

## **Assessing the impacts of global changes on the water resources of the Mediterranean basin**

**M. MILANO<sup>1,4</sup>, D. RUELLAND<sup>2</sup>, S. FERNANDEZ<sup>4</sup>, A. DEZETTER<sup>3</sup>,  
S. ARDOIN-BARDIN<sup>3</sup>, J. FABRE<sup>1,4</sup>, G. THIVET<sup>4</sup> & E. SERVAT<sup>3</sup>**

<sup>1</sup> *UM2 – UMR HydroSciences Montpellier, Place E. Bataillon, 34395 Montpellier Cedex 5, France*  
[marianne.milano@um2.fr](mailto:marianne.milano@um2.fr)

<sup>2</sup> *CNRS – UMR HydroSciences Montpellier, Place E. Bataillon, 34395 Montpellier Cedex 5, France*

<sup>3</sup> *IRD – UMR HydroSciences Montpellier, Place E. Bataillon, 34395 Montpellier Cedex 5, France*

<sup>4</sup> *Plan Bleu, 15 rue Beethoven, 06560 Valbonne Sophia-Antipolis, France*

**Abstract** The Mediterranean basin is characterized by limited and unequally distributed water resources, as well as by important development of its anthropogenic activities. The latter has led to continuously increasing water withdrawals. Moreover, the region should be particularly affected by climate change, with rising temperatures and more frequent and intense drought periods affecting water resources availability. This paper assesses the impacts of those changes by investigating the current and future situation of both water availability and water withdrawals. Over the reference period (1971–1990), a conceptual rainfall–runoff gridded model was applied to evaluate freshwater availability, and an overview of agricultural and domestic water use was completed according to national reports. To evaluate the future trends in water availability at short (2025) and mid (2050) terms, climatic scenarios were generated by applying unbiased and delta methods to projections from four global climate models. These climatic scenarios were used as inputs to the hydrological model but also to an irrigation management model to evaluate future agricultural water withdrawals. Domestic water use was estimated using demographic scenarios. For both sectors, progress in water-use efficiency was also considered. A water stress index accounting for those various indicators was then computed. The results show that both climate and socio-economic changes will have a significant impact on water resources. The Mediterranean basin might be subjected to a more arid climate and increasing local disparities. Some areas might experience increasing water stress. This study is a first step towards providing indicators combining water resources availability and water use in line with planning decisions at a regional level.

**Key words** Mediterranean basin; water availability; water withdrawals; water stress index; water balance model; CROPWAT; scenarios