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CLIMATE CHANGE

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DECLARATION

This research proposal is my original work prepared with no other than the indicated sources and support and has not been presented elsewhere for a different or similar assignment.

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DEDICATION

This section is optional

ACKNOWLEDGEMENT

This section is optional

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CHAPTER ONE

INTRODUCTION

1.1 Background of study

Climate change refers to long-term alterations in temperature, precipitation, and other atmospheric conditions that persist over decades or centuries.

While climate variations have occurred naturally over centuries, the rapid and significant changes we are witnessing today are primarily driven by human activities such as deforestation, industrialization, and the burning of fossil fuels. These activities increase the levels of greenhouse gases (GHGs) such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) in the atmosphere. The result is a phenomenon commonly known as global warming, which is a primary driver of contemporary climate change (Rajamanickam et al., 2023).

In Kenya, climate change is not just a global issue but a pressing national concern. The country's economy, largely dependent on agriculture, tourism, and energy, is vulnerable to climate change's direct and indirect effects.

Over the last few decades, Kenya has experienced a notable shift in weather patterns, with rising temperatures, unpredictable rainfall, and an increase in extreme weather events like droughts and floods. These changes have widespread impacts on the environment, human health, food security, and socio-economic development (Gebre et al., 2023).

Kenya has witnessed an increase in the frequency and severity of extreme weather events. The most common are droughts and floods. Droughts, especially in arid and semi-arid lands (ASALs), have become more prolonged and intense. This not only threatens water availability but also reduces agricultural productivity, pushing vulnerable populations deeper into poverty. At the same time, flooding, particularly during the rainy seasons, has led to displacement of communities, destruction of infrastructure, and loss of lives. The increasing unpredictability of

these events makes it difficult for communities to prepare and adapt, exacerbating their vulnerability (Wambua et al., 2019).

Agriculture is the backbone of Kenya's economy, contributing about 30% of the GDP and employing over 75% of the population, particularly in rural areas. However, the sector is highly dependent on rainfall, making it particularly vulnerable to climate change. Changing rainfall patterns and the increased frequency of droughts have led to crop failures and reduced livestock productivity. For example, maize, which is a staple food crop, has seen declining yields due to erratic rainfall and increased temperatures. This has contributed to food insecurity, particularly in ASAL regions, where subsistence farming is a key livelihood. In turn, food shortages lead to increased reliance on food aid and imports, straining Kenya's economic resources (P et al., 2017).

Kenya is renowned for its rich biodiversity, which is an integral part of its cultural heritage and economy, particularly through tourism. However, climate change threatens the stability of ecosystems and wildlife populations. Changes in temperature and rainfall patterns disrupt ecosystems, causing shifts in species distribution and behavior. For instance, altered migration patterns of animals such as wildebeest in the Maasai Mara can affect the delicate balance of the ecosystem and negatively impact tourism. Forest ecosystems, such as the Mau Forest, are also at risk. Deforestation, exacerbated by climate stress, reduces the forests' ability to absorb CO₂, thus worsening global warming (Mushitsi et al., 2023).

Climate change poses significant health risks to Kenyans. Increased temperatures and changes in rainfall patterns create favorable conditions for the spread of vector-borne diseases such as malaria and dengue fever, particularly in areas where these diseases were previously uncommon. Flooding also increases the risk of waterborne diseases like cholera (Wanjara et al., 2023).

Recognizing the urgent need to address climate change, Kenya has taken significant steps toward both mitigation and adaptation. One of the key policy instruments is the Climate Change Act of 2016, which provides a legal framework for addressing climate change through

coordinated efforts across various sectors. The act established the National Climate Change Council, which is responsible for overseeing the implementation of climate change policies and ensuring that Kenya meets its international commitments under agreements like the Paris Agreement.

In addition to policy initiatives, Kenya has embraced renewable energy as part of its mitigation strategy. The country is a leader in geothermal energy production, with projects in areas like Olkaria contributing to a clean energy transition. Wind and solar energy projects are also being scaled up, reducing the reliance on fossil fuels and helping Kenya reduce its carbon footprint(Klagge et al., 2020).

At the community level, several adaptation strategies are being implemented to build resilience. These include the promotion of climate-smart agriculture, which encourages sustainable farming practices that are more resilient to drought and variable rainfall.

In pastoral regions, efforts to promote livestock diversification and water conservation techniques have shown promise in helping communities adapt to changing environmental conditions.

Reforestation and afforestation programs, such as the "Billion Tree Campaign," aim to restore degraded ecosystems and improve carbon sequestration.

Climate change is a pressing issue that poses significant challenges for Kenya's environment, economy, and society. While the country has made notable progress in addressing these challenges through policy frameworks, renewable energy projects, and community adaptation efforts, more work remains. Kenya must continue to strengthen its resilience to climate impacts while pursuing sustainable development to safeguard its people's well-being and natural heritage.Margins of the paper: Left margin should be 35mm (1.3 inches) Right, top, bottom margins should be 30mm (1.2 inches)

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1.2 Motivation for study

Climate change is one of the most pressing global challenges of our time, leading to severe environmental, social, and economic consequences. The rising occurrence of extreme weather events such as floods and drought shows the need for predictive models that can inform preparedness and response strategies.

This study aims to analyze historical climate data and identify trends and patterns to predict future climate scenarios and inform policy makers and communities about necessary actions to combat the effects of climate change.

1.3 Problem Statement

Climate change remains a pressing national concern, posing a significant threat to global ecosystems, economies, and human health. Rising temperatures, increased frequency of extreme weather events, and shifting precipitation patterns are disrupting natural systems and affecting food security, water resources, and public health. Despite the growing awareness, effective strategies to mitigate and adapt to these changes remain underdeveloped and poorly implemented. To effectively combat climate change, there is a need to understand the impact of human activities such as deforestation, industrialization, and burning of fossil fuels, and the frequency of extreme weather events such as droughts and floods and how they influence climate change across various regions. This project aims to analyze historical climate data and identify trends and patterns in climate variables that can inform more specific and effective climate change control strategies.

1.4 Research objectives

1.4.1 General objectives

To determine how different environmental and socioeconomic aspects are affected by climate change and create a prediction model that will direct Kenya's mitigation and adaptation plans.

1.4.2 Specific objectives

The objectives of this research project are:

- i. To evaluate how various Kenyan regions' agricultural output and food security are affected by climate change.
- ii. To assess how often and how intense extreme weather events, such as floods and droughts are related to climate change.
- iii. To examine how social-economic variables such as public health outcomes and migration patterns are impacted by climate.
- iv. To create predictive models that will help with targeted adaptation measures by identifying the areas and populations most susceptible to the effects of climate change.

1.5 Significance of the study

Better prediction skills will result from the research, allowing for greater readiness for upcoming environmental situations. It will assist policymakers in developing efficient climate strategies and laws by offering data-driven insights. Communities and governments will be guided in their efforts to counteract the negative consequences of climate change by the identification of effective measures for adaptation and mitigation provided by the findings. The study also seeks to raise public awareness of climate change by promoting fair solutions and the distribution of resources among vulnerable groups.

The study will add to the body of knowledge already available on climate change by providing fresh perspectives and innovative approaches that can direct further research and projects. It will stimulate collaboration amongst scientists, environmentalists, policymakers, and community leaders to address climate change concerns collectively by fostering interdisciplinary collaboration. In the end, the research will support international initiatives.

1.6 Scope of the study

This study will focus on certain nations or regions, evaluating localized climate data to comprehend regional trends and implications, encompassing vulnerable, urban, and rural areas impacted by climate change. The study will estimate future situations based on previous climate data over a specified period of time, like the last 30 years. Important climatic trends and occurrences will be captured during the chosen timeframe.

The study will concentrate on important climatic factors, such as temperature, humidity, precipitation, and extreme weather events, and it will look at how these have changed over time and what effects they might have in the future.

1.7 Assumptions in the study

1. The study assumes that the historical climate data it has gathered from many sources—including NASA and NOAA—is accurate and trustworthy.
2. Additionally, it is expected that the models chosen would offer reliable forecasts based on previous patterns.
3. It is anticipated that past trends will continue, enabling reliable extrapolations, and that other outside influences won't significantly change climate patterns while the study is being conducted.

1.8 Limitations of study

The availability and quality of historical climate data, which can differ by location and could result in analytic gaps, is one of the study's possible shortcomings. Because of their complexity, the models can be difficult to implement and analyze, requiring a lot of processing power and knowledge. The presumption that past trends would persist might not be valid if unanticipated events significantly change the environment.

Furthermore, the study might not have taken into consideration all of the external socioeconomic factors that have a big impact on climate patterns. The results of spatially limited research might not apply to other areas with distinct climate patterns. The temporal scope of the historical data utilized in the prediction models may also have limitations, which could lower the precision of long-term projections.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction XXXXX

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APPENDICES

Budget

Work plan