Improving drought risk-reduction management strategies: An innovative and practical tool applied to the Upper Genil River Case (Granada)

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Droughts cannot be avoided since they form part of the climate variability of a region. These natural phenomena are being affected (in terms of their duration, magnitude, intensity and frequency) by global climate change and will continue to do so along this century based on the current trends.

Efforts should thus be focused on learning how to live with these complex phenomena by improving preparedness, risk-reduction management strategies and progressive adaptation in order to enhance resilience and reduce vulnerability, and with all that, avoid (where possible) or minimise the potential negative impacts.

Precisely for this reason, it is fundamental to manage droughts from an integrated perspective, so that optimal balance can be found among technically feasible, environmentally sensible, economically efficient, and socially acceptable measures to deal with droughts and water scarcity.

In this context, Decision Supporting Systems (DSS) represent key strategic tools to facilitate the strategic water decision-making process. The aim of GRwaterDSS project was to create a practical instrument that could be easily used by water decision-makers (not necessarily specialists or with technical backgrounds), to achieve rational water management strategies that work from a preventive and adaptive approach.

GRwaterDSS project consists of a series of technical and evidence-based tools applied to the Upper Genil River (Guadalquivir River Basin). These instruments are:

a) a monthly and yearly streamflow forecasting model for the current hydrological year,

b) an hydrogeological model that consider the river-aquifer relationship,

c) a detailed model (MODSIM) of surface waters,

d) an instrument for water cost recovery.

e) Aqua4.0 Plataform: this platform was built to optimise the usability of the available hydrological data and the models developed, adapting them to the needs of the final user.

The forecasting model has shown to be a reliable tool for the early detection of droughts in the area of study. Thanks to the surface water and underground water models, the potential water scarcity issues can be identified, so the potential risk can be assessed under a range of possible drought scenarios and preventive drought-risk management strategies can be undertaken. For each of these potential scenarios, the economic implications on the water cost can be assessed. Therefore, this integrated tool ensures that the proposed measures and actions to deal with droughts and water scarcity issues are sufficiently robust and proportionate to the situation and support water decision makers to achieve a comprehensive, efficient and rational water management strategy in an easy manner.