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ABSTRACT

The water footprint knowledge as a multidisciplinary framework for water management: Guadiana river basin case study (Spain)

M. M. Aldaya, M. R. Llamas – Complutense University of Madrid

As apparently water needs and droughts are increasing, concerns about them are also becoming more and more important on the political agenda. All possible remedies need to be investigated. The virtual water concept, defined as the volume of water used in the production of a commodity, good or service, together with the water footprint (water volume used to produce the goods and services consumed by a person or community), links a large range of sectors and issues, providing an appropriate framework to find potential solutions and contribute to a better management of water resources, particularly in arid or semi-arid countries.

As the most arid country in the European Union, water use and management in Spain is a hot socio-political topic. In this country, irrigation is the largest blue water user and most green and blue water consumption is through crop evapotranspiration. This study focuses on the Guadiana Basin, which has an area of about 67,000 km^2 (83% in Spain and 17% in Portugal), a total irrigated area of 336,000 has, an average streamflow of 6-7 km^3/year, an average precipitation of about 450 mm/year and 1.5 million inhabitants. In particular, the Upper Guadiana basin is an example of environmental impact and conflict created by the use of water resources in a semiarid region. In this region, private crop irrigation with intensive groundwater use by individual farmers with scarce control from

water authorities, has, since the 1960s, become widespread in the area, triggering abundant social and economic benefits. The associated water table drawdowns, however, have caused relevant negative environmental impacts upon groundwater-dependent wetlands and rivers, and significant social conflicts. The motto “more crops and jobs per drop” achieved in this region should be replaced by “more cash and nature per drop”.

The implementation of the Water Framework Directive (WFD) requires achieving good status of groundwater and surface water in Europe by 2015. In order to achieve WFD objectives, and framed within the European NeWater project, the present study analyses the virtual water, water footprint and economic value of the different economic sectors, crop virtual water content and value, and related political issues in the Guadiana basin. Within this context, the study demonstrates that the virtual water and water footprint hydrologic and economic analysis can provide a multidisciplinary framework for informing and optimising production and trade decisions, contributing thus to a better management and allocation of water resources.