

Hydrological Characteristics and the Dynamics of Seasonal Changes in the Rongkop Karst Area, Gunungkidul, Indonesia

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ABSTRACT

Global climate change has a direct impact on the agricultural sector. Rongkop is an area that has a karst structure. Most of the people in Rongkop sub-district make a living as farmers. Areas that have karst rock types have distinctive hydrological characteristics. Karst areas do not have surface water resources but have great potential for subsurface water resources. Therefore, agriculture in karst areas is dominated by rainfed agriculture, which only relies on rainwater for irrigation. With the occurrence of global climate change, changes in the rainy and dry seasons become erratic. The tendency of a long dry season reduces the availability of water. Meanwhile, the uncertainty of the start of the rainy season makes it difficult for farmers to determine the start of the planting season. This uncertainty has an impact on farmers' losses and lack of agricultural productivity, especially in dry land.

This study analyzed the impact of climate change on the characteristics of rain in the Rongkop karst area and seasonal changes with reference to rainfall data from 1986-2021. Rain data was obtained from manual rain measurements carried out by the Agriculture and Food Office of Gunungkidul Regency. The start of the rainy season is determined based on basic rainfall data with a value of more than 50 mm and occurs twice in a row. Meanwhile, the beginning of the dry season is determined when the rainfall is less than 50 mm and occurs twice in a row.

Based on the analysis of rainfall from 1986-2021, the Rongkop karst area has moderate rainfall. The average annual rainfall in the area is 2012 mm. From 1986-2021 there was an increase in the percentage of heavy rain events (>50 mm) and an increase in the frequency of very heavy rains (>100 mm). Heavy rain is a hydrometeorological disaster that has the potential to reduce agricultural productivity. In addition, the results of the basic rainfall analysis show that there are erratic seasonal changes. The rainy season in the Rongkop karst area begins no later than August III and no later than December III. Meanwhile, the dry season begins no later than February I and no later than May II. The duration of the dry season and the rainy season each year also changes. The average duration of the dry season is 212 days and the rainy season 151 days. The longest dry season duration occurred in 1997 (274 days) and 2013 (284 days) and 2019 (286 days). The long drought was the impact of the El Nino phenomenon that occurred that year. The frequency of heavy rains that occur during the normal dry season (April-September) also experiences an increasing trend. This can be triggered by the La Nina phenomenon that has occurred recently and its frequency is getting more frequent. La Nina has an impact on increasing rainfall.

Kata Kunci: *karst, rainfed agriculture, global climate change*