*2020 International Conference on the Nile and Grand Ethiopian Renaissance Dam: Science, Conflict Resolution and Cooperation, August 20-21, 2020, Florida International University, Miami, FL USA (Virtual)*

# The Impact of Land Use and Climate change on the Blue Nile Basin Assessment using SWAT

Sead Ahmed Swalih[1]

## Abstract

This research aims to evaluate the impacts of land use change and climate change on both hydrologic regimes and water resources of the Blue Nile River Basin found mainly in Ethiopia and Sudan where observed hydrologic data are limited. The downstream countries of the Nile River Basin are sensitive to the variability of runoff from the Ethiopian part of the basin. This research presents three steps for analysing land use and climate change impacts of the Blue Nile Basin on hydrology and water resources of the river. The first step is to improve the available SWAT model of the Blue Nile Basin and evaluate its applicability for land use change and climate change assessment taking into consideration the limited data availability and the scale of the basin. The hydrologic model uses the constructed climate scenarios as input to predict runoff. The second is the construction of the climate change scenarios whereby the simulation outcomes of the multiple general circulation models (GCMs) scenarios will be used in the available SWAT model to compare them with the baseline climate simulation using the current precipitation and temperature patterns. In the final step, land use and cover change impacts on hydrology and water resources of the basin are examined using hypothetical Land Use and Cover (LUC) scenarios. The results suggest that (1) the climate in most of the Blue Nile River Basin is likely to become warmer towards the end of the century but the precipitation change doesn't exhibit a uniform pattern (2) the future flow has not been agreed by the GCM models where some estimate an increase in flow (flooding, erosion etc.) while others estimating a decrease in flow (low flows, extended dam filling time, power shortage, etc.) (3) Land use and cover change due to natural (e.g. forest fire) and anthropogenic causes (e.g. deforestation) has proven to have significant impact on the flow regime of the basin. The results, however uncertain with existing accuracy of climate models, suggest that land use and climate change will have a significant impact on the Blue Nile River which accounts for 60% of the Nile annual flow. This will definitely have an impact on water resources of riparian countries; therefore, concerned stake holders need to take this into consideration in any further water resources management plan both in the upstream as well as downstream regions of the basin.

**Keywords**: Blue Nile Basin, Land use change, Climate change, SWAT, GCM, Climate prediction, Blue Nile flow prediction

1 Istanbul Technical University, Istanbul, Turkey, Email: swalih@itu.edu.tr