Progress in Aqua Farming and Marine Biology
ISSN: 2640-6764

Mini Review *Volume 3 Issue 1*

Fish Passes

Shivakrishna A*

The Indian Council of Agricultural Research, Central Institute of Fisheries Education, India

***Corresponding author:** Avadootha Shivakrishna, ICAR, Central Institute of Fisheries Education, India, Email: avadootha.frmpa804@cife.edu.in

Received Date: August 28, 2020; **Published Date:** November 19, 2020

Abstract

Running waters naturally interlink different eco-regions, and are of essential ecological significance. They are, therefore, rightly called the vital lines of communication in nature. It is important for the flow of water to be sufficiently swift to attract the fish to the bridge, but it cannot be as strong as to wash the fish downstream or render them unwilling to keep moving upstream.

Introduction

A fish pass, also known as a fish way, fish ladder or Fish steps are an artificial and naturally existing (such as dams, locks and waterfalls) system that promotes the natural movement of diadromous fish. The majority of fishing ways require fish to pass through the barriers and leap into the waters on the other side of the ladder in several fairly small measures. According to the recommendations of Francis Day (1873) the Government of Punjab was the pioneer in India in erecting fish passes across the Indus river at Jhelum (1901), followed by Sutlej, Ravi and Jhenab (1910-1934 period).

History

Written records of rugged fish ways date back to the 17th century and are used to create steep channel measures to circumvent obstructions by packages of branch ways. Richard McFarlan of Canada copyrighted a variant in 1837, which engineered a fish way for circumventing his water driven lumber mill. The Fish Pass was built in Ireland from 1852–54 to carry salmon into a channel that did not allow fishing. In 1880, on Pawtuxet Falls Dam, the first fish ladder was installed on Rhode Island, USA. When the City of Providence demolished the wooden dam with a cement dam in 1924 the ladder was cut.

Types of Fish Passes

There are two types of Fish ways that are Close to nature and technical type [1-4].

Close-to-Nature Types of Fish Passes

Imitates as closely as possible natural river rapids or brooks with steep gradients. Construction material chosen corresponds to what is usually present in rivers under natural conditions. There are several types in this such as

Bottom Ramps and Slopes

A sill with a rugged surface that is as flat as possible around the entire river width to resolve a gap in the river's edge. It also requires systems for stability (e.g. weirs stabilizing) whether the weir body is small, like a bridge or slide slope and has loose construction. Originally designed to secure the floors of the river.

Bypass Channels

A fish pass that travels into a dam with characteristics identical to those of a natural lake. As the dam stays intact, it does not impact its roles. The whole river segment may thus be circumvented. Enable migrants to bypass the whole field, often to the bottom of the backwater, without changing abiotic characteristics unexpectedly. Establish the requirement for the use of the channel as shelter for Rheophile (current-loving) animals. Especially in impounded riverine habitats, where heophilic river species are particularly adversely affected. Relatively wide building surface area required. That is why the local conditions are so significant.

Fish Ramp

It's a ramp like construction. Mean discharge being sent through the fish ramp. The body of the ramp is a rock fill construction.

Technical Fish Passes

There are several types such as

Pool passes: The idea of the pool transfer is to separate from the headwater through the tailwater by constructing wall crossings through a sequence of step-by-step swimming pools. The discharge is typically rendered through openings in the cross-walls and the latent water energy in the pools step by step is dissipated. Fish pass from one tank to the next through holes in the walls at the bottom (submerged apertures) or at the top (notches).

Vertical slot passes: The slot pass, or vertical slot pass, was developed in North America and has been widely used there since the middle of the twentieth century (Clay (1961); Bell (1973); Rajaratnam, et al. (1986)). The slot transfer is part of a transition in the pond transfer where vertical slots spaced around the entire height of the cross wall are added to the cross-walls. Depending on the extent of the waterway and the usable discharge, the cross walls can have one or two locations. The openings are all on one hand in the configuration of the one-slot (unlike the standard pool transfer in which holes are located on various sides).

Denil passes (counter flow passes): Developed by the Belgian engineer G. Denil named a "counter flow pass", and today is called "Denil pass" after its inventor (Denil, 1909). The fish pass is a linear channel in which bumps are placed periodically and fairly shortly in a direction of traffic. The reverse flows between the two balls disperse considerable energy and require a fairly low flow speed in the lower part of the bubbles because of their contact. This makes it easier to resolve the slight to medium disparity in height in contrast to certain forms of fish passes on a steep slope.

Eel ladders: The ascending eels with a body length of 7 to 25 cm are certainly in a position to overcome small obstacles with rough surfaces, small cracks or fissures. But practically smaller sized glass eels have proven to be fail during ascending through conversional fish passes. Two principle types of design are common such as Pipes are laid through the body of a weir, often close to the river bottom, in which bundles of brushwood, fascines or other baffles are placed to lower the flow velocity and Relatively small and flat open channels, which pass from tail water to headwater and are made of concrete, steel or plastic in which various fittings are placed that help eel in winding upwards.

Fish locks: Relatively new concept; has been applied especially in the Netherlands, Scotland, Ireland, Germany and Russia (Van drimmelen, 1966; Jens, 1982). The structure of a fish lock is similar to a ship lock ,essentially consist of a lock chamber as well as a lower inlet and an upper outlet structure with closing devices. It is not normally sufficient to sustain fish migrations nor can it replace a fish pass. The timing of the operating modes is done automatically. Usually there are half-hourly to hourly operating intervals. The most efficient rhythm and, if applicable, the necessary seasonal adjustments, can only be determined through monitoring controls.

Fish lifts: When there are considerable height differences (> 6 to 10 m) and little water available there are restrictions on the applicability of conventional fish passes, due to the building costs, the space requirement and, not least, the physiological abilities and the performance of the fish. Thus Where great heights are to be overcome, solutions have been developed to carry fish from the tail water to the headwater using a lift.

Conclusion

All we need is not more designs only modifications based on the feedback experiences and a multidisciplinary strategy for maintenance and management involving Engineers, Biologists and managers.

References

1. Das MK, Hassan MA (2008) Status of Fish Migration and passes with Special Reference to India (CIFRI Bulletin no. 156).

2. Larinier M, Marmulla G (2004) Fish passes: types, principles and geographical distribution–an overview. In Proceedings of the second international symposium on the management of large rivers for fisheries, RAP Publication 2: 183-206.

3. FAO/DVWK (2002) Fish passes-Design, dimensions and monitoring. Rome, pp: 119.

4. Roscoe DW, Hinch SG (2010) Effectiveness monitoring of fish passage facilities: historical trends, geographic patterns and future directions. Fish and Fisheries 11(1): 12-13.