Assessing the impact of climate change on rainwater harvesting in the Oum Zessar watershed in Southeastern Tunisia

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Abstract

Climate change is believed to have a large impact on water resources system both globally and regionally. It has become a major global issue, especially in developing countries because these are most affected by its impacts. Rainwater harvesting techniques offer an alternative source of water and represent specific adaptive strategies to cope with water scarcity within future climate change. Studying the impact of climate change on rainwater harvesting techniques, however, is difficult, because the general circulation models (GCMs) which are widely used to simulate scenarios of future climate change operate on a coarse scale. We estimated the impact of climate change on water availability at the watershed level by downscaling precipitation and temperature from the GCMs using a statistical downscaling model. A water harvesting model then assessed the performance of the rainwater harvesting techniques for the Oum Zessar watershed in southeastern Tunisia under current climatic conditions and scenarios of future climate change. Annual temperature tended to increase and precipitation tended to decrease. These changes of climatic variables were used in the water harvesting model to simulate future water availability. Changing the directions of water flow between sub-catchments in combination with changing the spillway heights strongly affected the performance of rainwater harvesting under the scenarios of future climate, resulting in a sufficient water supply for 92% of all sub-catchments, compared to 72% without these changes