



Optimizing Watershed Management by Coordinated Operation of Storing Facilities

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Water storing facilities in a watershed are very often operated independently one to another to meet specific operating objectives, with no information sharing among the operators. This uncoordinated approach might result in upstream-downstream disputes and conflicts among different water users, or inefficiencies in the watershed management, when looked at from the viewpoint of an ideal central decision-maker. In this study, we propose an approach in two steps to design coordination mechanisms at the watershed scale with the ultimate goal of enlarging the space for negotiated agreements between competing uses and improve the overall system efficiency. First, we compute the multi-objective centralized solution to assess the maximum potential benefits of a shift from a sector-by-sector to an ideal fully coordinated perspective. Then, we analyze the Pareto-optimal operating policies to gain insight into suitable strategies to foster cooperation or impose coordination among the involved agents. The approach is demonstrated on an Alpine watershed in Italy where a long lasting conflict exists between upstream hydropower production and downstream irrigation water users. Results show that a coordination mechanism can be designed that drive the current uncoordinated structure towards the performance of the ideal centralized operation.