



SWAT modeling for assessing future scenarios of soil erosion in West Rapti River Basin of Nepal

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This study uses Soil Water Assessment Tool (SWAT) for watershed modeling in West Rapti River Basin (WRRB) of Nepal for assessing future scenarios of soil erosion till the end of 2100. Firstly, the river discharge was calibrated for the period (2003–2009) and validated for the period (2010–2013). We used three discharge stations (namely Mari at upstream, Bagasoti at mid-stream and Jalkundi at downstream). Secondly, sediment discharge was calibrated and validated at two sediment monitoring stations (namely Mari at upstream and Jalkundi at downstream). A Sequential Uncertainty Fitting (SUFI-2) technique was employed for the fine-tuning of sensitive hydrological parameters. The model achieved a good performance in both the calibration and validation periods. R^2 , NSE, PBIAS, and RSR were taken as performance indicators. Finally, the developed model was then used to assess future scenarios of sediment yield in the WRRB. This study used five regional climate models (RCMs) for precipitation and temperature, and their ensemble under two representative concentration pathways (RCPs 4.5 and 8.5). This study analyses future scenarios for three time-frames namely, near future (NF: 2025–2049), mid future (MF: 2050–2074), and far future (FF: 2075–2099) with respect to the baseline (2003–2013). We found a significant increase in temperature in the future with annual average temperature anticipated to change from +0.76 °C to +5.8 °C and a moderate increase in precipitation with annual precipitation projected to change from -1.9% to 19.3% under different scenarios. In general, the MME shows slightly increasing precipitation (higher under RCP 4.5 than RCP 8.5), significantly increasing temperature (higher under RCP 8.5 than RCP 4.5) and moderately increasing sediment discharge. Our findings are useful for water resources and sediment management in WRRB under changing climate.