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“Reconcile land system changes
with planetary health”

Climate informed water resources management in a shrinking lake basin

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Abstract

Urmia Lake is an endorheic Salt Lake in northwestern Iran. At its greatest extent, it was the largest lake in the Middle East and the sixth-largest saltwater lake on Earth. Currently, changing climate along with the consequent need for more water resources to meet the agriculture, industry and domestic needs have dramatically impacted the Lake causing continuous shrinking and salty dust storm to the neighbouring cities and agricultural field resulted in accelerated land degradation and health problems. Climate is a major driving force in arid and semi-arid regions and is associated with high degree of uncertainty and developing strategies for an uncertain future is a challenging task. Therefore, a multi scenario modelling was developed to determine the thresholds for each climate scenario level in the future. The study developed climate information services considering SSP scenarios as a way to contribute to improved management of hydroclimatic risk for effective management of water at the lake -basin scale. The developed modelling supports appropriate decisions about land allocation for different agricultural purposes for the efficient management of scarce water resources. The results of modelling considering current withdrawals exploitation indicate that if the inflow conditions of the Lake do not change and the current withdrawals continue, the Lake area will be permanently a dry salt flat in the long term. In contrast, a climate-based hydrologic forecasting resulted in 27 percent of higher food production while 18 percent of water saving in the average SSP scenarios and even higher water saving in the optimistic emission scenarios which can be used for ecological maintenance of the shrinking lake. The results contribute to agricultural development resilient to climate change and sustainable land and water resources management and food security in the region.

Keywords: Climate informed, land use allocation, sustainability , water resources