

ASSESSMENT ON THE HYDROLOGICAL RESPONSES TO LAND USE/LAND COVER AND CLIMATE CHANGES OF ADDALAM RIVER BASIN (ARB), CAGAYAN VALLEY USING THE SOIL AND WATER ASSESSMENT TOOL (SWAT)

ABSTRACT

Watershed hydrology is influenced by many factors, mainly by changes in the climate and land use/land cover (LULC). These two interacting factors can alter the hydrological processes and components of watershed systems, affecting availability of water resources, the ecosystems and can increase risks of hydrological hazards such as flood, drought and related events, consequently affecting socio-economic development. Climate change can be considered as the main global problem that the world is currently facing. In the recent decades, observed changes in climate have caused impacts to the hydrological system such as changes in precipitation, streamflow and runoff. In addition, LULC changes which are mainly attributed to anthropogenic activities have also substantially affected hydrological processes in local to global scales. In the case of Philippines, the country is highly vulnerable to impacts of climate change and risks to related hazards and disasters. Its vulnerability and disaster risk are projected to intensify under climate change. Observed changes in the country's air temperature, precipitation patterns and tropical cyclones (TCs) are also projected to continue with the changing climate. The country's land cover have also changed extensively in the past decades. The forest cover was drastically reduced between 1900s - 2001 and continuously to decline up to present. Quantifying and understanding the impacts of variations in LULC and climate to watershed hydrology can provide predictive information which can be used as guide in the formulation and/or implementation of policies and strategies for water resources management. It can also be used in decision making on related hydrological hazards and in formulation of adaptation strategies to impacts of future climate and LULC changes to water resources. Thus, this study aims to apply the watershed model Soil and Water Assessment Tool (SWAT) to evaluate the hydrologic responses of the Addalam River basin (ARB), a sub-watershed of the Cagayan River basin, to LULC changes and climate change. To achieve this, the specific objectives are to 1) Simulate the baseline hydrologic processes within the ARB 2) Quantify and analyze the separate and combined impacts of LULC and climate changes on surface runoff, streamflow and available water of ARB under different LULC and climate change scenarios and 3) Evaluate how the changes in the climate and LULC affected the surface runoff, streamflow and available water of ARB.