Cage Designs for rearing of Hilsa

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Successful cage farming of fishes in open waters depends largely on the design of the cage as it should suit the behavior of the fish and its hydrodynamics in the location, besides the economics, and operational factors. In view of the above, an experimental cage culture unit for nursery rearing of Hilsa (*Tenualosa ilisha*) was established in Ukai reservoir, Gujarat. The multi-purpose reservoir having a catchment area of 62255 km^2 with a water spread of 52,000 ha has a mean depth of 11.8 m. Based on extensive surveys, the reservoir was found suitable for cage culture of hilsa, as it supported a landlocked population of hilsa and young ones of stockable sizes were available in sizeable quantity. The site selected for cage installation was devoid of macrophytes and water turbulence at a depth of about 10m (Latitude: 21°20'39" N and longitude: 73° 49'13" E). Nursery rearing trials were performed with two types of cage designs, considering the fast-moving behavior of the fish. One was a rectangular cage (15x5m) and the other, was a circular cage (6m diameter) with depth of 3m each. The fabricated cages for nursery rearing were made up of High Density Polyethylene (HDPE) and PP net was used as an outer predatory and as an inner net for stocking the fish. A bird net for the top cover to avoid predation by birds was also provided. The cage frames were made up of 140mm HDPE pipes (PE 100 PN 10). Cat-walk and handrails were made of 90mm HDPE pipes (PE 100 PN 10) for the safety of the workers while feeding the fishes and on routine management (Huguenin, 1997). The bottom of the net cage was provided with a ballast made of HDPE pipe filled with weights for keeping the net cage in shape and volume. The collars *viz*., horizontal, diagonal, and vertical base brackets, were made up of HDPE material. A pair of floatation pipes made of HDPE, filled with expanded polystyrene, was used to give adequate structural strength and buoyancy for floatation of the cage structure. The ballast pipes were provided with holes for the free flow of water and for increasing its weight. Considering the size of the hilsa seeds to be stocked, the mesh size of the inner net was fixed at 8mm. To prevent predatory fishes and also to provide security to the inner net, an outer net having 25mm mesh was used. The bird net provided on top of the cages was of 35mm mesh. The cages were anchored individually using a single-point revolving mooring system with 80 grade long-linked alloy steel chain. RCC blocks of two tonne weight installed at the reservoir bed served as an anchor and a revolving shackle of three tonne capacity was provided to allow free rotation of the cages (Fröyaringen, 2003; Kristiansen and Faltinsen, 2012).

Tenualosa ilisha being a fast-swimming fish and a plankton feeder, its behaviour concerning swimming depth and speed was studied in both, rectangular and circular cages. It was observed, that the fish moved at a fast pace inside the rectangular cage, in straight lines, and frequently dashed against the walls of the net cage resulting in fatal injuries on their snouts. In the circular cage, though the fish moved speedily, it followed the circular shape of the cage and slowly got acclimatized to the cage environment. The acclimatization of hilsa juveniles collected from the wild, during nursery rearing in the cages and their survival were better in circular cages. Taking a clue from the above, similar circular cages were fabricated and installed for grow-out culture, which ensured high growth rate and survival of the cultured fish. This highlights the need for adequate studies on the behaviour of the various fish species in cages for their successful cage aquaculture operations.

References

Fröyaringen, A.2003. *Single point mooring/tandem mooring (SPM system)*. www.froyaringen.no, 10th February 2004.

Huguenin, J. 1997. *Aquaculture Engineering*, 16:167-203.

Kristiansen, T. and Faltinsen, O. M. 2012. *Journal of Fluids and Structures*, 34: 218-235.