

Evaluation of Climate Forecast System Reanalysis and local weather station data as input for run-of-river hydropower assessment in Agusan River Basin, Philippines

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Abstract

Stream flow discharge determination is essential for the assessment of hydropower potential. However, obtaining representative meteorological data which is a key input parameter in hydrological modelling in the actual watershed of focus is oftentimes difficult. In this study, the stream flows for the Agusan River Basin were simulated to assess its hydropower potential. The river basin, located in Southern Philippines, has an area of about 11,700 km² but has no weather stations within its boundaries. Weather data from Climate Forecast System Reanalysis (CFSR) and local weather stations near the study area were used as input for the Soil and Water Assessment Tool (SWAT) to model the watershed runoff. The hydrologic modelling was conducted for the years 2000 – 2015. The potential power of streams were calculated using the resulting flows from the simulation, and the hydraulic head determined using a developed digital elevation model (DEM) based algorithm. A total of 1876 sites on 69 sub-watersheds were identified as potential location for run-of-river hydropower generation in the studied river basin using the model outputs. Power potential for each sites ranges from 100.1 kW to 18.16 MW (average: 3.69 MW) for simulations using CFSR data and 533.3 kW to 2.376 MW (average: 2.45 MW) for simulations using the local weather station data. Initial analysis shows that using CFSR data will yield higher values for the simulated stream flows as compared to the values obtained using local weather station data. Therefore, for watersheds without observed weather data, using measurements from local station near the study will give more conservative values for hydropower assessment.

Keywords: hydropower assessment, hydrological modelling, weather data, CFSR, SWAT

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