



## **Establishing objective criteria to estimate environmental marginal benefit functions: an example for fluvial systems**

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The idea that environmental flows can result from the competition for water allocation between traditional and non-traditional water uses has been explored in the past. In order for such a competition to occur, the definition of convenient marginal prices the related economical benefit functions need to be quantified for the competing users. A common way to do this is to estimate the willingness of both users and non-users to pay for the conservation of the aquatic environment. The dramatic weakness of this approach is of not being objective with regard to the environmental needs. That is, water withdrawal from a given stream environment would depend on the importance and, in turn, on the economical value that people give to this environment. We suggest in this work an objective criterion to establish marginal prices for environmental uses of the resource. This is done by considering: (a) the ecological status of the riverine system in pre-anthropogenic conditions; and (b) the economical value that the future competitor will assign to the use of the questioned water resource. Such a competition is solved analytically for a simplified fluvial ecosystem sharing water with an exploitation activity. We show that the optimal condition occurs, as expected, when the allocation of the resource between the two users produces equal marginal benefit values. The water allocation at optimality allows for the maximum economical benefit for both users. For the exemplary case proposed here we show the link between the parameters of the economic functions, the environmental flows and eventually the ecological indexes. Indeed, this approach allows to restore a more natural variability of the streamflow to the cost of a profit reduction for the resource exploitation. On the long term, however, the overall idea is that the benefit for having preserved more natural environmental flow conditions would balance the future cost for potential restoration of the riverine corridor and the missing human profits.