Geophysical Research Abstracts
Vol. 16, EGU2014-15264, 2014
EGU General Assembly 2014

Integrated analysis of the climate change effects on water availability for catchment management. The case of the Ésera River (Spain)

Abel Solera, Carlos Segura, Gianbattista Bussi, Andrea Momblanch, and Félix Francés
Research Institute of Water and Environmental Engineering, Universitat Politècnica de València, Spain

The analysis of the impact of climate change on water resources is of primary importance in Mediterranean Areas. Mean precipitation is expected to decrease, although an increase in its torrentiality is foreseen, and temperature is expected to increase. In addition, growing urban water demand and new environmental requirements also contribute to increase water stress. To achieve an improved use of water resources, new and detailed studies of the impact of the climate change are needed.

Due to the high complexity of rainfall-runoff processes and the need to incorporate climate change effect in them, physically based distributed models are proposed as a tool for assessing and analysing the climate change impact on water discharge. In this case, the distributed conceptual TETIS model was employed. This model was previously calibrated and validated in order to reproduce the hydrological cycle of a Mediterranean-influenced catchment, the Ésera River (Spain), under current climate conditions. Then, the TETIS model was driven by the results of a climatic model (precipitation and temperature series) under three climatic scenarios: current climate (or control scenario), A2 and B2 of the Special Report on Emission Scenarios. Water discharge series were generated at different points of the catchment. The model results pointed out that a global decrease in water yield is devised, being around 33% and 37% for scenario A2 and B2 respectively.

Water discharge series were subsequently used in the analysis of climate change impact on water resources and water use in the studied river basin. To do so, a water allocation model was built, calibrated and validated under current streamflow conditions for the Ésera River. It considered all the water management infrastructures, water uses and environmental requirements. The results from TETIS for the three different scenarios were introduced as inputs to the water management model, what allowed performing three simulations. The outcomes showed the impossibility to satisfy water demands with the current water management strategy in both A2 and B2 scenarios. Thus, a climate change adaptation analysis was conducted to adopt and assess several measures based on the management of water resources. The actions included updating the reservoir operation rules, new water sources and water consumption reduction for agricultural uses. The measures resulted in the general improvement of the water resources system functioning, harmonising all figures with the legal requirements for human and environmental demands satisfaction.