ASSESSING THE BLUE AND GREEN WATER DYNAMICS OF SWAT HYDROLOGICAL MODEL USING ADAPTIVE META SIMULATORS

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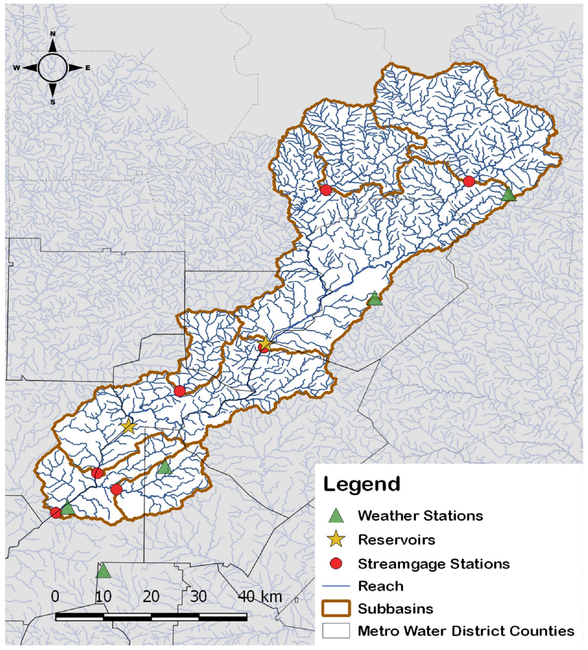

Figure 1: *Map showing of Upper Chattahoochee River basin.*

Virtual Identity	Details
Location	Georgia state, USA
Name of the watershed	Upper Chattahoochee River (UCR)
Area of the Watershed	4291.87 km^2
Elevation range	19.4 to 135.3 m, based on DEM
Dominant Land use	Imperviousness
Dominant Soil	Cecil-Madison-Pacolet
Annual Streamflow and Precipitation	14.725 m^3 / sec - 178.113 m^3 / sec, 1346.2 mm to 1524 mm per year.

Data Sources

- *Streamflow*: United States Geological Survey (USGS) Current Water database
- *Precipitation:* National Climatic Data Center (NCDC) database
- *Digital Elevation Model (DEM):* National Hydrography Dataset (NHD)
- *Land Use and Land Cover (LULC): National Land Cover Dataset (NLCD)*
- *Soil data : USSTASTGO*

Introduction

- Under the increasing threats of climate and land use change, fresh water availability will eventually become a limiting resource for many regions across the globe in the near future.
- The dynamics of water availability within a region can be analyzed in multiple ways, including statistical methods, sensitivity based methods and distributed hydrologic modeling.
- This study aims to quantify the water availability (i.e., blue and green water dynamics) of Metro Water District (MWD) basin. The Soil and Water Assessment Tool (SWAT) is adopted to assess the hydrologic phenomena.
- Here, SWAT is a semi distributed and physical based hydrological model, it contains enormous number of parameters to capture the hydrological regime which leads to high complexity and computational burden during calibration. Where, Meta models are cheap simulators to represent input-output response of physical simulation models, it helps to minimize the computational burden and increases the model consistency. Hence, Adaptive Meta Modelling based Optimization (AMMO) framework is implemented for calibration of SWAT watershed model.

Methodology

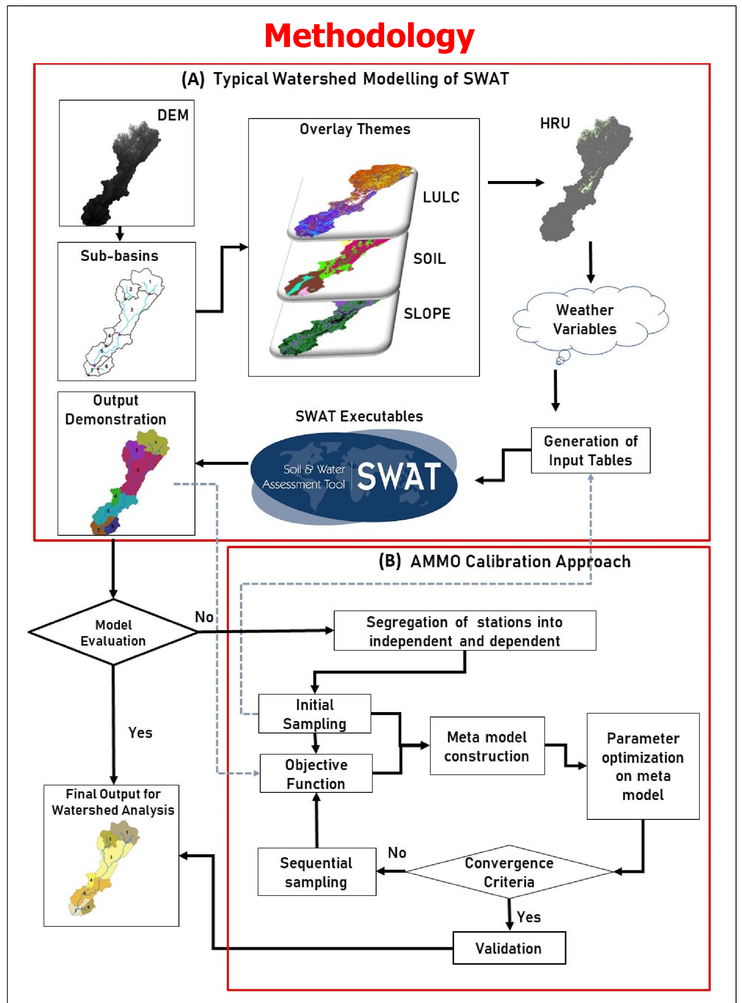

Figure 2: *Framework of SWAT and AMMO algorithm*

Results and Conclusions

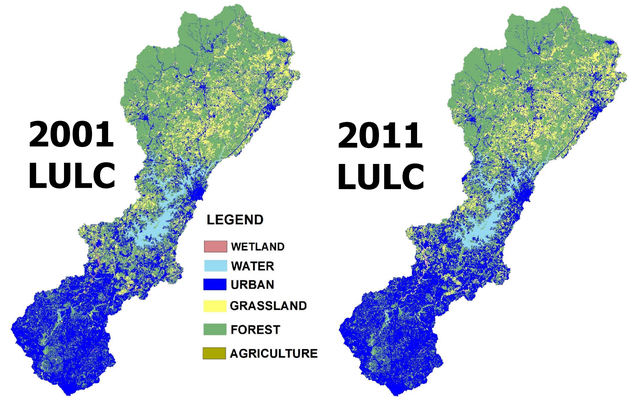

Figure 3*: Spatial analysis over a period of 10 years in UCR.*

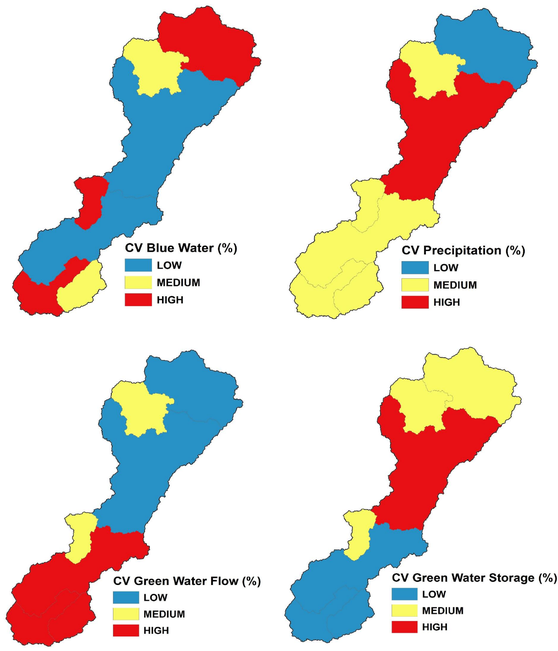

Figure 4*: Assessment of blue and green water dynamics from approximated UCR SWAT model.*

Importance of Study

- Study analyses will help regional water boards in planning, designing, and managing respective systems as per the future climate change.

References

- L. Du et al. 2018, Large scale spatially explicit modeling of blue and green water dynamics in a temperate mid-latitude basin Journal of Hydrology 562, 84–102.
- C. Wang et al. 2014, An evaluation of adaptive surrogate modeling based optimization with two benchmark problems Environmental Modelling & Software 60, 167-179.