# Modeling Future Streamflow under Climate and Land Use Scenarios in the Lower Okavango River Basin

## Oral

Kaleb Gizaw Negussie[a,c*], Daniel Wyss[b] and Martin Kappas[b]

*a Department of Land and Spatial Sciences, Namibia University of Science and Technology, 13388 Windhoek, Namibia*

*b Department of Cartography, GIS and Remote Sensing, Georg-August University Goettingen, 37077 Goettingen, Germany*

*c Earth Observation and Satellite Application Research and Training Centre (EOSA-RTC), Namibia University of Science and Technology, 13388 Windhoek, Namibia*

**Corresponding author: kaleb.gizaw@gmail.com or knegussie@nust.na*

**ABSTRACT**

Climate and land use/land cover (LULC) change are primary drivers of hydrological changes, particularly in water-scarce transboundary river basins. This study addresses the need to understand these interactions for sustainable landscape management in the semi-arid Okavango Basin. The objective was to assess the projected streamflow response of the lower Okavango River Basin under combined climate and LULC change scenarios. We quantified future changes in streamflow and water yield across three periods, extending to 2100. In the transboundary lower Okavango River Basin, we applied the SWAT+ hydrological model. The model was forced with downscaled climate projections and land use change scenarios under moderate (SSP2-4.5) and high (SSP5-8.5) emission pathways. Results project a 5–20% decrease in precipitation by 2100, leading to a severe decline in streamflow of up to 60%. Dry season flows are projected to nearly cease. Concurrently, projected land use change indicates that cropland will expand to over 65% of the basin, replacing natural wetlands. The annual water yield becomes concentrated along the river channel, with most of the basin generating less than 200 mm of water. The basin's hydrology is highly sensitive to these combined changes. The combined climate and LULC pressures threaten the basin's hydrological integrity and water security. This underscores an urgent need for integrated land and water management. We recommend strengthening transboundary governance and implementing nature-based solutions, such as wetland conservation.

**Keywords:** climate change, CMIP6, Okavango River basin, semi-arid hydrology, streamflow simulation