



## **Investigation of Regional Drivers for Discharge Variability in the Blue Nile Basin under Climate Change Conditions**

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A discharge time series is the result of complex and interacting processes. Important for the runoff variability are catchment characteristics like the basin size and shape, gradient of altitude and exposition as well as micro- and macroclimatic conditions. The discharge dynamic of the Blue Nile is predominantly controlled by the monsoon variability. Due to the steep gradients in the Ethiopian highlands, the surface flow component represents the main fraction of the total discharge. The composition of discharge and the resulting time response of river runoff is further a function of subsurface retention and surface roughness. Thus, the soil surface characteristics and thereby the land use are main factors controlling formation of local water availability in the Upper Blue Nile basin.

During the last 30 years the continual transformation of forest and grassland to cropland reduced the total forest area of Ethiopia to 2.5 % with respect to the total area. Regarding the discharge formation process, land cover change supports generation of surface flow because of degradation of the surface roughness with two mainly negative effects: more surface runoff and less vegetation cover leads to erosion and degradation of soils. On the other hand, the water available for plants (soil moisture) may be reduced by a decreasing infiltration rate. Both effects have consequences for agricultural production and lead to an increasing demand for irrigation. Thus, the combination of the processes may accelerate the negative environmental response which makes the system highly vulnerable and sensitive to changes in driving forces.

This study aims at analyzing the correlation of possible regional drivers with the inter-seasonal and inter-annual variability of subcatchment discharge generation. The study will be carried out applying the eco-hydrological model SWIM (Soil and Water Integrated Model) driven by observed and scenario climate data. Based on satellite image information the effect of a changing land cover will be analyzed for two different sites in the basin under different climate conditions.