



## Assessment of Future Climate Change Projections Using Multiple Global Climate Models

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### Abstract

Nowadays, the hydrological cycle which alters river discharge and water availability is affected by climate change. Therefore, the understanding of climate change is crucial for the security of hydrologic conditions of river basins. The main purpose of this study is to assess the projections of future climate across the Upper Ayeyarwady river basin for its sustainable development and management of water sector for this area. Global Ten climate Models available from CMIP5 represented by the IPCC for its fifth Assessment Report were bias corrected using linear scaling method to generate the model error. Among the GCMs, a suitable climate model for each station is selected based on the results of performance indicators ( $R^2$  and RMSE). Future climate data are projected based on the selected suitable climate models by using future climate scenarios: RCP2.6, RCP4.5, and RCP8.5. According to this study, future projection indicates to increase in precipitation amounts in the rainy and winter season and diminishes in summer season under all future scenarios. Based on the seasonal temperature changes analysis for all stations, the future temperature are predicted to steadily increase with higher rates during summer than the other two seasons and it can also be concluded that the monthly minimum temperature rise is a bit larger than the maximum temperature rise in all seasons.

**Keywords:** Hydrological Cycle; Climate Scenarios; Precipitation; Temperature; General Circulation Model.

### 1. Introduction

Climate change is a global phenomenon and one of the most interesting issues exhibited by three prominent signals, that is: (1) global average temperatures are gradually increasing; (2) changes in global rainfall patterns; and (3) rising of sea levels [1]. Increasing atmospheric carbon dioxide, other greenhouse gases, and human activities like land use changes, production of industrial effluents and other activities due to the development of society cause to change in global as well as regional climate [2]. The impact of climate change such as precipitation and temperature changes may lead the world to a more serious risk of storms, droughts, floods, and other events each year [3]. Due to the impact of climate change, water resources are facing uncertainties at the regional, national, and local levels [4]. Since the 1970s, global mean temperatures have increase 0.2°C per decade and global mean precipitation increased 2% in the last 100 years with a high probability of warming of more than 2°C over the next century [5]. Myanmar consists of eight major physiographic regions: The Ayeyarwady Delta, Northern Hilly Region, Central Dry Zone, Rakhine Coastal Region, Eastern Hilly Region, Southern Coastal Region, Yangon Deltaic Region, and Southern Interior Region [6]. Climate change impacts on rainfall intensity and rainfall pattern are significantly changed in some parts of the country because climate change is depending on the topographical condition in Myanmar [7].

According to the record by Department of Meteorology and Hydrology of Myanmar, climate change impact on

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