Available online at www.CivileJournal.org

Civil Engineering Journal

Vol. 6, No. 2, February, 2020

Analysis of Streamflow Response to Changing Climate Conditions Using SWAT Model

Han Thi Oo [a], Win Win Zin [a], Cho Cho Thin Kyi [a*]

[a] *Department of Civil Engineering, Yangon Technological University, Yangon and 11181, Myanmar.*

Received 06 November 2019; Accepted 12 January 2020

Abstract

The understanding of climate change is curial for the security of hydrologic conditions of river basins and it is very important to study the climate change impacts on streamflow by analyzing the different climate scenarios with the help of the hydrological models. The main purpose of this study is to project the future climate impact on streamflow by using the SWAT model. The multi-model projections indicated that Upper Ayeyarwady River Basin is likely to become hotter in dry season under low rainfall intensity with increasing temperature and likely to become wetter but warmer in both rainy and winter season because of high rainfall intensity with increased temperature in future. The impact of climate change scenarios is predicted to decrease the annual streamflow by about 0.30 to 1.92% under RCP2.6, 5.59 to 7.29% under RCP4.5 and 10.43 to 11.92% under RCP8.5. Based on the change in high and low flow percentage with respect to the baseline period, the difference between high and low flow variation range will increase year by year based on future scenarios. Therefore, it can be concluded that it may occur more low flow in the dry season which leads to increase in water scarcity and drought and more high flow in the wet season which can cause flooding, water insecurity, stress, and other water-related disasters.

Keywords: Climate Change; SWAT Model; Streamflow; High and Low Flow.

1. Introduction

The assessment of climate change impact on streamflow is one of the most interesting issues in hydrological research [1]. Changes in air temperature and precipitation cause a major impact on the hydrologic cycle directly and indirectly and moreover, the water resources [2]. Climate change altering the amount, intensity, form, and timing of precipitation as well as the rate of evapotranspiration also affects hydrological regimes by affecting the volume, peak rate, and timing of river flow [3]. For studying the impact on the regional water resource availability, the estimation of changes in river flow is the most common and is considered for decision-making processes in water-resource management [4].

Myanmar is situated in the tropical climate region with three dominant seasons: the hot season (16 February to May), the wet season (June to September), and the cold season (October to 15 February) [5] and a region that is highly vulnerable to impacts from climate change. There are about 60 rivers in Myanmar [6], the country's largest main river is Ayeyarwaddy and it is an important commercial waterway used for trade and transport. The Ayeyarwaddy River is divided into the upper and lower parts with the river confluence with the Chindwin River [7]. Upper Ayeyarwady river basin is one of the major river basins in Myanmar and consists of Central Dry Zone and the Northem Hilly Region. The central dry zone area is known as the "oil pot" of the country and the economic growth of the country through agricultural development is essential in prenatal economic life. However, current climate change effects such as high temperature,

* Corresponding author: ccthinkyi@gmail.com

http://dx.doi.org/10.28991/cej-2020-03091464