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Assessment of climate change impacts on soil and water resources management using GIS

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Climate change is one of the most challenging issues which have affected all living matters on the Earth. This research aimed at assessing the impacts of climate change on soil and water resources of Gorganroud river basin, in north of Iran, and its application in watershed management options. For this purpose, the hydrologic model soil and water assessment tool (SWAT) in combination with sequential uncertainty fitting program (SUFI2) in SWAT-CUP package were used for calibration, validation and uncertainty analysis. Future climate scenarios for period of 2010–2100 were generated from three GCMs (CGCM1, HadCM3 and SCIRO) for scenarios A1F1, A2, and B1, which were downscaled. The hydrologic model was then applied to simulate the effects of climate change. Soil and water conservation options including range management, soil conservation in agriculture lands and sediment control in streams were proposed to evaluate the effectiveness of watershed management measures for adapting to climate change. Study results indicated a high sensitivity of sediment yield to climate change so that the increase in annual stream discharges were 5.8%, 2.8% and 9.5% and in sediment yield were 47.7%, 44.5% and 35.9% for different emission scenarios for 2040–2069 period. Implementation of proposed adaptation measures in hydrological model of the watershed showed decrease of 1.1%, 6.9% 7.9% in sediment yield at watershed scale, for A2 scenario whereas in sub basin scale were 7.1%, 20.4% and 23.4 %. These results highlighted the likely impacts of climate change on hydrologic cycle and watershed management options.

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