

Analysis of the potential effects of future projected changes in temperature and rainfall on monthly streamflow of Panay River Basin

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Abstract

Approximately 90% of disasters in the past two decades have been linked to the interaction of climate and water. The integration of the results of climate models into hydrological models allows for better understanding of how rainfall and temperature variations are translated into energy and water fluxes in watersheds. With the improvement of hydrological impact studies, disaster risk reduction and management policies are positioned to be more informed and responsive to local complexities. These interventions are much needed in the Philippines – a country whose combined physical vulnerabilities and socio-economic challenges makes it one of the most affected countries by climate change.

The Panay River Basin, a key agricultural area in the Western Visayas Region, illustrates this vulnerability. The basin faces perennial flooding problems and suffers from agricultural damage during periods of drought. These problems have prompted the revival of plans of constructing a dam within the basin. While studies have pointed to the benefits to these interventions, it is imperative to assess future conditions which can affect their effectiveness especially considering a changing climate.

This study aims to utilize future monthly projections of temperature and rainfall derived from downscaled outputs of selected Global Climate Models (GCMs) from the Sixth Phase of the Coupled Model Intercomparison Project (CMIP6). These projections are based on a set of Shared Socioeconomic Pathways (SSPs): SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5, as provided by the Revised Climate Information Risk Analysis Matrix (CLIRAM) tool of the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA). These variables will be used to drive hydrological processes using the Soil and Water Assessment Tool (SWAT). Changes in monthly streamflow and other water balance components compared to 1991-2020 baseline period shall be evaluated for six future time slices up to 2100. Results of the study shall provide insights on current and future hydrological response of the basin as well as a rapid assessment of inflows to the proposed dam with the effects of a changing climate.