

Hydrological Dynamics and Sustainability of the Angat Watershed: A Comprehensive Modeling Approach

ABSTRACT

This dissertation proposes a comprehensive investigation into the hydrological dynamics and sustainability of the Angat watershed, a critical water resource in the Philippines, through a comprehensive modeling approach. Utilizing the Soil and Water Analysis Tool (SWAT) and Geospatial Future Land Use Simulation (Geospatial-FLUS) models, alongside Representative Concentration Pathways (RCP) scenarios. This study aims to (1) hindcast the baseline hydrology of the Angat watershed (with and without a dam) (2) integrate land use land cover change and climate change scenarios into the watershed, and (3) apply reservoir management strategies to the Angat watershed.

The methodology covers a detailed literature review, extensive data collection on climatic, hydrological, soil, and land use parameters, and the application of advanced hydrological and geospatial modeling techniques. Sensitivity analysis, calibration, and validation of the SWAT model will provide an in-depth understanding of the reservoir's current hydrological processes. Historical hydrological conditions will be reconstructed to evaluate the dam's impact on the watershed. The integration of land use projections from Geospatial-FLUS and climate scenarios from RCPs will offer insights into future challenges and guide sustainable watershed management practices. The findings aim to inform sustainable watershed management strategies for Angat Reservoir by providing insights into key parameters affecting its hydrology and the potential impacts of environmental changes. This research contributes to the field of environmental management and hydrology by offering a comprehensive model for analyzing and managing water resources in the face of changing environmental conditions.