Assessment of the Potential Occurrence of Dry Period in the Long Term for Pahang State, Malaysia

Ahmad Saifuddin Othman[1, 2,*], and *Nurul Nadrah Aqilah* Tukimat[1]

[1]Universiti Malaysia Pahang, Faculty of Civil Engineering and Earth Resources, 26300 Gambang, Kuantan Malaysia
[2]Universiti Malaysia Pahang, Centre for Earth Resources Research and Management, 26300 Gambang, Kuantan Malaysia

Abstract. The interference of climate circulation and continuous rising of surface temperature every year has caused the atmosphere composition change which gives serious impact to water resource management. Pahang is among of the affected states by El Nino that hit Malaysia in recent years which led to water depletion at several water plants. Based on the current situation, this study focuses on 1) simulate the average rain pattern using statistical downscaling; 2) identify the severity index and dry duration occurrence in the catchment area. Predicting potential changes in the climate events is important to evaluate the level of climate change in the critical region. Therefore, the integration of Statistical Downscaling Model (SDSM) and Standard Precipitation Index (SPI) have been conducted to study the potential occurrence of the dry period due to climate change for year 2020s and year 2050s. The results reveal that the dry condition is high during the mid-year. The lowest SPI value is estimated to reach -2.2 which can be classified as extreme. The potential dry period is expected to increase 2.5% and 3.3% in 2020 and 2050, respectively.

1 Introduction

Nowadays, climate change has become the important issue due to its impact on the ecosystem, water resources, environment and human life [1]. The probability of climate change of an area also refers to the historical condition or the projection of future climates such as monsoons, droughts and floods. Climate change refers to the continuous change in natural climate variability properties in long term due to changes in the global climate as a result of human activities [2]. Industrial advancement is one of the main factors that led to the uncontrolled greenhouse gas emissions especially carbon dioxide (CO_2) thereby raising the world temperature. The enhancement of CO_2 was measured by computing the hydrogen ion of sea water concentration which showed a reduction in pH value to 0.1 which equivalent to an increase of 26% of acid [3]. The dramatic increase in temperature due to climate change will cause high evapotranspiration which affects the water resources [4, 5,6]. In the 20th century, the temperature is expected to increase more than 2°C in the tropical and temperate regions and more than 4°C globally. This will threaten the global security [3]. The projected mean surface temperature in Malaysia is expected to be higher with an average increase of 0.6°C–1.2°C [7]. Drought is a natural phenomenon that occurs directly but the impact to the region and the occurrence frequency are the features that distinguished from other phenomena. Dry basis is the long term dry conditions with low moisture content which the

studies indicate that the information of rainfall and temperature changes.

General Circulation Models (GCMs) is a method developed in the present, for the purpose of projections of climate change scenarios studied by the scale set. The uses of GCMs need to be identified in order to focus and narrow down the grids to get the right hydrological cycle information at site studied. Statistical downscaling model, the National Centers for Environmental Prediction (NCEP) data have been used in designing the predictor-predictant relationship and GCM data provided by Canadian Centre for Climate Modeling and Analysis (CCCma) used to project the climatic changes due to greenhouse gases (GHGs) contribution in the future year [8, 9]. Two main approaches for a downscaling model are dynamical downscaling (DD) and statistical downscaling (SD). In this study, statistical downscaling techniques have been chosen and the universally multiple linear regression models called Statistical Down-Scaling Model (SDSM).

There are many future climate change projection studies conducted globally such as Sylhet and Moulvibazar districts in North-eastern region of Bangladesh [10], Marsyangdi River Basin, Nepal [11] and Lisbon [12]. While in Malaysia, the studies in the Muda Irrigation Scheme in north of peninsular Malaysia by N. N. A. Tukimat et al. [13] and the Kurau River by Hasan et al. [14] are the preliminaries studies available in Malaysia at this time. The study is initiated by Hassan et al. [14] in Kurau River are conducted to assess the impact

---

*Corresponding author: othman.ibnu@yahoo.com