PRECIPITATION AND RICE PRODUCTION IN ZAMBALES, PHILIPPINES: A CLIMATOLOGICAL TIME SERIES ANALYSIS

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An Undergraduate Thesis Submitted to the Faculty of the Department of Engineering Sciences, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines
in Partial Fulfillment of the Requirements
for the Degree of

BACHELOR OF SCIENCE IN METEOROLOGY

MAY 2023

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ABSTRACT

EDILLO, NOEL G., Department of Engineering Sciences, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines, **DECEMBER 2022, PRECIPITATION AND RICE PRODUCTION IN ZAMBALES, PHILIPPINES: A CLIMATOLOGICAL TIME SERIES ANALYSIS.**

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Patterns in precipitation have been changing due to climate change and pose significant impacts on crop production and productivity. Local scientists have studied rainfall variation, but not regarding the rice crop and observable trends. This study examined the climatological time series analysis of the precipitation and rice production of the rain-fed rice-producing areas of Zambales, Philippines, over 31 years from 1991-2021. Using the shapefiles of the National Irrigation Administration (NIA) Irrigation Management Office (IMO) of Zambales and the raster data of the Total Rice Producing Regions of the Philippine Rice Information Systems (PRiSM) of the Philippine Rice Research Institute (PhilRice), the subtraction method produced the assumed purely-rainfed rice producing areas of the province. With this output region and the combined geospatial methodologies from the Quantum Geographic Information System (QGIS) and Google Earth Engine (GEE), the accumulated precipitation was obtained from the Climate Hazards Group Pentad InfraRed Precipitation with Station dataset (CHIRPS). The trend analysis for the precipitation showed no significant overall trend (MK = 0.8650).

Meanwhile, the trend analysis for Rice Production showed a significant increase (MK = 1.7821x10-6). The anomalies show significant rises and dips in each variable for the 31 years caused by extreme events, ENSO years, and changes in agricultural practices.

The correlational tests between the precipitation and rice production produced a significantly weak overall linear relationship ($r = -0.0904$). However, after splitting the dataset into ten years, results show that the correlation between each variable exhibited a negative trend with $r = 0.07$, -0.24, and -0.37 from 1991-2000, 2001-2011, and 2012-2021 respectively. Each year in the time series shows that the Zambales region is vulnerable to El Niño events and more resilient to La Niña regarding precipitation and rice production. Further, the Southwest Monsoon (Habagat) and Tropical cyclones affect the purely-rainfed rice-producing regions. Rice farmers in the area who depend solely on rainfall are therefore advised to follow the start of the rice planting season as developed by the DA, PhilRice, and PAGASA.

Keywords: *Precipitation; Rice production; Climatological Time series analysis; Trend Analysis.*

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