

IMPACT ASSESSMENT OF FLOODING ON FOOD SECURITY: A CASE STUDY OF KOTON KARFE IN KOGI LOCAL GOVERNMENT AREA OF KOGI STATE

¹Roselyn I Izuagbe, ²Gbenga Oba Fadare, ³Aminu Murtala Ibrahim,
⁴Kilani Oluwatobi Fatai

Department of Defence and Security Studies, Nigerian Defence Academy Kaduna.

DOI: <https://doi.org/10.5281/zenodo.8214313>

Published Date: 04-August-2023

Abstract: Changes in climate around the world have caused extreme weather events that continue to upset food production. The problem has assumed worrisome dimensions in Nigeria, especially in areas prone to flooding. This study therefore examined the impact of flooding and food security in Koton Karfe area of Kogi State. The study was premised on five (5) research objectives which included determining the factors responsible for flooding in Koton Karfe, highlight the challenges militating against efforts to address flooding for improved food security in Koton Karfe and proffer strategies to curb flooding for improved food in Koton Karfe. For this reason, the relevant literature were reviewed, the gap in literature was established and the Structural Functionalism Theory was adopted for the study. The study was guided by the survey method hinged on the positivism framework, with data collected from both primary and secondary sources analysed quantitatively and qualitatively. Findings from the study showed that flooding has remained alarming in Koton Karfe due to the confluence nature of Kogi State, abrupt construction of buildings, poor drainage systems, cheap cost of land around river banks and flood-prone areas as well as opening of Lagdo Dam by Cameroonian authorities. The result has been reduction of food production evidenced by damaged transport system, submerged farmlands, water pollution and food shortages among others. It is therefore recommended that the Hausa Dam is completed and strong political commitment is shown by the government to tackle the menace of flooding which is having catastrophic effects on food production in Koton Karfe.

Keywords: Impact, Assessment, Flooding and Food Security.

1. INTRODUCTION

Floods are often recorded during heavy rainfalls but can also arise from dam leakages, snow melting and the inflow of ocean waves to the land. Regardless of the contributing factors, floods are damaging. The immediate effects often include human and material losses (Danibo, et al, 2019a). The aftermath also includes the destruction of livestock and crops leading to shortages of food thus deteriorating an aspect of national security called food security. Weather events are part of national life in every country of the world. Largely, they are either dry or rainy. The latter has however increased over the years due to changes in climate occasioned by natural events and anthropological activities in particular. Its severity has resulted in a phenomenon called flooding. Flooding connotes increase in the movement of water to usually dry lands. It is the most prevalent natural disaster confronting nations of the world today. Food security denotes the broad access to safe, sufficient and nutritious food by everybody to achieve a healthy life by meeting their preferences and dietary needs. Its stability, accessibility, availability and utilisation are vital for human productivity and existence (FAO, 2010).

Food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (Nyamwanza et al., 2019). Wolfe and Frongillo (2001) defined food security as extending beyond the lack of availability, access and consumption or use of food. They refer to it as involving perceptions that the food is sufficient, adequate, certain and sustainable. It also denotes availability of food with respect to production, distribution and consumption (FAO, 2010). However, an operational definition provided in 1996 by the United Nations' Committee on World Food Summit during its meeting maintain that food security connotes the economic and physical access of all people at all times to sufficient, safe and nutritious food that meets their dietary preferences and requirements for an active and healthy life (World Bank, 2022).

Worse still, transportation of food to other towns faced daunting challenges as the floods render roads unmotorable due to the ravaging flood. Flooding in Koton Karfe has been cyclic, happening almost every year, yet not resolved in spite of the devastating impact in the area and other parts of the country. For instance, flooding of the area in 2022 was fingered as being responsible for fuel scarcity in Abuja and environs as the trucks could not pass through the flood. Despite mitigative and adaptive efforts by governments, the situation has remained unchanged and increasingly alarming. In Sindh province of Pakistan for instance, thousands of hectares of farmlands were destroyed following the catastrophic floods that happened in 2022 (Naz, 2022). The result has been an estimated loss of 80% of rice production expected from the area in addition to 61% loss of cotton and 88% loss of sugarcane (Rhan, 2022). The Pakistani government has therefore warned of a looming food security crisis as it has imported onions and tomatoes from neighbouring Iran and Afghanistan (Rhan, 2022).

Flooding in Koton Karfe are resultant effects of climate change, indiscriminate waste disposal, improper drainage, dam failure, water released from dam particularly from Cameroun (Danibo, Adeoye & Ojo, 2019a). Specifically, flooding in the community is attributed to heavy rainfall which is a product of sea tidal surges, thunder storm and global warming (Oyekola, Azubuike & Obianeri, 2022). Raining seasons are generally characterised by gusts of wind caused by tropical storms resulting in torrential rains and its attendant flash floods (Danibo, et al, 2019a). Koton Karfe is vulnerable to this yearly event that raises water table and levels of water bodies (Danibo, et al, 2019a).

Another cause is the release of water from the Lagdo Dam in Cameroun (Adeyemi, 2022; African news, 2022). This increases the water level in Rivers Niger and Benue where Kogi State is located (Onyedinefu, 2022). The construction of the dam which is located in Northern Cameroon began in 1977 and was completed in 1982 (Wahab, 2022). Nigeria and Cameroon, at inception, agreed to build 2 dams to contain outflow of excess water from the dam in order to prevent flooding (Wahab, 2022). However, the Nigerian government has not completed the dam to be located in Adamawa. Consequently, whenever the Cameroonian authorities open the dam to release excess water, communities along river banks include rivers in Kogi are badly affected (Wahab, 2022). Flooding in Koton Karfe is also linked to weak or absent infrastructures, dearth of suitable legal and policy frameworks, inadequate funds, poor building practice and presence of settlements on river banks and flood plains interact or act alone to aggravate vulnerability to the disaster (Mayeni, 2022). Structures cited on drainage channels tend to block the flow of water during rainfall, thereby causing flooding (Itodo, 2018).

2. STATEMENT OF THE PROBLEM

Nigeria is also battling with floods that have impacted food production, especially in affected areas. Many communities in the country have at one point or the other experienced flood disaster often majorly attributed to heavy rainfall (Danjibo, Adeoye & Ojo, 2019). The Nigeria National Emergency Management Agency (NEMA) reported that the 2012 and 2022 flood disasters remain some of the worst natural events the nation has faced, resulting in the death of many people and financial losses running into billions (Wahab, 2022; NEMA, 2013). In Koton Karfe area of Kogi State, for example, farming and fishing activities were seriously impaired by torrential water currents in 2022 (Isah, 2022). Fishing which is the mainstay of the locals was more impacted as most of the fishes were either pushed away or went underground thus making it difficult to catch them (Isah, 2022). The purpose of this study is therefore to assess the impact of flooding on food security in Koton Karfe area of Kogi State.

In Koton Karfe, the erratic precipitations to farmlands have devastated cultivations, destroyed plants, led to loss of crop yields, killed livestock and increased water level in rivers which are mostly unhealthy for aquatic animals being the major source of livelihood for people in Koton Karfe which is chiefly a fishing community. The result led to shortages of food coupled with skyrocketing prices of available commodities. Consequently, access and affordability of food have been worsened as people within and outside Koton Karfe are increasingly affected by the floods which has caused disruptions to fishing and farming activities.

Research Questions

- i. What are the factors responsible for flooding in Koton Karfe area of Kogi State?
- ii. What is the impact of flooding on food security in Koton Karfe?
- iii. What are the challenges to strategies emplaced to address flooding for improved food security in Koton Karfe?
- iv. What are the prospects for tackling flooding for the enhancement of food security in Koton Karfe?

3. OBJECTIVES OF THE STUDY

- i. Determine the factors responsible for flooding in Koton Karfe area of Kogi State.
- ii. Assess the impact of flooding on food security in Koton Karfe.
- iii. Identify the challenges militating against strategies emplaced to address flooding for improved food security in Koton Karfe.
- iv. Highlight the prospects for tackling flooding for the enhancement of food security in Koton Karfe.

4. METHODOLOGY

Research Design

This study adopted the survey method. According to Check and Schutt (2012), the survey method entails the collection of information from a predefined population. In the case of this study, questionnaire and semi-structured interviews were used as instruments to gather pertinent information from the respondents.

Research Philosophy

This study was guided by the positivism framework. The model has its roots in natural sciences and deals with the scientific testing of hypotheses and reaching mathematical or logical proofs, derivable from analysis of data generated (Ramsberg, 2018). For this purpose, sample sizes are required to produce objective, accurate and quantitative data. Questionnaire, structured interviews and official statistics were thus crucial in the gathering of information from the sample size (Smart, 2019).

Study Area/ Setting

Climate change in Nigeria has its roots in 1941 when the country witnessed the late onset of rain (Haider, 2019). It however intensified in 1971 when Nigeria experienced late and early cessation of rain in almost all parts of the country, constricting the period of the rainy season (Haider, 2019). The country experienced disastrous effects of climate change in 1994, followed by 2004, 2010, 2012, 2017, 2018, 2019 and 2020, which displaced 850,000 people, killed 250 others and damaged property valued at millions of dollars (Oyedele, Edinam, Olorunfemi & Walz, 2022). In 2019 alone, approximately 1.9 million people were displaced across the country and about 150 communities in 9 Local Government Areas (LGAs) along the banks of Rivers Niger and Benue were submerged in floodwater due to massive flood (Future Learn, 2021; Adaoyichie, 2019). Increased rainfall caused a rise in sea level caused flooding which impacted agricultural production, washing away significant parts of farmlands in coastal regions of Nigeria including Koton Karfe (Anabaraonye et al., 2019).

In 2019 alone, approximately 1.9 million people were displaced across the country and about 150 communities in 9 Local Government Areas (LGAs) along the banks of Rivers Niger and Benue were submerged due to massive flood (Future Learn, 2021).

Instruments of Data Collection

The instruments used to obtain data for the study were questionnaire, semi-structured interviews, which represent the primary sources, while books, journals and internet materials constitute the secondary sources.

Data Analysis Technique

The data obtained for the study were quantitatively and qualitatively analysed. The data from the semi-structured interview and secondary sources were thematically analysed, while data gathered from the primary sources were analyzed quantitatively using Microsoft Excel Spread Sheet and descriptive statistic tools.

5. DATA PRESENTATION AND ANALYSIS OF RESULTS

This chapter contains three (3) sections. The first part focuses on the presentation and analysis of data collected during the research. The second contains the quantitative analysis, while the third part covers the critical discussion of findings. To achieve the objectives of this research, 200 copies of the questionnaire were administered on the population of this study. Of this number, 190 copies or 95% were retrieved. This means that 10 copies representing 5% were withheld by the respondents. Moreover, interviews conducted with three (3) key Respondents selected from the National Emergency Management Agency (NEMA), Nigerian Meteorological Agency (NiMet) and the head of Traders' Association in Koton Karfe were thematically analysed. For confidentiality, they are simply designated as respondents.

1: What are the factors responsible for flooding in Koton Karfe area of Kogi State?

Questions 8 to 13 in the questionnaire (See Appendix 1) provide answers to this Research Objective (RO 1) and Research Question (RQ 1).

Table 5.1a: Factors Responsible for Flooding in Koton Karfe Area of Kogi State

| Factors | Frequency | Percentage (%) |
|---------------------------------|------------|----------------|
| Climate change | 22 | 11.6 |
| Opening of Lagdo Dam | 23 | 12.1 |
| Confluence nature of Kogi State | 21 | 11.1 |
| Poor drainage system | 22 | 11.6 |
| Infrastructural deficit | 19 | 10 |
| Lack of legal frameworks | 18 | 9.4 |
| Inadequate funding | 21 | 11.1 |
| Poor urban planning | 22 | 11.6 |
| Poorly maintained drainages | 22 | 11.6 |
| Total | 190 | 100 |

Table 5.1a covers respondents' opinions on factors responsible for flooding in Koton Karfe. Respondents who ticked opening of Lagdo Dam, climate change, poor drainage system, poor urban planning and poorly maintained drainages were 12.1%, 11.6%, 11.6%, 11.6% and 11.6%. Those who selected the confluence nature of Kogi State and inadequate funding were 11.1% each, while 10% and 9.4% represent respondents who marked infrastructural deficit and lack of legal framework. Responses gathered from the 3 interviews showed that climate change, poor maintenance of drainage systems, low political will, the opening of Lagdo dam and the confluence nature of Kogi State are responsible for flooding in Koton Karfe.

2: What is the impact of flooding on food security in Koton Karfe?

Table 5.2a: Impact of Flooding on Food Security in Koton Karfe

| Options | Frequency | Percentage (%) |
|----------------------------------|------------|----------------|
| Soil degradation | 15 | 7.9 |
| Submerges farmlands and markets | 17 | 8.9 |
| Displaces aquatic animals | 16 | 8.4 |
| Disrupts livestock business | 15 | 7.9 |
| Water pollution | 16 | 8.4 |
| Reduction of crop harvest | 17 | 8.9 |
| Lowers income from crop sales | 17 | 8.9 |
| Destroys food storage facilities | 15 | 7.9 |
| Damages roads | 13 | 6.8 |
| Alters food transportation | 15 | 7.9 |
| Increases food prices | 17 | 8.9 |
| Food shortages | 17 | 8.9 |
| Total | 190 | 100 |

Table 5.2a contains opinions relating to the impact of flooding on food security in Koton Karfe. From the Table, 8.9% represents respondents who ticked submerges farmlands and markets, reduction of crop harvest, lowers income from crop sales, increases food prices and food shortages, while soil degradation, disrupts livestock business, destroys food storage facilities and alters food transportation are denoted by 7.9%. Only 6.8% said it damages roads. According to the Respondents, the effects were crop reduction, the devastation of farmlands, pollution of water bodies, increase in food prices, soil degradation and disruption of transportation.

3: What are the challenges militating against strategies employed to address flooding for improved food security in Koton Karfe?

Table 5.3a: Challenges Militating against Strategies to Address Flooding for Improved Food Security in Koton Karfe

| Challenges | Frequency | Percentage (%) |
|---|------------|----------------|
| Persistent building on flood plains and river banks | 11 | 5.8 |
| Cheap cost of land on flood plains and river banks | 13 | 6.8 |
| Lack of evacuation and weak flood management measures | 11 | 5.8 |
| Flood-prone farmlands | 10 | 5.3 |
| Longer period of floodwater | 11 | 5.8 |
| Closeness of house to water bodies | 13 | 6.8 |
| Weak household economic capacity | 9 | 4.7 |
| Over-dependence on rain-fed agriculture | 11 | 5.8 |
| Poor flood management education | 12 | 6.3 |
| Inaccessibility of flood warning facilities | 11 | 5.8 |
| Poor knowledge of the ever-changing climate | 13 | 6.8 |
| Failure to reduce GHG emission by developed countries | 14 | 7.4 |
| Absence of social safety nets | 11 | 5.8 |
| Low political will | 14 | 7.4 |
| Riverine flooding caused by Lagdo dam and other tributaries | 14 | 7.4 |
| Paucity of hydro-metrological information | 12 | 6.3 |
| Total | 190 | 100 |

Respondents' opinions concerning the challenges impeding food security in Koton Karfe are shown on Table 5.3a. Those who identified low political will, riverine flooding caused by Lagdo dam and other tributaries as well as failure to reduce GHG emissions by developed countries constituted 7.4% each of the population. These are followed by 6.8% representing cheap cost of land on flood plains and river banks, the closeness of houses to water bodies and poor knowledge of the ever-changing climate. Going by the responses of the Respondents interviewed, increasingly unpredictable weather events, low political will, misappropriation of funds, political sabotage, climate change, the seasonal opening of the Lagdo dam, inflow of water from the tributaries of Rivers Niger and Benue, poor building system, among others.

4: What are the prospects for tackling flooding for the enhancement of food security in Koton Karfe?

Table 5.4a: Prospects for Tackling Flooding for the Enhancement of Food Security in Koton Karfe

| Prospects | Frequency | Percentage (%) |
|---|------------|----------------|
| Clamour for low-level carbon emission by IPCC, UNFCC and other related institutions | 48 | 25.3 |
| Sheer determination of African governments under Nationally Determined Contributions (NDCs) | 47 | 24.7 |
| Production of clean energy | 53 | 27.9 |
| Organisation of seminars and workshops on climate change by public and private institutions | 42 | 22.1 |
| Total | 190 | 100 |

Table 5.4a captures the prospects for tackling flooding for the enhancement of food security in Koton Karfe. As shown on the Table, 27.9% of the respondents ticked the production of clean energy. Clamour for low-level carbon emission by IPCC, UNFCCC and other related institutions and sheer determination of African governments under Nationally Determined Contributions (NDCs) are 25.3% and 24.7% respectively. Organisation of seminars and workshops on climate change by public and private institutions are denoted by 22.1%. Interviews with the Respondents revealed that climate change education by public and private institutions, calls for the reduction of GHG emissions, the commitment of African governments under NDCs and the production of green energy were the prospects.

6. DISCUSSION OF FINDINGS

Based on the findings, climate change, poor drainage system, poor urban planning, infrastructural deficit and lack of legal frameworks, low political will, the opening of Lagdo dam and confluence nature of Kogi State are responsible for flooding in Koton Karfe. This result was corroborated by the Respondents. Respondent 1 stated that:

“Flooding has persisted in Koton Karfe because the political actors have shown little to zero commitment to tackling the root causes. The menace has also worsened due to increasing changes in weather conditions, abrupt construction of buildings along river banks and flood-prone areas and the seasonal opening of Lagdo Dam by Cameroonian authorities during rainy season”.

Stating the factors responsible for flooding in Koton Karfe, Respondent identified the:

“Location of the community i.e. its proximity to the confluence town of Lokoja where two major Rivers, Niger and Benue, continue to increase its vulnerability to flood. Another issue is the changes in climate conditions intensified by anthropological activities”.

These findings align with extant literature reviewed for this study. Oyekola, et al (2022), From the finding, it was revealed that flooding has submerged farmlands and markets, reduced crop harvest, lowered income from crop sales, increased food prices and food shortages, caused soil degradation, disrupted livestock business, destroyed food storage facilities, altered food transportation, damaged roads, polluted water bodies and increased food prices. The submissions of the Respondents tally with these outcomes. Respondent 1 observed that:

“The phenomenon has intensified food insecurity owing to disturbances to farmers, traders and even consumers. On one hand, farmers and fishermen are unable to farm and catch fishes and other aquatic animals. On the other hand, market places are deserted because they are submerged by flood. As such, traders have nowhere to display their goods while consumers are devastated by the attendant food shortages”.

Respondent 2 had a different perspective on the impact of flooding on food security in Koton Karfe. For the Respondent:

“Erosion of topmost part of the soil, low farm yield, disruption of aquatic life, damage roads and hike in food prices attributable to scarcity of food items and disruption of markets”.

The studies reviewed for this work are in tandem with these findings of Omono (2022), Oyekola et al (2022).

The issue of climate change has increased the severity and rate of occurrence of flood disasters, with its negative impact on food production, food distribution, food utilization, and food security (IPCC, 2007). Flooding in Koton Karfe degrades the environment, spreads infestations, pollutes water and soil because it is contaminated with dangerous chemicals (Danjibo et al., 2019b). Soils become infertile through leaching and erosion of the topmost part (Omono, 2022). According to the International Climate Change Development Initiative (ICCDI) Africa, “flood washes away the topsoil, which is the richest part of the soil which contains organic matter and nutrients. This leads to a reduction in the soil’s fertility and its sustainable use” (Omono, 2022).

Furthermore, farmlands, water bodies and market places are often submerged for weeks and sometimes, washed away (Danjibo et al, 2019b). The devastating event bury both agro-forestry and arable farmlands. Livestock farmers equally record losses due to the collapse of electric poles and destruction of bridges (Danjibo et al, 2019b). Floods also reduces fish harvest from ponds and rivers, thereby affecting income generation for fishermen and traders. Largely, flooding causes reduction of crop harvest, decreases income accruable from crop sales, destroys food storage facilities, damages roads, reduces labour demand, pollutes streams, lowers meals, affects the quality and quantity of food consumed as well as increases food prices (Akukwe & Odingo, 2020).

According to one of the Respondents interviewed challenges militating against efforts at containing flooding are:

“Low political will, increasing changes in weather conditions, poor climate education, construction of buildings on water paths as well as the opening of Lagdo dam and water bodies channeling into River Niger and River Benue have remained a bane to strategies meant to address flooding so as to guarantee food security in Koton Karfe”.

These findings summed up the investigations of Fanwo (2022); Raphael (2022). The social and economic factors hindering the steps taken to address flooding must be tackled to yield the expectations for which they were outlined and pursued.

The result revealed that the prospects to tackle flooding for the enhancement of food security in Koton Karfe include the clamour for the production and use of clean energy, clamour for low-level carbon emission by IPCC, UNFCCC and other related institutions, sheer determination of African governments under Nationally Determined Contributions (NDCs) and organisation of seminars and workshops on climate change by public and private institutions. The opinions of the Respondents supported these findings. Respondent 1 said:

“It is necessary to explore the commitment of the international community to reduce the Emission of Greenhouse Gases (GHGs) as well as the resolution of African governments, under the NDC, to tackle climate change. The readiness of local government administration and grassroots authorities to tackle the menace can be leveraged by relevant bodies”.

The perspectives of Sani (2022), Edet (2022), African Development Bank, (2021) conform with the above. The relevant authorities must show commitment to the known problems by leveraging the available solutions. The clamour for a low-level carbon emission by the Intergovernmental Panel on Climate Change (IPCC), UNFCCC and other related institutions is a case in point (Sani, 2022; Edet, 2022). Such organisations are gaining the attention of African governments through several platforms and public enlightenment programmes that are sensitising both public and private bodies about the dangers of high carbon radiations (Mohammed, 2022). These ongoing discussions by the respective institutions are expected to drive a stable and suitable climate for Nigeria and the African continent (Edet, 2022).

The factors fueling flooding in Koton Karfe were the confluence nature of Kogi State, the opening of Lagdo dam, low political will, infrastructural deficit, poor urban planning, climate change, poorly maintained drainages; Reduced crop harvest, submerged farmlands and markets, soil degradation, disrupted livestock business, increased food prices and food shortages, destroyed food storage facilities, altered food transportation, damaged roads were impacts of flooding on food security in Koton Karfe; Challenges to the measures to tackle flooding in Koton Karfe were low political will, riverine flooding caused by the opening of Lagdo dam and other tributaries, cheap cost of land on flood plains and river banks, the closeness of houses to water bodies and poor knowledge of the ever-changing climate, persistent building on flood plains and river banks, weak flood management among others. The prospects to tackle flooding for the enhancement of food security in Koton Karfe were the production of clean energy, clamour for low-level carbon emission by IPCC, UNFCCC and other related institutions, sheer determination of African governments under NDCs and organisation of seminars and workshops on climate change by public and private institutions; and Panaceas to flooding for improved food security in Koton Karfe were town planning, provision of social safety nets, political commitment, local production of clean energy, improved flood education, encouragement of irrigation farming and completion of Dasin Hausa Dam. Supported by Fanwo, 2022; Oyedele, Edinam, Olorunfemi and Walz (2022) One of the factors impeding attempts to strategically mitigate flooding in Koton Karfe, is the continuous building of houses and other structures on river banks and flood plains. People prefer to stay in such places due to the low cost of land compared to upland (Raphael, 2022). Moreover, they find it naturally difficult to vacate their ancestral habitat (Raphael, 2022; Fanwo, 2022).

7. CONCLUSION

Flooding has ravaged many parts of Nigeria over the years with devastating effects on troubled communities. This phenomenon has grave impact of food security across the country, and in particular Koton Karfe as highlighted in this study. The study noted that despite efforts by governments, local and international organisations at addressing this phenomenon, there are several challenges militating against these efforts. Consequently, there is need for intensify efforts as well as devising innovative ways of addressing these challenges that will in turn enhance food security. In view of this, the study recommends the following:

8. RECOMMENDATIONS

The Federal Ministry of Water Resources, the Federal Ministry of Humanitarian Affairs, Disaster Management and Social Development (FMHADMSD) and other relevant government Agencies should:

- i. Ensure the completion Dasin Hausa Dam which was planned to be located in Adamawa State to contain water released from the Lagdo Dam in Cameroon.
- ii. Liaise with the Federal Ministry of Agriculture for sensitisation on irrigation farming, starting from the first quarter third quarter of 2023.
- iii. Collaborate with the Ministry of Environment on appropriate drainage systems and maintenance, beginning from the last quarter of 2023.
- iv. Pass a Bill to the National Assembly (NASS) for promotion and support of indigenous producers of renewable energy starting from the first quarter of 2024.

REFERENCES

- [1] Adaoyichie, G. (2019). *150 Kogi communities submerged in flood water*. <https://www.pulse.ng/news/local/150-kogi-communities-submerged-in-flood-water/e6fq1wm>.
- [2] Adeyemi, E. (2022). *How dam in Cameroon wreaked havoc in Kogi*. (Online). <https://www.sunnewsonline.com/how-dam-in-cameroon-wreaked-havoc-in-kogi/?amp>
- [3] African Development Bank. (2021). *Climate Change in Africa*. <https://www.afdb.org/en/cop25/climate-change-africa>
- [4] Akukwe, A. K. & Odingo, O. O. (2020). Component Analysis of the Effects of Flooding on Agrarian Communities. *International Journal of Hydrology*, Vol.2, No.2
- [5] Anabaraonye, B., Okafor, C. J., & Ikuelogbon, J. O. (2019). Educating farmers and fishermen in rural areas in Nigeria on climate change mitigation and adaptation for global sustainability. *International Journal of Scientific & Engineering Research*, 10(4), pp. 1391-1398.
- [6] Danjibo, N. D., Adeoye, A. E., & Ojo, O. S. (2019). Dynamics in the response mechanisms of major stakeholders during flood disasters: A Case Study of Kogi State, Nigeria. *African Journal of Social Sciences and Humanities Research*. Volume 2, Issue 2, pp. 29-42
- [7] Edet, V. O. (2022). *The role of technology in mitigating global climate change*. A paper submitted to the National Institute for Security Studies (NISS), Abuja.
- [8] Fanwo, K. (2022). *Kogi floods already humanitarian crisis, we need foreign aid – Commissioner*. <https://punchng.com/kogi-floods-already-humanitarian-crisis-we-needforeign-aid-commissioner/?amp>
- [9] Food and Agricultural Organization. (2010). *Towards Food Security Multidimensional Index*. fao.org/fileadmin/templates/ERP/Uni/
- [10] FutureLearn. (2021). *What are the impacts of climate change in Nigeria?* <https://www.futurelearn.com/info/futurelearn-international/impacts-climate-change-in-nigeria>
- [11] Haider, H. (2019). *Climate change in Nigeria: impacts and responses*. https://opendocs.ids.ac.uk/opendocs/bitstream/handle/20.500.12413/14761/675_Climate_Change_in_Nigeria.pdf?sequence=1&isAllowed=yhttps://www.nationalgeographic.com/environment/article/global-warming-effects/
- [12] IPCC, C. C. (2007). *The physical science basis. Contribution of working group I to the fourth assessment report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996(2007), 113-119.
- [13] Isah, A. S. (2022). *Koton-Karfe: A fishing community ravaged by flood*. <https://dailytrust.com/koton-karfe-a-fishing-community-ravaged-by-flood/>
- [14] Itodo, D. S. (2018). *Why Kogi's floods always return deadlier*. (Online). Available at: <https://dailytrust.com/why-kogis-floods-always-return-deadlier/>

- [15] Mayeni, J. (2022). *Nigeria floods: Braving the rising waters in Kogi state*. <https://www.bbc.com/news/world-africa-63262391>.amp
- [16] Mohammed, M. (2022). *Climate change and resource conflict in Africa*. A paper submitted to the National Institute for Security Studies (NISS), Abuja.
- [17] National Emergency Management Agency. (2013). *Nigeria post-disaster needs assessment 2012 floods The federal government of Nigeria with technical support from the World Bank, EU, UN, and Other Partners*. www.gfdrr.org/sites/default/files/publicationNIGERIA_PDNA_PRINT_05_29_2013_WEB.pdf
- [18] Naz, F. (2022). *Floods are tipping Pakistan into a food crisis*. <https://www.aljazeera.com/amp/opinions/2022/10/28/floods-are-tipping-pakistan-into-a-food-crisis>
- [19] Nyamwanza, A., Jacobs, P., Sinyolo, S., Parker, W. A., Babalola, M., Makobane, L., & Dyantyi, P. (2019). *South Africa food and nutrition security information systems review and capacity assessment: literature review report*.
- [20] Omono, O. (2022). *Food security threatened as Benue, and Kogi communities submerged*. <https://nairametrics.com/2022/09/29/food-security-threatened-as-benue-and-kogi-communities-submerged/?amp=1>
- [21] Onyedinefu, G. (2022). *Motorists stranded, properties destroyed as Kogi battles 'worst flood'*. <https://businessday.ng/amp/news/article/motorists-stranded-properties-destroyed-as-kogi-battles-worst-flood/>
- [22] Oyedele, P., Edinam, K., Olorunfemi, F., & Walz, Y. (2022). *Understanding flood vulnerability in local communities of Kogi State, Nigeria, using an index-based approach*. *Water* 2022, 14, 2746. <https://doi.org/10.3390/w14172746>
- [23] Oyekola, T., Azubuike, C., & Obianeri, E. (2022). *Deaths, losses, tears as floods overrun Kogi, Anambra, Gombe, others*. <https://punchng.com/deaths-losses-tears-as-floods-overrun-kogi-anambra-gombe-others/?amp>
- [24] Ramsberg, N. (2018). *Research methodology*. <https://medium.com/ma-leading-design/research-methodology-45871a6e4cc7>
- [25] Raphael, R. (2022). *Nigeria's Worsening Flood Menace*. <https://www.sunnewsonline.com/nigerias-worsening-flood-menace/?amp>
- [26] Rhan, W. (2022). *Pakistan floods threaten food security as critical crops destroyed*. <https://amp.dw.com/en/pakistan-floods-threaten-food-security-as-critical-crops-destroyed/a-63104114>
- [27] Sani, S. (2022). *Climate Change in Africa: Challenges and prospects for conflict resolution*. A paper submitted to the National Institute for Security Studies (NISS), Abuja.
- [28] Wahab, B. (2022). *Why a dam in Cameroon causes devastating floods in Nigeria every year [Pulse Explainer]*. <https://www.pulse.ng/news/local/why-a-dam-in-cameroon-causes-devastating-floods-in-nigeria-every-year/py1twey.amp>
- [29] Wolfe, S., & Frongillo, E. A. (2001). Building household food security measurement tools from the ground up. *Food and Nutrition Bulletin*, 22: 5-12
- [30] World Bank. (2022). *What is food security?* <https://www.worldbank.org/en/topic/agriculture/brief/food-security-update/what-is-food-security>.