

Assessing risks for integrated water resource management: coping with uncertainty and the human factor

M. J. POLO¹, C. AGUILAR¹, A. MILLARES², J. HERRERO², R. GÓMEZ-BEAS¹, E. CONTRERAS¹ & M. A. LOSADA²

1 Andalusian Institute of Earth System Research, University of Cordoba. Campus de Rabanales, Edif. Leonardo da Vinci, 14071, Córdoba, Spain

mjpolo@uco.es

2 Andalusian Institute of Earth System Research, University of Granada. Edif. CEAMA, Avda. del Mediterráneo s/n, 18006, Granada, Spain

Abstract Risk assessment for water resource planning must deal with the uncertainty associated with excess/scarcity situations and their costs. The projected actions for increasing water security usually involve an indirect “call-effect”: the territory occupation/water use is increased following the achieved protection. In this work, flood and water demand in a mountainous semi-arid watershed in southern Spain are assessed by means of the stochastic simulation of extremes, when this human factor is/is not considered. The results show how not including this call-effect induced an underestimation of flood risk after protecting the floodplain of between 35 and 78% in a 35-year planning horizon. Similarly, the pursued water availability of a new reservoir resulted in a 10-year scarcity risk increase up to 38% when the trend of expanding the irrigated area was included in the simulations. These results highlight the need for including this interaction in the decision-making assessment.

Key words risk; uncertainty; call-effect; water resource planning