Applicability of remotely-sensed gridded precipitation and land use data for SWAT Modeling in the Philippines: A case for the Pampanga River Basin

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ABSTRACT

Understanding and quantifying water resource availability is essential in the management of water resources in both macro and micro-scale settings. Hydrologic models help fill in the information for managing these resources. However, several studies in the Philippines suggest and noted that some watersheds lack the necessary meteorological data for hydrologic models, especially for the Soil and Water Assessment Tool (SWAT). As limited as the usage of SWAT in the country due to gaps in data, this study proved the potential in using easy-access data and tools to perform SWAT simulations in the Philippines. Specifically, this paper highlights the usage of NASA remote sensing datasets such as Global Precipitation Measurement (GPM) and the Global Land Data Assimilation System (GLDAS) as alternative inputs to perform SWAT simulations for Pampanga River Basin (PRB) – a major river basin in the country.

Results suggest that using these gridded data performed better deterministically in modeling monthly streamflow when compared to simulations performed using ground-based weather inputs. When evaluating model performance stochastically, both ground-based and gridded datasets achieved acceptable model performances. Worth noting is that these two (2) models failed to achieve acceptable deterministic results for simulating and calibrating daily flows due to peak flows resulting from recorded flood-related events.

Lastly, landuse scenarios in the years 2020, 2030, and 2050 were also projected using the GeoSOS-FLUS model to evaluate their changes and impacts on the hydrologic water balance of PRB and showed that the complex dynamics of landscape changes over time affect the natural hydrology of watersheds and these conversions visibly affect components related to flow such as subsurface lateral flow, surface flow or runoff, and water yield.

Keywords: *SWAT, gridded meteorological datasets, landuse scenarios*