4

Design and building of a monk gate using mild steel plate and carbon steel valve

Okojie, L. A./ Eze, J. O.

Abstract

In this case a design and building of a monk gate that is safe and easy to operate which is made from mild steel plate and carbon steel ball valves has been undertaken and completed. All it needs to function efficiently is for it to be installed in to a monk designed for it (that has its groove) and it starts full operation.

Keywords: *Sluices, steel plate (mild or stainless), ball valves (carbon or stainless), zink-oxide and monk gate.*

Introduction

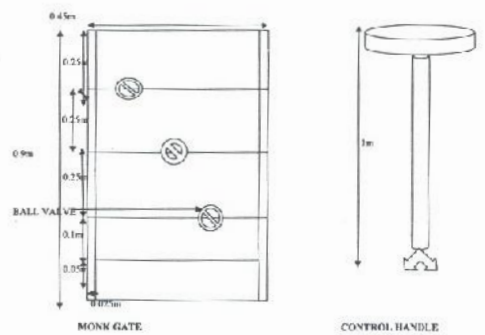

Fig. 1: Diagrammatic construction of a monk gate

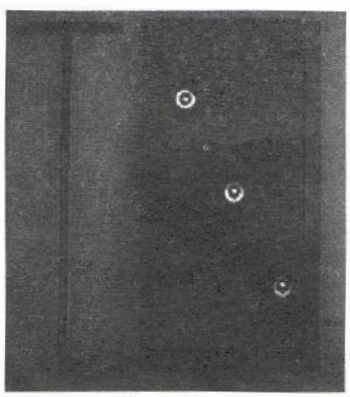

Fig. 2: A monk-gate

Farm ponds are small tanks or reservoir-like constructions that are constructed for the purpose of storing the surface runoff, generated from the catchment area. The farm ponds are water harvesting structures, solve several purposes of farm needs such as supply of water for irrigation, cattle feed, fish production etc, (Suresh, 2006). Fish ponds have to be emptied either partially or fully, especially during harvesting time. When there is excess water in the pond it has to be drained to required level to prevent pond wall from being weakened and collapsing.

A good drainage system is enhanced when ponds are built on a good slope. The system must be built before the walls because most of them go through the base of the main pond wall. Drainage structure should be screened with fine wire mesh to prevent escape of fish. For large ponds, sluice and monk are built on concrete base to prevent possible erosion of the drainage structure. The monk functions only as an outlet structure. Monk consists of a vertical U-shaped tower and it opens towards the pond. A pipe goes through the pond wall from the back of the monk to the outside. The grooves are where the wooden boards can be slotted to stop water from seeping. The monk is much like a sluice gate, but it is not built into the pond wall. Monk should be constructed at least 0.5meters away from the foot of the wall in the deepest part of the pond and at least 40cm(0.4m) above the water level, but not more, as this will make the removal of boards difficult. The drainage pipes should be at least 0.3 meter below the pond and slopes at 45 for good draining (*Fish pond site selection and construction*, 1994).

The drainage system must accommodate three needs. First it must allow water to be released when necessary while preventing release under normal operating conditions. Second, it must act

as over flow. Third, when quality deteriorates and the pond is flushed, it must allow the farmer the option of drawing from the bottom, where the water quality is worse. The drainage system consists of a device that controls the water level and a pipe or canal that carries the water to an outside drainage area. Some common devices are monks, sluice gate and canfield (also called turndown) drains (Jeff and Dave, 1990).

This study gives a description on the effort made under several researches in the designing and building of a monk gate that is safe and easy to operate which is made from mild steel plate and rods and carbon steel ball valves. In completion, all it needs to function efficiently is for it to be installed into a monk designed for it (that has its groove) and it starts full operation. With the present type of monk gate being used for Monks in reservoirs and earth ponds in NIFFR, New Bussa and her environs and also in Owerri environs which has a zonal station, it has being observed and noted by users that it is difficult and tedious to install and operate the widely used monk gates (the use of wooden boards of various sizes to regulate water in the monks) and above all there are usually loss of water through these Monk-Gates in reservoirs and earth pond at times when conservation of available water for fisheries activities is of utmost importance.

Materials and Methods

Design: In this case a prototype monk-gate of 0.9X0.45m made from mild steel plate of 5mm (0.005m) thickness with holes bored at 0.071m vertically at a distance of 0.25m apart from each other on the plate and carbon steel ball valves of 2inch (0.0508m) internal diameter and 0.07m external diameter fitted to each hole on the plate for displacement and regulation of water has been built .The plate was cut to size using an angle grinder with the appropriate stone attached to the angle grinder and the holes for the installation of the valves were bored with lathe machine on the plate for accuracy, also all the welding were carried out using a gauge-10 mild steel electrode.

A manual detachable control handle made also from mild steel with a grip at its base helps to switch on and off the ball valves control from the top of the monk. The monk gate and its handle were supposed to be coated with zink-oxide to prevent rusting but in this case oil spray paint was used. From the 0.9×0.45m plate, 0.025m from left and right will go into the concrete wall of the monk structure and 0.05m from below the plate will also go in to the concrete wall below of the monk structure and held firm with a little quantity of freshly mixed concrete. Below is the front view of the design of the monk gate and its manual control handle.

Results and Discussion

The only limiting factor at this point is the environment to test-run this design, to really prove its efficiency. But from the design and photograph above, it well illustrates the monk gate.

Conclusion

For us (Nigerians) to be able catch up with the developed and advanced nations in the aquaculture business, new technologies like these should be embraced so as to make aquaculture an all year round practice since with the use of this new monk gate more water can be conserved and also it is easier and safer to operate.

REFERENCES

Jeff, M. and Dave, L. (1990). *Design And Construction of Diversion Ponds for Aquaculture*. Department of Fisheries and Wildlife, University of Minnesota.

NAERLS (1994). *Fish Pond Site Selection and Construction*. National Agricultural Extension and Research Liaison Services, Ahmadu Bello University, Zaria.