

Creating an elevator-shaped fish migration system

fish passage engineer - PhD - Răzvan Voicu

The creation of this fish migration system can be located at any overflow threshold with heights of up to 4m. Thus, four metal sheet piles are fixed perpendicular to the overflow threshold. The first two (fig.1) are fixed with the help of metal corners on its canopy and the other two (fig.1) are fixed with the help of metal corners on the downstream surface of the overflow sill. In fact, it is a single L-shaped sheet pile.

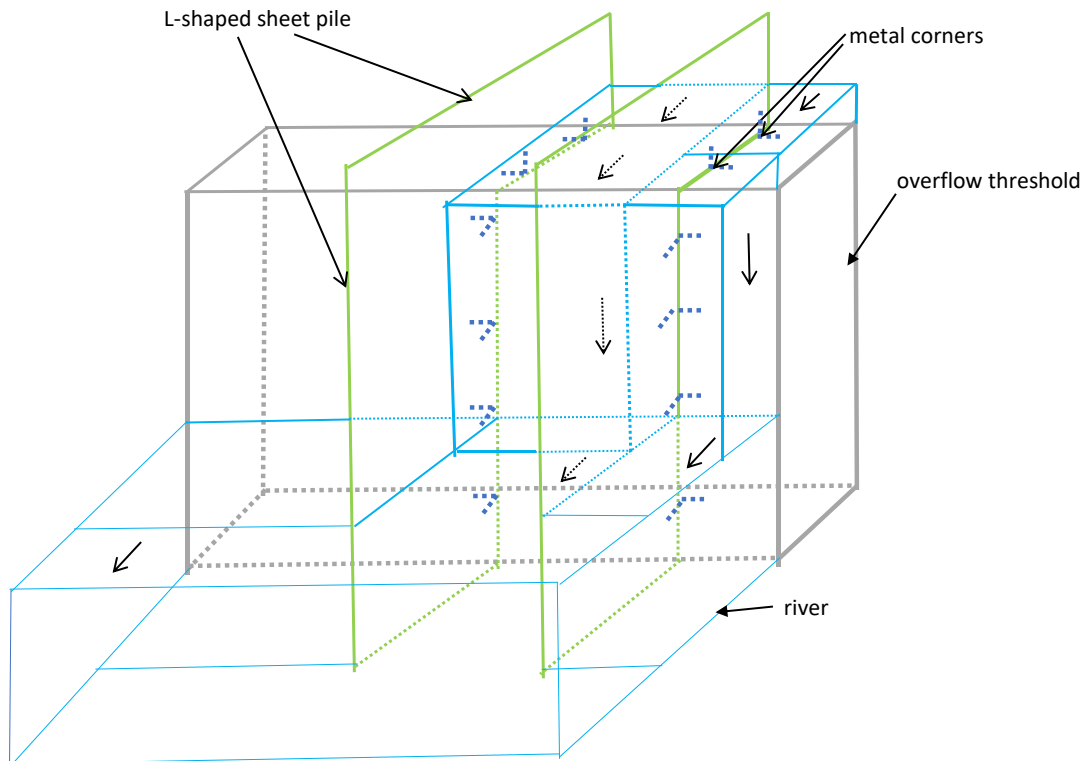


Figure 1 Positioning of metal sheet piles

A metal frame is welded to the sheet piles (inside them) that form the longer side of L (fig.2). A hindrance with vertical movement is fixed to this metal frame. The movement of the hindrance in the vertical plane occurs due to a threaded metal bar and an electrically operated reducer. Electricity can come from the national grid or from a solar panel (fig.2). Between the two metal sheet piles, at their base, the riverbed concretes (fig.2) on a small portion to allow the aluminum sheet pile to rest on it.

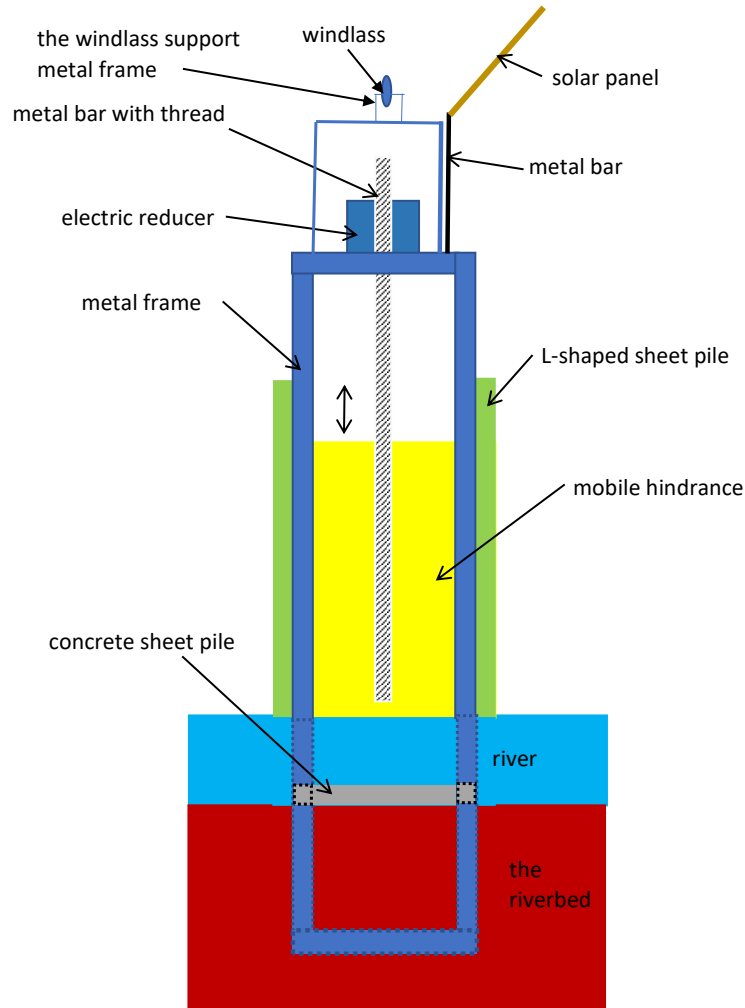


Figure 2 Positioning the metal frame and the movable hindrance

Four metal bars are welded to the metal palpation. 4 cylinders are fixed to these metal bars, to which a metal spacer is fixed to each one (fig.3). The cylinders slide on the bars.

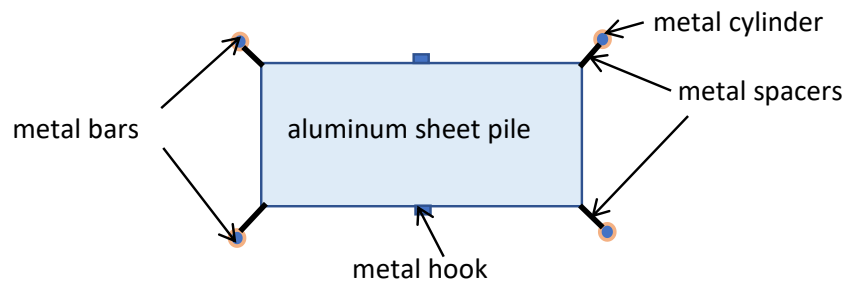


Figure 3 The system for fastening the aluminum sheet pile to the metal bars

An aluminum sheet pile is fixed to these metal spacers. This aluminum sheet pile is in the shape of a sloping plane with a small angle (fig.4). The aluminum sheet pile is fixed to the concrete sheet with the help of metal hooks (fig.3). When the dam reaches the minimum point, press a metal button and loosen the metal hooks.



Figure 4 The aluminum sheet pile

A U-shaped bar is fixed above the electric reducer (fig.2).

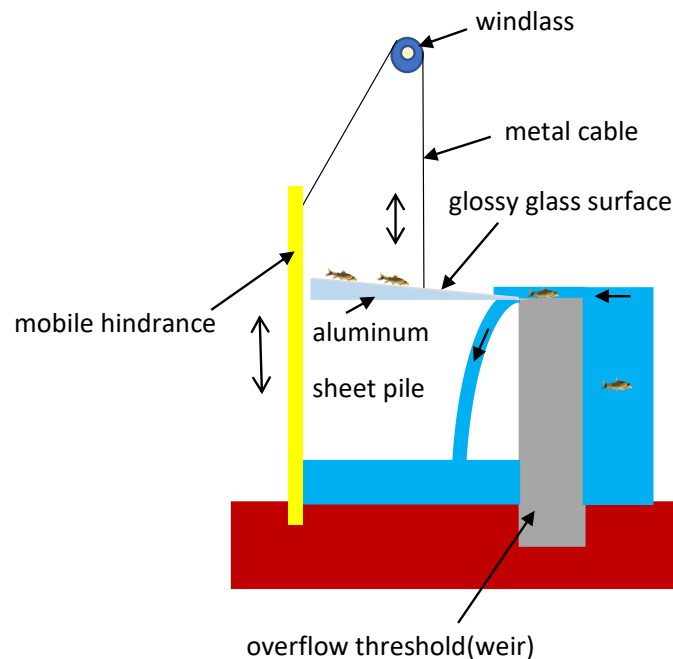


Figure 5 Maximum height at which the aluminum plate can be positioned

When the dam reaches the minimum point, the sheet pile fixed by it reaches the maximum point near the maximum height of the crown of the overflow threshold. The aluminum sheet pile has a glossy glass surface on the top that helps the fish to slide on the crown of the overflow threshold (figure 5). The aluminum sheet pile having a glossy

and inclined surface on it directs the fish on the crown of the inclined plane and the fish then pass downstream from the overflow threshold. The metal frame to which the movable hindrance is fixed is also fixed inside the riverbed so that the movable hindrance has enough space to move so that the aluminum sheet pile reaches the maximum position. The system does not injure the fish as the components are not sharp. In order for the system not to enter floats (branches, bottles, etc.) upstream of it, a semicircular metal grid will be fixed (fig.6). The metal bars that are fixed in the overflow threshold offer enough space for the fish to pass upstream of them, through its side and below (fig6).

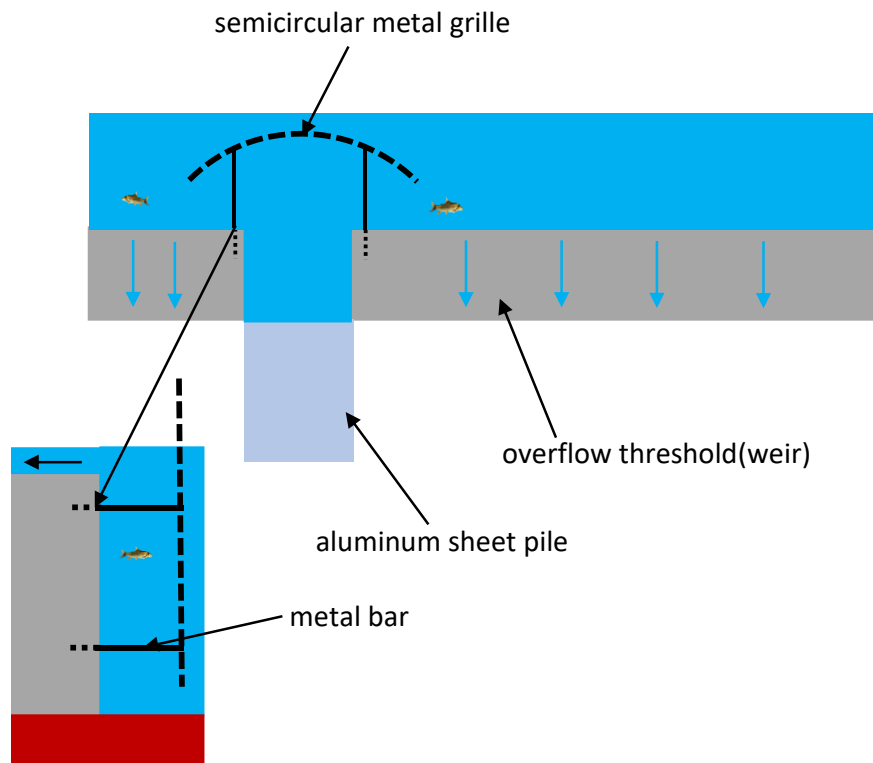


Figure 6 Positioning the metal grille

Conclusions

Given that few countries in the world have high-performance laboratories where they can do mathematical calculations, mathematical modeling, case studies of innovations, etc. I thought of a solution (as in fact others) that does not require a very advanced technology but requires basic notions of hydroengineering. The system works automatically and can be fixed by different overflow thresholds in various relief areas. Like any system, it needs to be cleaned or repaired at some point. Only a small part of the overflow thresholds can be demolished (the non-functional ones) for the others, systems for the migration of classic fish or new models must be made. In the case of this system, when the dam has closed and the fish have been caught inside it 100% will reach upstream of the overflow threshold. The ichthyofauna sensor that triggers the electric reducer is fixed on the aluminum sheet pile at the sharper end. In the maximum position, the aluminum sheet pile stays for 10 seconds, after which the reducer triggers the return to the initial position of the movable hindrance. This system can also work at night. This system can help dozens of fish (maybe even more) cross the spillway in one day. If the dimensions of the project are strictly observed and if quality components are used, the system can have a long maintenance. Due to its perpendicular position on the overflow threshold, this system also resists in case of floods. If there are no more migratory fish in the area, the system can be detached in another area, which is an advantage.

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