Double metal frame system and variable geometry plate

Razvan Voicu, Phd Fish Passage Engineer

Inside a spillway threshold, a rectangular battlement will be built, which varies depending on the height of the threshold, the length of the threshold, etc. As an example, the battlement will be 100 cm high and 60 cm wide. Both at the upstream end of the battlement but also at the downstream end, two rectangular metal frames will be fixed, which resemble the one in figure.1.

Figure 1 Dam fixed in the metal frame positioned on a spillway threshold located on the river Azuga (photo Razvan Voicu)

A metal hindrance (metal sheet pile) with vertical sliding will be fixed to the metal frame 1 (fig. 2) as in figure 1. A metal dam will also be fixed to the metal frame 2 but cut up to 5 cm from the metal frame (fig. 3). The hindrance with the cut interior will be fixed by a threaded bar (threaded) which in turn will be fixed by a manual reducer (fig. 3). And from the metal frame 1 dam will be fixed to a threaded bar and this in turn will be fixed in a manual reducer (fig. 2 and 3). The reducer will be operated by a metal handle.

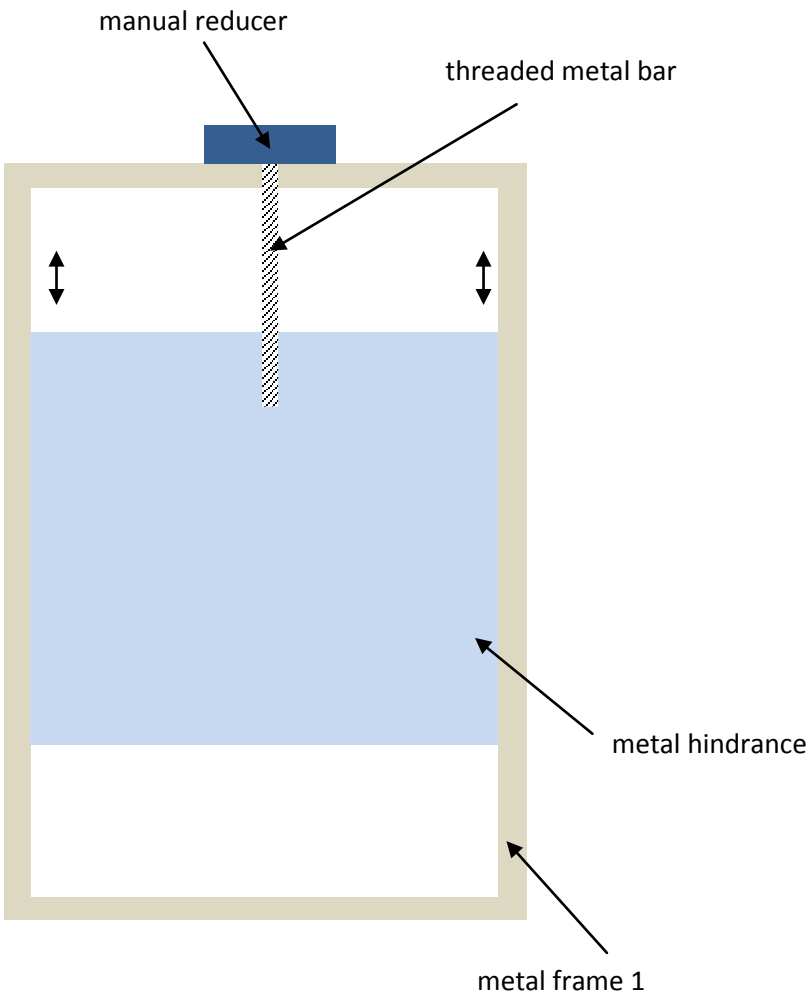

Figure 2 Positioning of the metal frame 1 and the metal hindrance

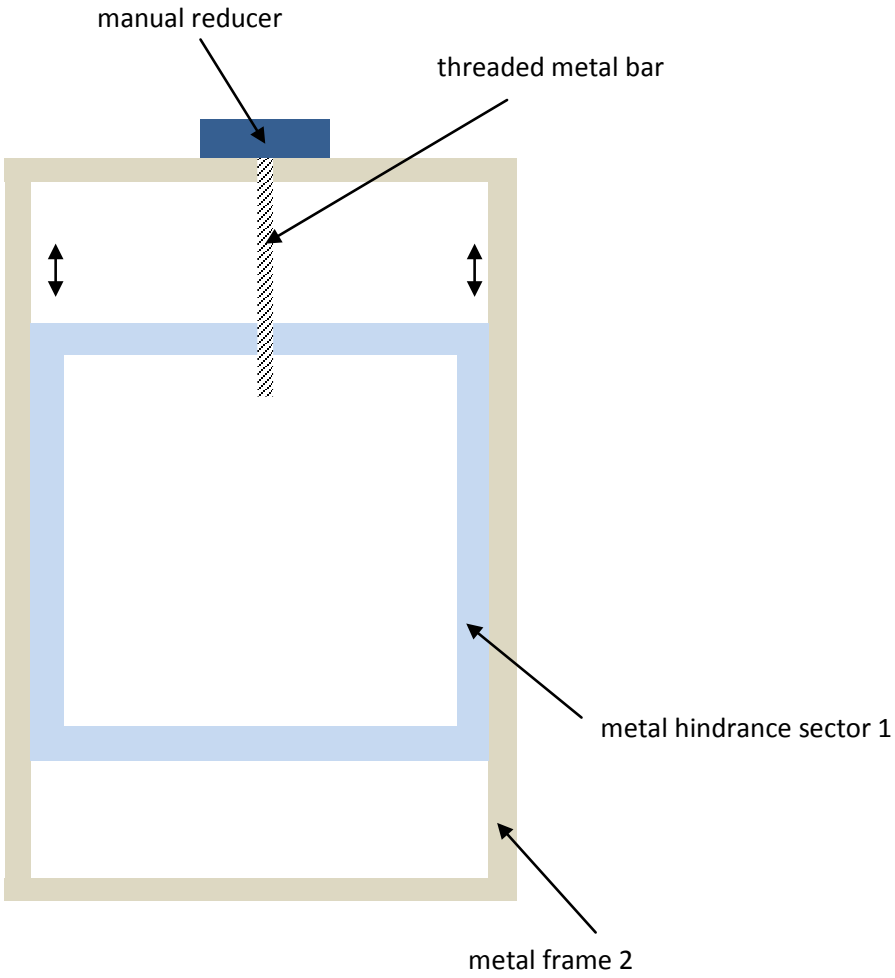

Figure 3 Positioning the metal hindrance sector 1 sector inside the metal frame 2

From the bottom of the metal hindrance sector located on the metal frame 2, two metal hinges will be welded (fig. 4). A metal or resistant plastic plate will be fixed to the metal hinges. When the metal hindrance sector is set in motion by the manual reducer, this plate will change its slope. Between the hinges, the plate will be equipped with a parallelepiped rubber portion. But also on the side of the hinges the movable plate will have rubber that will help stop the water that could leak. On the edges, on both sides of the movable plate will be fixed mattress hinges. Two aluminum sheet piles (of the same material as the movable plate) are fixed to these metal hinges (fig. 5).

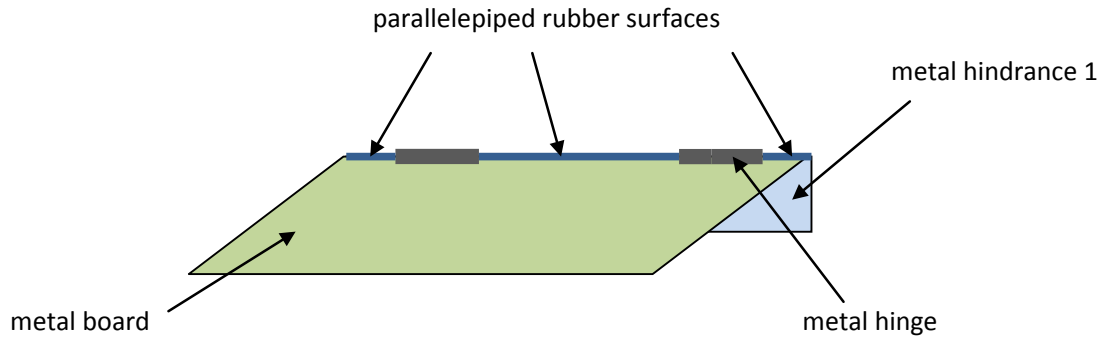

Figure 4 Positioning the hinges on the movable plate as well as on the dam sector 1

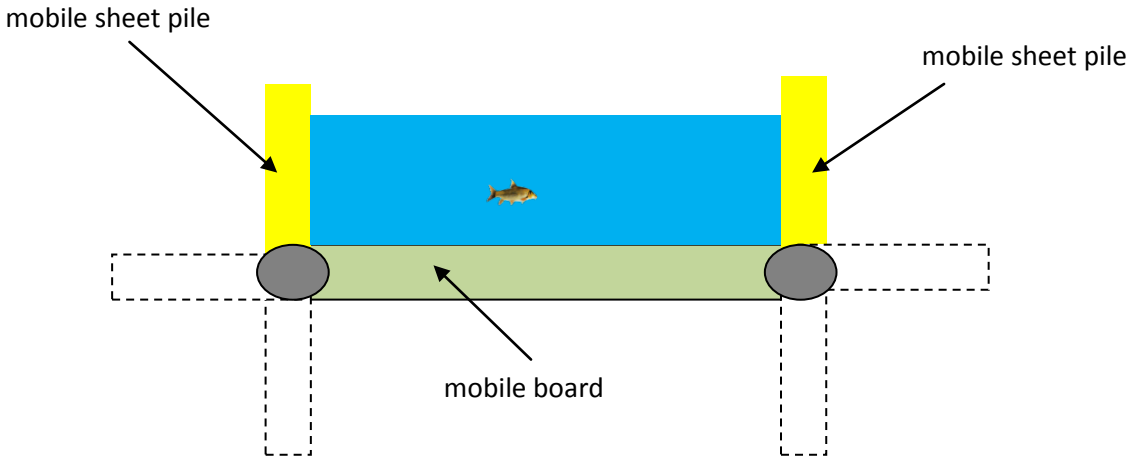

Figure 5 Positioning the sheet piles at the end of the movable plate

The end of the movable plates downstream will be fixed to a rubber surface in the shape of a battlement with the help of metal rivets (fig. 6).

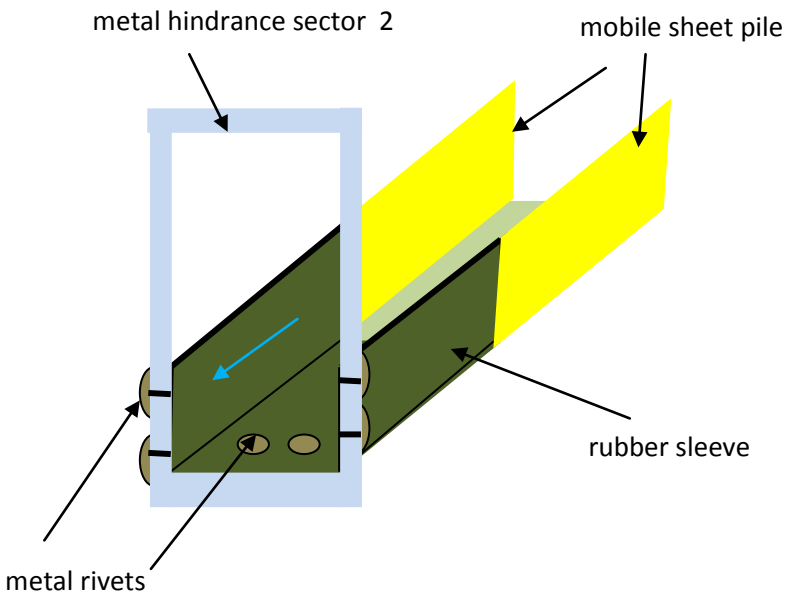

Figure 6 Fixing the rubber monsoon (crenel) to the metal hindrance sector 2

The movable sheet piles will be fixed in a vertical position by means of metal cylinders (fig. 7a). The frame in which this new metal hindrance sector 2 is fixed is in turn fixed in the riverbed with the help of a concrete battlement made under the water level (fig. 7b). The metal frame 3 is fixed in this concrete battlement (fig. 7b).

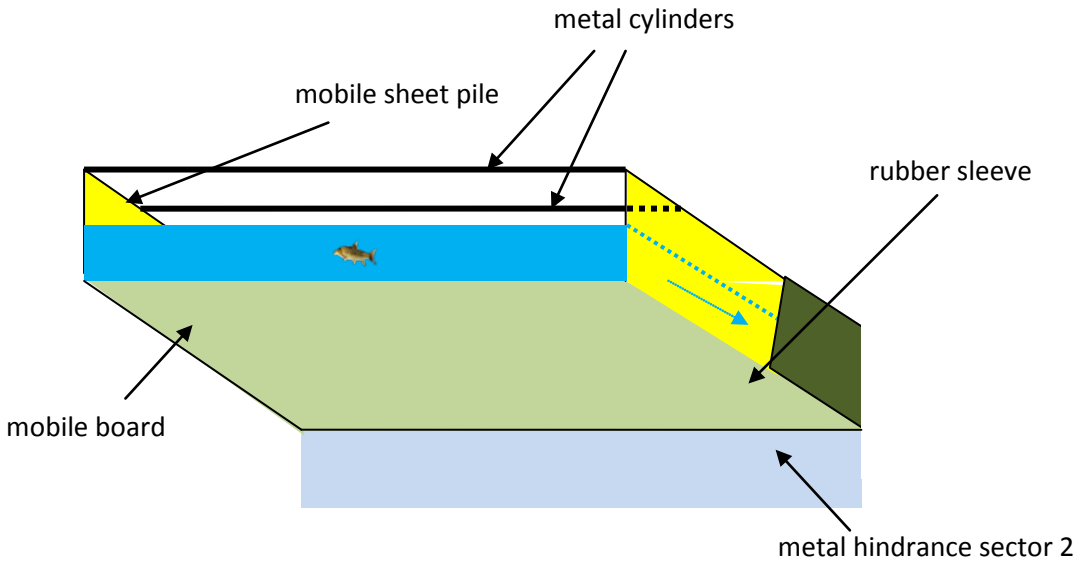

Figure 7 a Positioning of metal cylinders

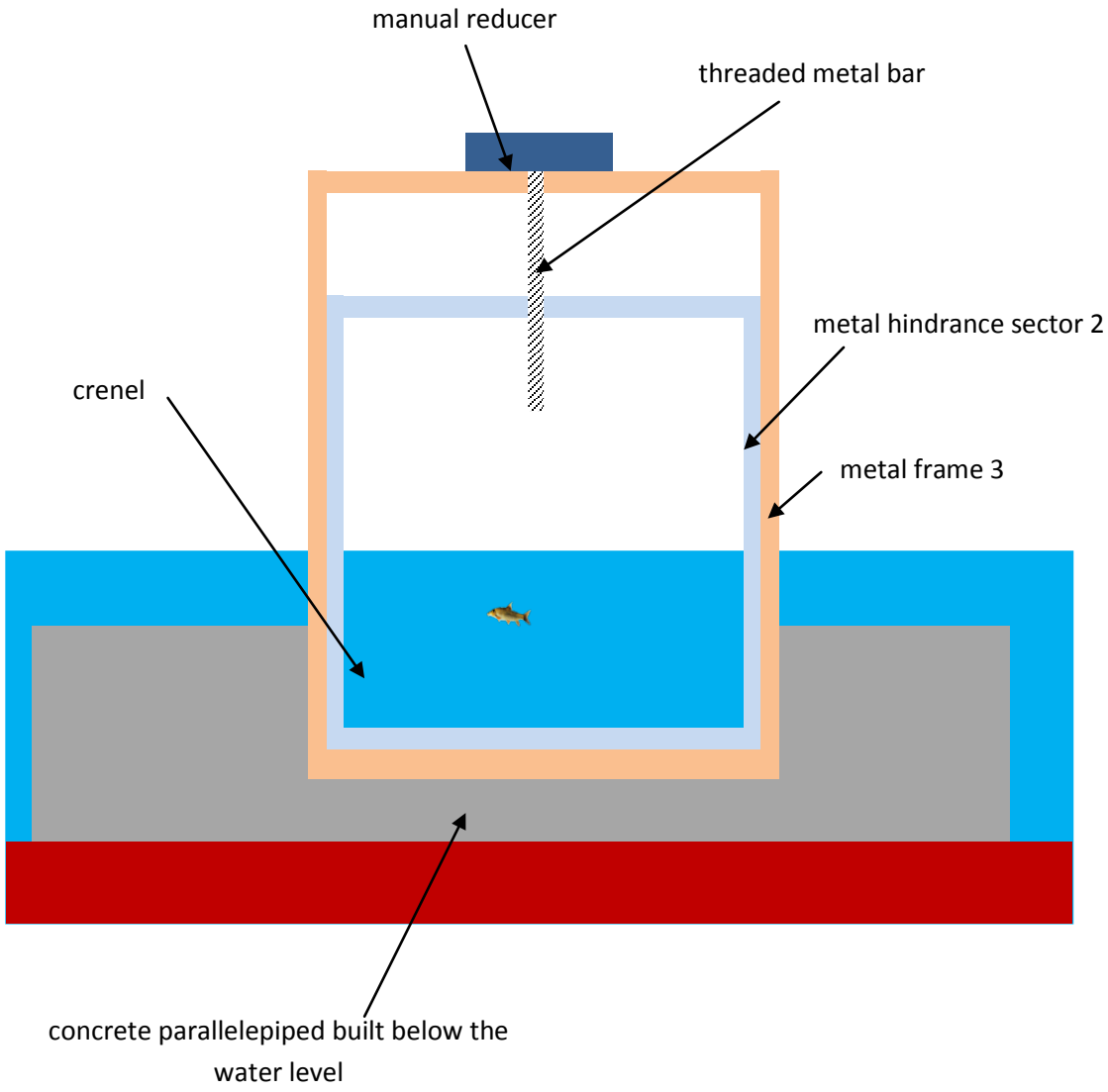

Figure 7b Positioning the metal frame 3 inside the battlement

The redirection of the fish to the entrance to the system will be done with the help of large river stones (fig. 8). River stones can be attached to the moving plate so that the fish can rest during the climb.

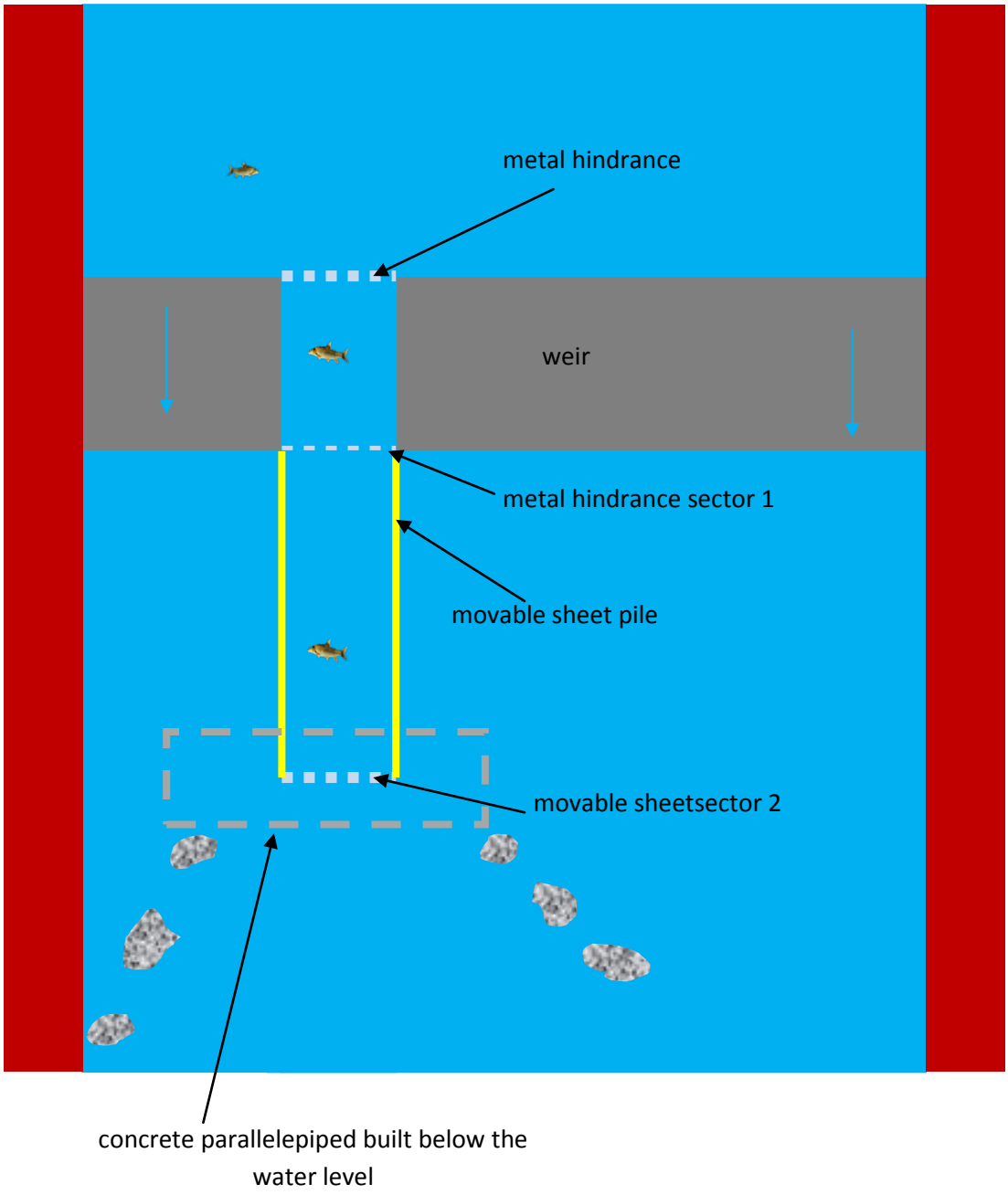

Figure 8 Positioning of river stones to redirect fish to the entrance to the migration system

Conclusions

The presented system can also be used at another spillway threshold if pestile migration is no longer valid. A very important thing is that within the dam sectors 1 and 2 can be fixed the classic system for the migration of fish such as Alaskan Steeppass or Denil fishway. The possibility of movement gives these classical systems designed to be fixed the possibility to change their slope which is a useful thing for many species of migratory fish. For repairs or in winter, the system can be closed due to the dam at the upstream end of the battlement located in the overflow threshold. All system components must be made of high quality materials and be resistant to corrosion. Using quality materials and respecting the manufacturing project, the system can have a long maintenance. The costs of building this system are reasonable.

Bucharest June 2020