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Farmers’ and academia’s views”

## Modelling the impact of climate change on crop production in Nepal

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### Abstract

Climate change is expected to impose pressures on crop yield and food security in Nepal. However, the real effect of the climate change on crop yield and food security is still unknown. In this context, we assessed the influence of three different climate change scenarios on the potential productivity of rice, maize and wheat in Nepal. The scenarios are based on SSP1–2.6 (low emissions due to strong mitigation), SSP3–7.0 (high emissions), and SSP5–8.5 (extreme emissions/unmitigated) and were run with three general circulation models GFDL-ESM4, IPSL-CM6A-LR and MPI-ESM1–2-HR, resulting in nine scenarios. The data were bias corrected as part of the Coupled Model Intercomparison Project phase 6 (CMIP6) and downloaded from the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP3b) database. We chose the periods 1989–2014, 2015–2045, 2045–2070, and 2071–2100 to represent the baseline, near future, midcentury and end of century climate, respectively. The data show that a delay of monsoon rainfall, a shifting of rainfall patterns, and increased air temperatures are to be expected in Nepal. With the different climate change scenarios as input, we used the bio-geophysical crop model EPIC to simulate crop yields under business-as-usual agriculture management practices, comprising of low fertiliser application rates and limited irrigation applications. The results show that the yields of all three crops will be affected by the changes in climate. They also show that the different ecoregions of Nepal, tropical terai, subtropical mid-hills and valleys, temperate mountains, and the Himalayas will be affected differently by climate change, indicating a need for region-specific agricultural adaptation measures.

**Keywords:** Climate change, crop modelling, crop yield, Nepal