



Cable-filtering barrier for woody debris entrapment

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Riparian and basin forests provide inputs of large woody debris (LWD) to streams and rivers. Over the last 30 years, the role of wood in river ecosystems has been studied from different points of view: hydraulic (LWD as roughness elements increasing flow resistance), ecological (LWD as storage for organic matter and sediments), and geomorphological (formation of bars, steps, terraces). LWD in rivers provides biodiversity and is an important element of conservation of fisheries and aquatic ecosystem functions. However, instream LWD can increase flooding hazard due to obstructions of channel “critical” cross-sections and in-channel structures (e.g. bridges).

Different engineering solutions are available to stop LWD transport along channels. Filter check dams are commonly built in the European Alps to “break” debris flows and to store the coarser fraction of the transported sediments. Later, from a modification of such a kind of structures, by the use of inclined buttresses and inclined grids, “debris-dedicated” check dams have been placed to trap floating logs in mountain rivers. More recently, a different, less impacting solution involving rope net barriers has also been developed.

Here we report the experience of an innovative structure for trapping woody debris, a cable-filtering barrier, built in 2005 along the Sarca River (Italian Alps, Trento), in aim to detain the downstream transport of LWD. In fact, the Sarca River is the major tributary to the Garda Lake, where floating woody debris poses serious problems for navigation. Furthermore, LWD accumulations on the lake shore have negative impacts to tourist activities.

The cable-filtering barrier is located in a 95 m-wide gorge. The structure is composed of 5 harmonic steel cables ($\varnothing = 80$ mm, $L = 126$ m) fixed on the rocky boundaries of the gorge by concrete and tie-beams. The barrier is inclined at 50° with respect to the

flow, so the floating debris is forced to accumulate on the right side of the gorge. Here a crane can hoist the entrapped LWD, and its subsequent final removal is allowed by a tunnel leading out of the gorge. The height of the barrier is 3.2 m and 3.8 m at the left and at the right margin, respectively. A central buttress permits to reduce the cables deformation by shortening the cables span.

The barrier has been statically designed applying the worst scenario of a completely debris-filled structure. No flood events with significant LWD transport have occurred so far. However, a similar cable barrier – built in 1982 in the Sarca River upstream of the new structure – have demonstrated to efficiently exert a filtering action even during a severe flood (T.R. = 50 years) with relatively intense LWD transport (100 m^3).