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Assessing The Ecosystem Service Freshwater Production From An Integrated Water Resources Management Perspective. Case Study: The Tormes Water Resources System (Spain)

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The Ecosystem Services are defined as the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life. A strongly related concept is the Integrated Water Resources Management. It is a process which promotes the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. From these definitions, it is clear that in order to cover so many water management and ecosystems related aspects the use of integrative models is increasingly necessary.

In this study, we propose to link a hydrologic model and a water allocation model in order to assess the Freshwater Production as an Ecosystem Service in anthropised river basins. First, the hydrological model allows determining the volume of water generated by each sub-catchment; that is, the biophysical quantification of the service. This result shows the relevance of each sub-catchment as a source of freshwater and how this could change if the land uses are modified. On the other hand, the water management model allocates the available water resources among the different water uses. Then, it is possible to provide an economic value to the water resources through the use of demand curves, or other economic concepts. With this second model, we are able to obtain the economical quantification of the Ecosystem Service. Besides, the influence of water management and infrastructures on the service provision can be analysed.

The methodology is applied to the Tormes Water Resources System, in Spain. The software used are EVALHID and SIMGES, for hydrological and management aspects, respectively. Both models are included in the Decision Support System Shell AQUATOOL for water resources planning and management. A scenario approach is presented to illustrate the potential of the methodology, including the current state and some intervention scenarios.