



## **The influence of climate change on Tanzania's hydropower sustainability**

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Economic costs induced by current climate variability are large for Tanzania and may further increase due to future climate change. The Tanzanian National Climate Change Strategy addressed the need for stabilization of hydropower generation and strengthening of water resources management. Increased hydropower generation can contribute to sustainable use of energy resources and stabilization of the national electricity grid. To support Tanzania the World Bank financed this study in which the impact of climate change on the water resources and related hydropower generation capacity of Tanzania is assessed.

To this end an ensemble of 78 GCM projections from both the CMIP3 and CMIP5 datasets was bias-corrected and down-scaled to 0.5 degrees resolution following the BCSD technique using the Princeton Global Meteorological Forcing Dataset as a reference. To quantify the hydrological impacts of climate change by 2035 the global hydrological model PCR-GLOBWB was set-up for Tanzania at a resolution of 3 minutes and run with all 78 GCM datasets. From the full set of projections a probable (median) and worst case scenario (95th percentile) were selected based upon (1) the country average Climate Moisture Index and (2) discharge statistics of relevance to hydropower generation.

Although precipitation from the Princeton dataset shows deviations from local station measurements and the global hydrological model does not perfectly reproduce local scale hydrographs, the main discharge characteristics and precipitation patterns are represented well.

The modeled natural river flows were adjusted for water demand and irrigation within the water resources model RIBASIM (both historical values and future scenarios). Potential hydropower capacity was assessed with the power market simulation model PoMo-C that considers both reservoir inflows obtained from RIBASIM and overall electricity generation costs.

Results of the study show that climate change is unlikely to negatively affect the average potential of future hydropower production; it will likely make hydropower more profitable. Yet, the uncertainty in climate change projections remains large and risks are significant, adaptation strategies should ideally consider a worst case scenario to ensure robust power generation. Overall a diversified power generation portfolio, anchored in hydropower and supported by other renewables and fossil fuel-based energy sources, is the best solution for Tanzania