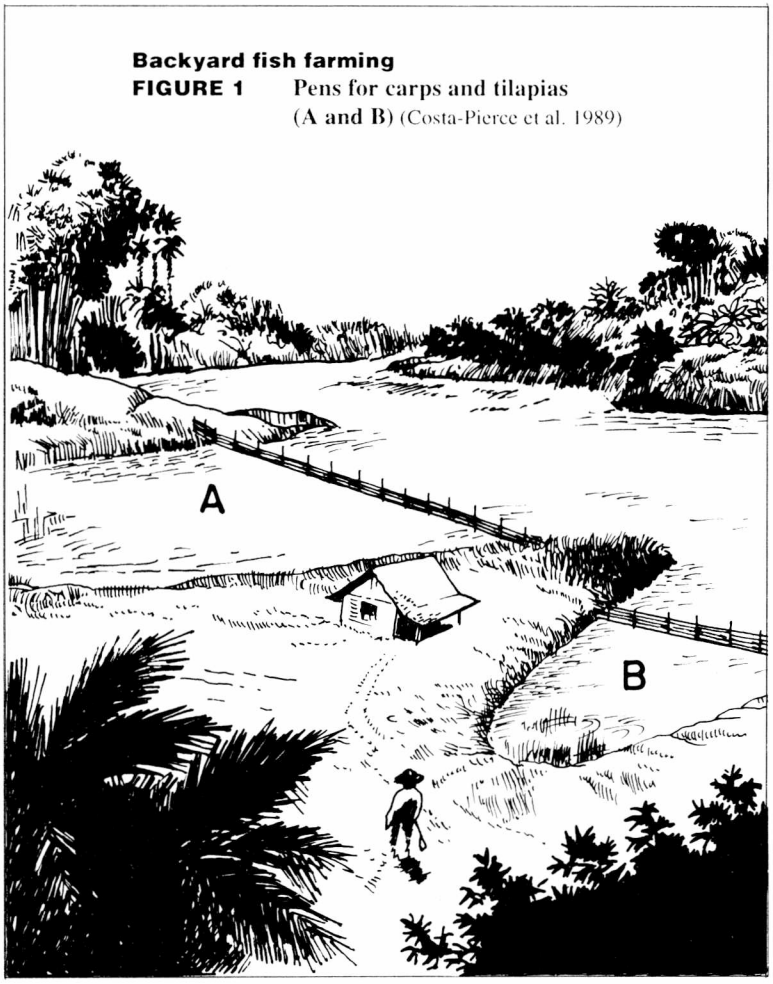
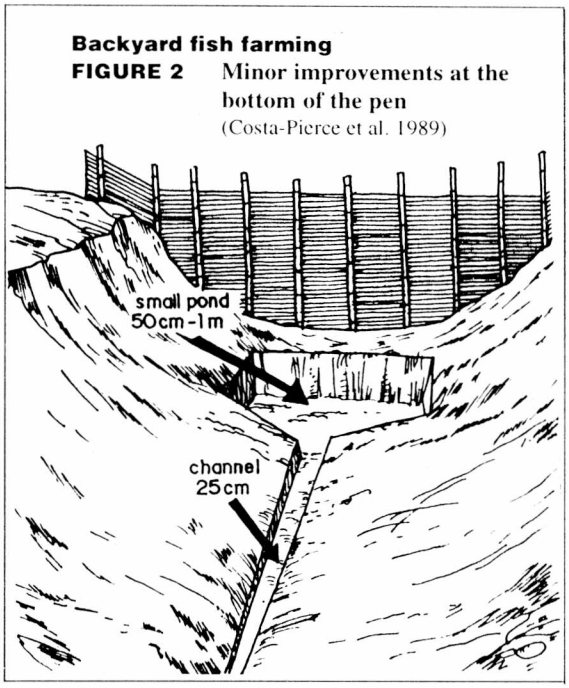


Backyard fish farming
FIGURE 1 Pens for carps and tilapias (A and B) (Costa-Pierce et al. 1989)



Backyard fish farming
FIGURE 2 Minor improvements at the bottom of the pen
(Costa-Pierce et al. 1989)

AQD broodstock cages ... from p 19

Grouper nursery and grow-out project. Four cages made of double 'B-nets' are used as nursery cages for grouper tiny or fingerlings. The nursery cages are provided with electric lamps to attract natural food at night. A total of 8,386 grouper fingerlings from Negros Occidental and Mindoro are presently stocked in these cages. Sizes of the fingerlings range from 0.6 to 25 grams. Sorting is done every week and stock sampling is undertaken every 15 days. One cage made of "pamo" netting is stocked with 1,054 grouper juveniles which weigh around 28 g and measure 12.8 cm each after 30 days of culture. Fish are fed with chopped trash fish at the rate 10% of the total biomass given daily at three times per day.

Cage culture of siganids. Another 'B-net' cage is stocked with 1,200 siganid fingerlings and are being fed filamentous green algae or 'lumut' supplemented with commercial feed pellets.

Seaweeds culture. *Eucheuma* spp. culture using fixed bottom line is on-going. Eighteen lines supported by wooden stakes are installed in the subtidal zone with an area of 10 x 2 m. Each line is stocked with 150 to 200 *Eucheuma* seedlings at an interval of 25 cm, making 36 seedlings per culture line. The module is enclosed with nylon nettings (1.0-1.5 cm mesh size) to minimize entry of grazers such as siganids and other herbivore fishes.

Twenty-five lines of seaweed hang vertically inside one floating cage stocked with grouper fingerlings. Initial sampling shows that growth of the seaweed inside the floating cage appears to be faster. Seaweed are protected from grazing wild fishes by both the nets and the groupers.

One floating raft module (10 x 10m) for *Gracilaria spp*. culture has been installed and is ready for stocking.

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