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How increased extreme precipitation under future climate change affects plant water stress and water availability.

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For many areas worldwide, increased rainfall intensity and frequency of extreme weather events are projected for the coming century. This will have effect on water security and soil erosion in large parts of the world. Here we present a detailed catchment-scale study, arguing that global and regional studies may be insufficiently accurate to describe actual impacts on the redistribution of water and the consequences for soil erosion. We applied a hydrological model, including infiltration excess surface runoff, coupled with an erosion model. The model was applied to 1 reference and 4 future climate scenarios (2 periods and 2 Representative Concentration Pathways), consisting of an ensemble of 9 Regional Climate Models. The climatic input for the future scenarios was bias-corrected using quantile mapping. Our results show a significant increase of plant water stress, reservoir inflow, soil erosion and reservoir sedimentation in all 4 future scenarios. Hence, a redistribution of water is expected, where agriculture may shift from rainfed to irrigated crops as a result of decreasing soil moisture and increased reservoir inflow. At the same time, reservoir sedimentation increases and threatens long-term sustainability of water storage and water security. Our results emphasize the role infiltration excess surface runoff and bias-correction methods play in the quantification of the impact of increased intense precipitation on water availability and soil erosion at the catchment scale.