



Assessing the impacts of combined climate and land use changes for water availability and demands in a Mediterranean watershed.

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Mediterranean basins experience water scarcity issues due to the dry climate associated with the need for agricultural irrigation and recurrent severe drought episodes. Recent land use changes have increased the pressure over water resources due to an expansion of irrigation. Global climate change is expected to bring forth a drier climate, which may simultaneously lead to higher irrigation demands and less water to sustain them, which would be a great management challenge.

The issues surrounding climate and associated land use changes were addressed for the Xarrama basin in southern Portugal. This is a region where there is already a large amount of irrigation, mostly consisting of corn and rice fields, but recent trends point to an increase of drip-irrigation in olives and vineyards. The water management strategies for this region assume water transfers from the larger Alqueva reservoir, without taking into account the impacts of these future changes which might introduce additional evapotranspiration losses while decreasing the amount of available water both in Xarrama and Alqueva.

Future climate and land-use scenarios were downscaled to the basin level, the latter taking into account local land-use change trends in recent decades. Downscaling based on local tendencies allowed detailed land use changes for agriculture and forest (the main land uses for this region), i.e. the most likely types of crops and trees to be introduced or replaced. The results of local tendencies scenarios reflect the SRES tendencies for Europe, namely agricultural abandonment and increased biofuel production, with species adapted to this climatic region. These scenarios are the first for this region with highly detailed information about land use change scenarios under climate change.

The SWAT eco-hydrological model is being applied to quantify the individual impact of climate and land-use change scenarios on both water availability and demands, and the synergies between both. This framework will also allow an analysis of the socio-ecological impacts of past severe droughts for the 2005 and 2012 episodes, the consequences of which can be extrapolated for the future considering the lower water availability and higher demands. This work will provide insights on the different impacts of climate and land-use on hydrological processes, water availability and demand in this region, as well as provide useful information for future water management strategies, particularly the water transfers needed to adapt to global change.