



**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF WATER RESOURCES ENGINEERING

FINAL YEAR PROJECT REPORT

DEVELOPING A PREDICTIVE MODEL USING ARIMA FOR METEOROLOGICAL
DROUGHT FORECAST AND MITIGATION

CASE STUDY: TEREKO DISTRICT

BY

NAME: JURUA DICKSON

REG NO. BU/UG/2020/2492

EMAIL: juruadickon@gmail.com

TELEPHONE NO. 0786965539

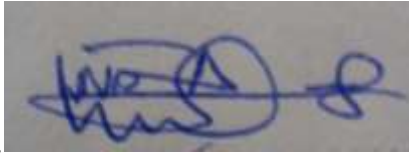
SUPERVISED BY: MR.MUYINGO EMMANUEL

Presented To the Faculty of Engineering for the Partial Fulfillment of the Award of Bachelor of
Science in Water Resources Engineering At Busitema University

DECLARATION

I, JURUA DICKSON hereby declare that this report in its form, nature and content is my work and has never been presented to any institution for an academic award

Signature.....21/11/2024.....

A handwritten signature in blue ink, appearing to be 'JURUA DICKSON', is written over a rectangular area.

Date.....

APPROVAL

This research report has been approved by MR MUYINGO EMMANUEL

Date.....20/11/2024.....

Signature ........

DEDICATION

This report is dedicated to my parents, my classmates, and my brothers and sisters for ensuring that I go through formal education for a better life. I also dedicate this report to my supervisor for guiding me through the process of report writing

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List of acronymns

SPI	Standardized Precipitation Index
ARIMA	Autoregressive integrated moving average
TCI	Temperature Condition Index
ACF	Autocorrelation function
PACF	Partial Autocorrelation function
VCI	Vegetation Condition Index
GIS	Geographic Information System
AVHRR	Advanced Very High Resolution Radiometer
NIR	Near Infrared
PDSI	Palmer Drought Severity Index
RAI	Rainfall Anomaly Index
SPEI	Standardized Precipitation Evaporation Index
SMDI	Soil Moisture Drought Index
SRI	Standardized Runoff index
CMI	Crop Moisture Index
UBOS	Uganda Bureau of Statistics
UMA	Uganda Meteorological Authority

ABSTRACT

This study was carried out to develop a predictive model for meteorological drought using Auto regressive moving average (ARIMA). The dataset used for this study was precipitation data which was used to derive SPI on 3 month timescale. Terego District located in the north western part of Uganda was used as the case study. Terego is faced with erratic rainfall patterns in the recent years that affect the normal livelihood of the people. Despite this not much has been done in the area of drought forecast not only in Terego district but west Nile region as a whole. This report is comprised of four chapters. Chapter one offers an introduction to the study, shows a statement of the problem that needs to be addressed, objectives of the study, and justification. While chapter two aims at a comprehensive literature review about the topic of study, investigating what has been done and what needed to be done. Chapter three on the other hand explains into details the methodologies that the researcher used to achieve each of the stated objectives in chapter one of the research proposal.

Historical weather records specific to Terego District were analyzed to understand past drought occurrences. Utilizing established drought indices such as the Standardized Precipitation Index (SPI) and Palmer Drought Severity Index (PDSI), the study quantifies and characterizes drought conditions relevant to the local context and then forecasts potential future drought conditions using the ARIMA model by predicting future rainfall values which were then used to capture season variations and deficiencies in precipitation on 3 month timescale. Chapter four comprehensively states and discusses the results that were obtained in the course of the study. Finally, the chapter four of the report includes not only the challenges, recommendations and conclusion on the study.

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