



RESEARCH ARTICLE

EFFECT OF FLOOD ON ENVIRONMENTAL ACTIVITIES IN ABUJA MUNICIPAL AREA COUNCIL, ABUJA, NIGERIA

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ABSTRACT

Flooding is the most frequently experienced phenomenon by any country, especially in Southeast Asia. Over the past several decades, the frequency and the severity of flooding had significantly increased. Loss of lives and property immediate impacts of flooding include loss of physical life, damage to property, destruction of crops, loss of livestock, non-functioning of infrastructure facilities and deterioration of health condition owing to waterborne diseases. Loss of livelihoods and communication links and infrastructure are damaged and disrupted, economic activities come to a standstill, resulting in dislocation and the dysfunction of normal life for a period much beyond the duration of the flooding. Field data and number of houses were randomly selected. The use of sampling is to concentrate effort to produce better quality results and get more in-depth information. The polynomial analysis of average temperature has shown that from 2000-2012 temperature distributions was bisected from the curve line indicating lowest temperature at that period. While the upper skewed variables of temperature denotes slightly higher due to increase in global warming and climate change. And this interoperation has a salient and fundamental impact in triggering flood in most part of Nigeria not only FCT-Abuja. The impact of climate change in the study area has attributed to flood even by increase in temperature and rainfall. The data obtained from the NiMET also justified the assertion.

KEYWORDS

Environmental, Flood, Climate, Infrastructure, Global Warming

1. INTRODUCTION

Floods are a common problem all over the world, including in Nigeria and other parts of Africa. They cause a lot of damage, take many lives, and destroy homes and other valuable things. In Nigeria, there has been an increase in the number of floods, according to the National Emergency Management Agency (Ikyapa et al., 2022). In the past ten years, many people have lost their lives and a lot of money due to floods, especially in urban areas like Gwagwalada in the Federal Capital Territory (Fakere Alexander et al., 2012). The main reasons for this increase in flooding include a growing population, more paved surfaces, blockage of rivers and waterways because of poor waste management, and other human activities in flood-prone areas (Odjugo, 2012).

There has been some research on how flooding affects the environment in Gwagwalada, but not much has been done on the social and economic effects, which are also very important (Adhvaryu et al., 2019). Because of this, this study aims to fill that gap. The study looks at the social and economic impacts of flooding and the ways people deal with it in the Gwagwalada area council of Abuja, Nigeria (John-Nwagwu et al., 2021). The specific goals are to find out which areas are most at risk of flooding, to understand the social and economic effects of the floods in the area, and to describe the coping strategies used by the community (John-Nwagwu et al., 2022).

These negative effects include shortages of goods and products, which lead to higher prices for basic food items. Similar research by (Suraratdecha and Okunade, 2006) on communities along the River Benue in Adamawa State showed that large areas of farmland were destroyed, and many properties were washed away (Wang and Xu, 2008). Also, the flood greatly affected

transportation, making it hard to move around and reducing the amount of crops produced in the community because of the difficulty in getting around (Chanda Shimi et al., 2010).

The floods in Ibadan in 1948 were among the earliest and best-documented flood events in Nigerian history (Ojigi and Shaba, 2012). A lot of areas were flooded, many manufacturing plants and businesses were shut down, and there was a big disruption in communication. Traffic, electricity, and telephone lines were out for several days. These findings show that if we have all the information about Nigerian floods, we can better understand and prepare for them (Opperman et al., 2009).

In recent years, as people have become more worried about climate change, there has been a lot of global attention on how natural disasters linked to climate change affect economic activities (Change, 2014). The damage from these disasters is not just about immediate problems like loss of life or damage to homes, businesses, or public buildings. It also includes long-term changes in how the economy works, such as disruptions in production and lower income for families, which happen because of the initial damage (Tsakiris, 2014). Many countries have already done a lot of research to understand how big these direct and indirect effects are, and to find out which economic and social factors influence the size of these effects (Balogun et al., 2020).

The main goals of this study are to:

- Find out the main types of floods in the study area.
- Look at the patterns of rain and temperature that cause floods in the study area.
- Study how the land shape affects flood occurrence in the study area.

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- Analyze how physical planning affects flood situations in the study area
- Check how often floods happen in AMAC.

2. METHODOLOGY

2.1 Research Design Field data and the number of houses were chosen at random

Using sampling helps focus efforts to get better quality results and more detailed information. Studying the whole population would be ideal, but time and money are limited, making it almost impossible. Therefore, sampling helps get more accurate results (Esakku et al., 2005). The people being studied include individuals, community leaders, religious leaders, and other important people like health centre managers, school owners, and Area council heads. The sample includes people who best represent the key features of the target group, so it truly reflects the typical qualities of the population being studied (Jambol, 2016).

2.2 Study area

Federal Capital Territory (FCT), also known as Abuja Federal Capital Territory, administrative territory, central Nigeria, created in 1976. The territory is located north of the confluence of the Niger and Benue rivers (Olayinka et al., 2013). It is bordered by the states of Niger to the west and northwest, Kaduna to the northeast, Nassarawa to the east and south, and Kogi to the southwest. Abuja, the federal capital and a planned modern city, is located near the centre of the territory (Aondoakaa, 2012).

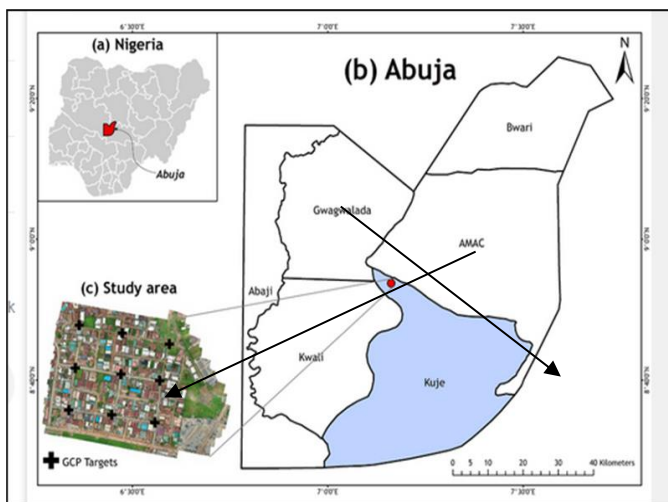


Figure 1: Map of the Study Area AMAC, FCT affected by flood, Sources (Ishaya & Ifatimehin, 2009)

3. RESULTS AND DISCUSSION

3.1 Identify the major types of flood in the study area

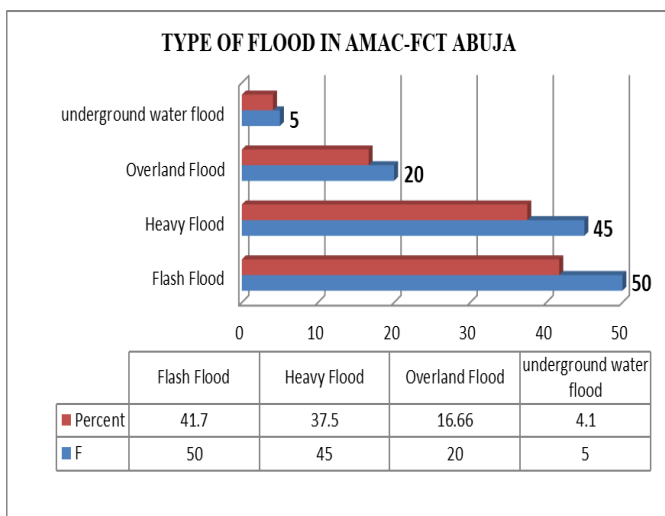


Figure 2: Flood types in the study area (Source: field data 2025)

One of environmental factor associated with flood in FCT is the nature of

the building. Building orientations and the lack of adherence to the master plans and town planning are the major concern. In this study, about 40% reported to have highest flood with the nature of the building. Sport and other recreational activities were affected by the flood in the study area of AMAC FCT with 33.33%. The landuse factor is also associated flood in the study area with 66.66%. The people attitude toward disposal of solid waste around the water ways also causes clogging of waste along the channels.

Majority of the flood types in AMAC FCT is the flash flood with 50% frequencies and 41.7% of the total responses from the respondents, Followed by the heavy flood with 37.5%. Overland flow also courses flood event in the study area with 16.66%. The less type of flood is the intermittent flow which is underground where water gashing out from the water table or aquifer. This type of is mostly found in high water table area around the FCT.

3.2 Examine Rainfall and Temperature pattern that influence Flood in the Study Area

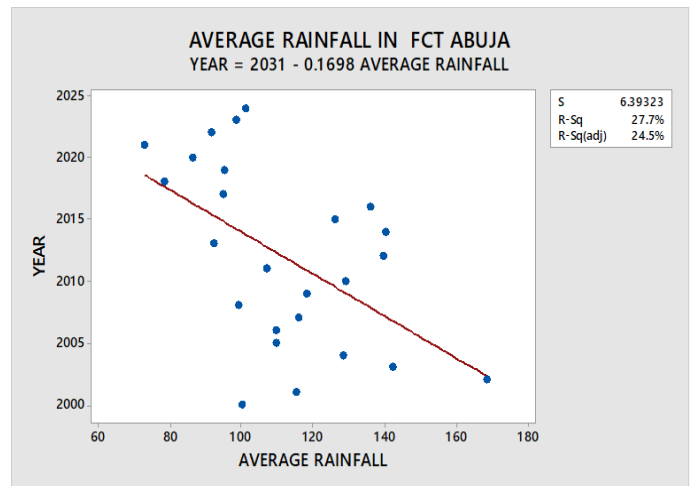


Figure 3: 25 years average Rainfall in the Study Area Source: (Software Analysis 2025)

The regression analysis indicates that the R^2 values 27.7% with R square value of 24.5% this signified that the model is fitted with medium distribution of rainfall in the study area as shown in the figure 3. The mean line have crossed the dispersed average rainfall which indicates the spread of the rainfall. The rainfall amount is high from the year 2010 to 2024. The mean line has cut across the total amount of rainfall in the study area.

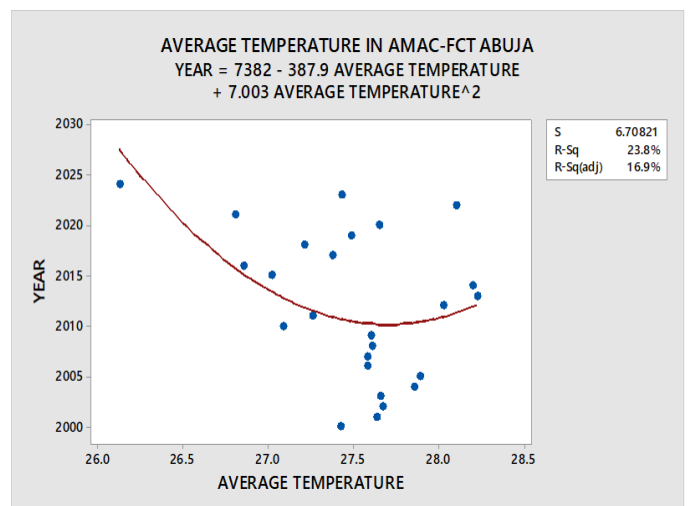


Figure 4: 25 years Average Temperature in the Study Area (Software Analysis 2025)

The same analysis was applied to the model in figure 4 which detect the average temperature with R^2 of 23.8%, and R square of 16.9%. The polynomial distribution graph has shown the curvature in the model with half of the variables was distributed evenly across the years. The average temperature in the study area is 28.5°C found in the year 2012. And the highest temperature was obtained 2024 with average temperature of 26.2°C. The regression analysis of average rainfall in the study AMAC-

Abuja is showing the R^2 of 20.55% values. The variation of rainfall distribution is contained in the model.

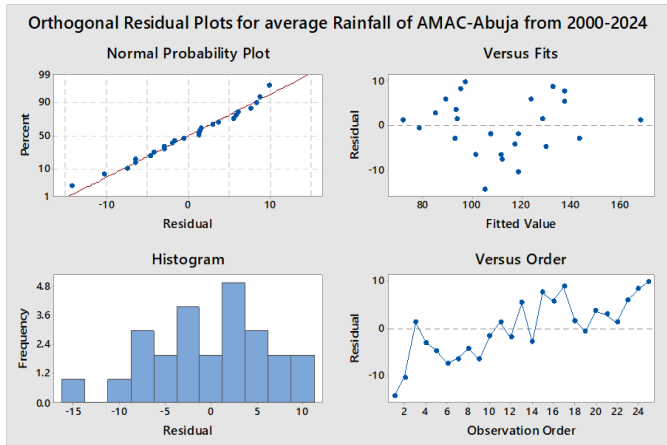


Figure 5: Residual modelling plot of average Rainfall from 2000-2024 in AMAC-FCT

The model in figure 5, indicate the result form the rainfall residual plot with normal curve distributions aligned in the mean line with only one-year deviation from the mean. The fitted model values of 10 and (-10). The observation order of the average rainfall model oscillates from 2000 to 2024 denoting the disperse frequency of rainfall distribution and this indicates most flood occurrence are much frequent within these years. The trend analysis has shown in the observation order of the average rainfall distribution in AMAC-FCT Abuja.

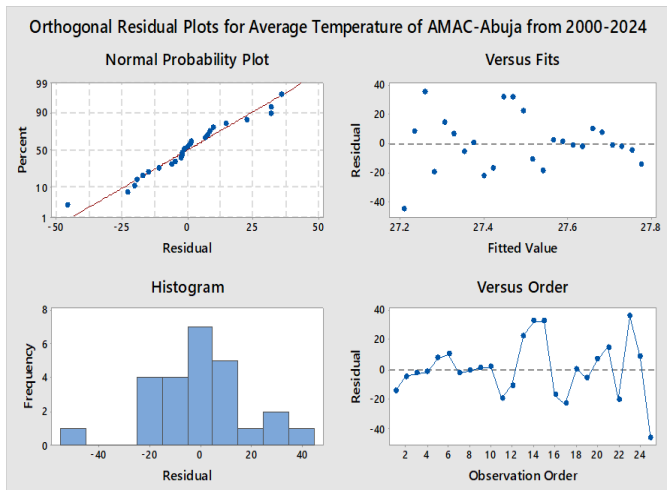


Figure 6: Residual modelling plot of average Temperature from 2000-2024 in AMAC-FCT

The residue model of average temperature in the study area AMAC-Abuja, has significantly illustrated 50 to (-50) of normal probability of temperature. The mean line was aligned with 5 years of distortion from the average mean temperature. The fitted model illustrated the highest temperature of 40°C and the lowest of 27.2°C. the bar graph have indicated positive distribution of average temperature and the observation order depicted the downward trend of residue average temperature in the study area.

3.3 Assess the impact of Terrain on Flood in AMAC-FCT Abuja

One of the impacts of flood is the blockage of the road and drainage with 41%, lack of drainage system 34%, heavy rainfall with 25%, and the climate change with 20%. There are other impacts which are also significant in this study such as prevalence of diseases, electrical disruption, collapse of buildings or homes, inaccessibility to health facilities, lost of lives and properties, shortage of water supply, closure of school, close-down of business.

3.4 Evaluate the flood frequency in AMAC

The frequency of flood determines the environmental factors in most of the countries where flood became predominant. In this study it was observed that flood mostly occur during heavy rainfall. The data obtained

from the NiMET also justified the assertion. Figure 4.19 illustrate the duration and frequency of flood in AMAC-FCT. Based on the result obtained, 79.2% of the flood frequency is during the rainy season with insignificant value dry during dry season with 16.2%. The analysis of rainfall and temperature is paramount as it can be seen in figure 3.5 and figure 3.6.

4. CONCLUSION

The flood event can be treated if the drainage system is well established. In this study, the highest solution is the provision of physical planning with 26.66%. Solid waste being disposed has positive correlation with the flood. The disposed waste blocked the water way. About 25% of the respondents have agreed of the wastes disposed blocked the water ways and result in flooding. There is no system to make people prepare against the flood, based on this study it was discovered that there is enough flood preparedness with 18.33% and the issue of flood alert does not exist with 16.66%. The fundamental issue is the lack of proper drainage system to channel the water in AMAC-Abuja; hence, 13.33% of the respondents have agreed that there is no proper drainage system.

RECOMMENDATIONS

- There is need to sensitise people on complying with the authority concern about the use of master plan to avoid flooding in the study area.
- The federal housing Authority most checkmate those who violated the rules and regulations on building on the water ways.
- There is need to set flood alarms in those flood prompt areas so that easy warning will serve as warning to evacuate from the flood zones.
- People should avoid preparing land or building sites in the flood zones, they should have to consider and abide by the laws.

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