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(FIELD REPORT)

# UNVEILING THE DYNAMICS OF THE 2024 MAIDUGURI FLOOD DISASTER: CAUSES, IMPACTS, PERCEPTIONS AND COMMUNITY COPING STRATEGIES

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## ABSTRACT

This study unveils the dynamics of the 2024 Maiduguri flood disaster, assessing its root causes, extensive impacts, and the coping strategies adopted by affected communities. Fieldwork was conducted across heavily impacted areas, including Alau Dam, Galtimari, Fori Bridge, and Shetimari. The findings reveal that the disaster was primarily triggered by heavy rainfall and the subsequent collapse of the Alau Dam, exacerbated by poor urban planning, inadequate drainage systems, and climate change. The floods caused severe infrastructural damage, property loss, and public health risks, displacing over 400,000 individuals. Containment and relief efforts by government agencies and non-governmental organizations were evaluated, highlighting logistical shortcomings and inequitable resource distribution. The study recommends robust interventions, including the enforcement of strict urban development codes, regular maintenance of drainage and dam infrastructure, and the adoption of international best practices such as the 'Sponge City' concept and green infrastructure. These proactive measures are critical to enhancing community resilience and mitigating the impact of future flood occurrences.

**Keywords:** Maiduguri flood 2024; Alau Dam; Disaster risk management; Urban planning; Climate change; Community resilience

## 1 INTRODUCTION

### 1.1 Definition of Field trip

Field trips are an educational procedure by which the learners obtain first hand information by observing places, objects, phenomena, and processes in their natural setting. This fieldwork started with a briefing by the Director of the center for disaster risk management and development studies. He stated the importance of the Field trip as related to the course of study and how it will give students the opportunity of the field experience and begin to think through on how to prefer solutions to the impending problems of flooding in our respective communities.

The following were highlighted as the objectives for the fieldwork in Alau, Dam Galtimari/Fori Bridge and Shetimari near NUJ.

- Causes of flooding in the area.
- Identifying life threatening characteristic.
- Identify peak of flood
- Identify the debris that comes with the flooding
- Making recommendations to problems identified.

## 1.2 OVERVIEW OF BORNO STATE

### 1.2.1 Location and Geographic Context

Borno State is situated in northeastern Nigeria and is one of the country's largest states by land area. It shares international borders with Niger to the northwest, Chad to the north, and Cameroon to the east. Domestically, it is bordered by Yobe State to the west, Adamawa State to the south, and Gombe State to the southwest.

- Coordinates: Latitude 10°N to 13°N, Longitude 11°E to 15°E
- Land Area: Approximately 70,898 square kilometers, making it the largest state in Nigeria.

Borno State derives its name from the historic Kanem-Borno Empire, known for its influence in trade, governance, and Islamic scholarship. The Kanuri people form the majority ethnic group, alongside Shuwa Arabs, Hausa, Fulani, and other minorities. The state capital, Maiduguri (Yerwa), is a key administrative and economic center with historical significance as a hub for trans-Saharan trade and Islamic learning.

The state's climate is predominantly arid and semi-arid, with a hot dry season and a brief rainy season from June to September. Its terrain consists of savannah grasslands and semi-desert regions, with the northern areas extending toward Lake Chad.

Borno State has faced significant security challenges due to the Boko Haram insurgency since 2009, leading to widespread displacement and destruction. Additionally, climate change has exacerbated environmental issues such as desertification, flooding, and reduced water levels in Lake Chad.

**Figure 1: View of the Dam**

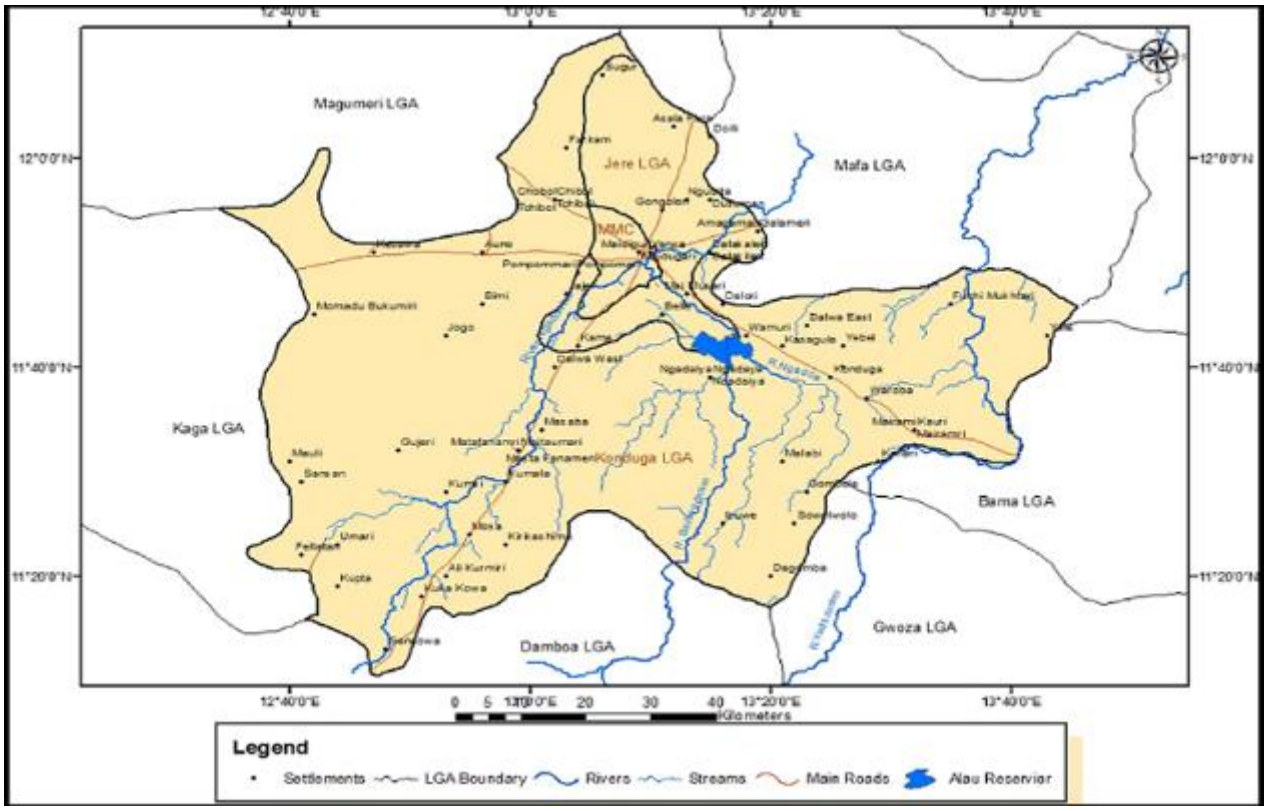


**Figure 2: LAU DAM: LOCATION**

**Figure 3: River Alau**

## 2 DAY ONE OF THE EXERCISE

### 2.1 Overview of factors that contributed to the 2024 Maiduguri flood disaster (A reflection of the lectures and what you may have learnt from news reports etc)

The visit began with an introduction at the Center for Disaster Risk Management, where participants were informed that dams serve both engineering and social functions. They are critical infrastructure requiring protection and proper

management. The Alau Dam, located in Jere and Konduga LGAs, was identified as a significant factor in the September 2024 flooding.

Actually, there were various factors that contributed to the flood disaster in Maiduguri, especially the 2024 Maiduguri flood disaster according to engineer Kaida the flood manager. The various factors are:

- Heavy rainfall and Dam collapse
- Poor urban Planning
- Inadequate Drainage system
- Climate Change

These factors combined to create a perfect storm that resulted in one of the worst flood disasters in Maiduguri history. According to engineer Kaidan, the 2024 Maiduguri flood disaster was a devastating event that resulted in significant loss of life, displacement of people, and drainage to infrastructure. Several factors contributed to this disaster.

Heavy rainfall and dam collapse, the collapse of the Alau Dam exacerbated by continuous heavy rainfall, was the primary cause of the flood. This market has flowed since 2012.

Secondly, poor urban planning in Maiduguri rapid urbanization and poor planning led to the construction of homes and businesses in flood prone areas, increasing the risk of the flooding.

Thirdly, inadequate drainage systems, the city were unable to handle the heavy rainfall, contributing to the severity of the flood.

Fourthly, environmental factors, the flood plains of two rivers that drain the city are prone to flooding and lack of provision of basic infrastructure, including water, sanitation, drainage, electricity and solid waste management exacerbated the disaster.

Fifthly: climate combined to create a perfect storm that resulted in one of the worst flood disasters in Maiduguri history.

### 2.2 Overview Of Containment Effort by The Government Agencies At The Days Site

Actually, the federal government Nigeria has taken proactive measure to contain the aftermath of the devastating flood in Maiduguri, here is an overview of the containment effort:

Relief and assistance. The government has directed relevant ministries and agencies to provide urgent relief and assistance to those affected.

Environmental health measures, the federal ministry of environment is conducting continuous water sampling and test to prevent water bone diseases. They are also studying the immediate and remote cause of the flooding to prevent future occurrences.

Collaborating with international partners. The government is working with international partners to control the aftermath of the flood through recovery and mitigation efforts.

Evacuation and relocation. Over 400,000 people have been registered in 30 relocation sites with more than 300,000 temporary displaced people registered in this site.

Infrastructure assessment and repair. The government is assessing damage to infrastructure including bridges, and working to repair and restore critical facilities.

These efforts demonstrate the government's commitments to supporting the Borno State in recovering from the devastating flood.

### 2.3 Physical observation (Your Evaluation of the situation)

There were various observations we have gone through the field work more especially the various damage of properties and loss of many lives has been done by the flood.

Many houses were destroyed by closed to the river, which is even illegal build by the people, this land was sold by the Bulamas without the knowledge of the government so people those don’t have enough money to possess land from government and expensive places, they would first come and buy the cheaper land and build house. Let go back to the previous year like 1993-1990 all this areas of Galtimari, Fori, Shettimari is a garden of Kashi only the green leaf of the

trees cover the area, people used the area for mini farming but with growing of population they are where it started constructed for building house, in those day there were not much bridges, it was only river bank but gradually with the increase in population all this area become resident of people which multimutated the government to construct the bridges and the road to Tashan Bama and Galtimari and when the flood came last year 2024 it destroyed the bridges and the houses close to the river bank, a lot of damages has been done. Millions of Naira have gone, life has not, many people become poor without houses and investment, some even their lives.

The bridges have been divided into two from the first joining, now no single or is passing only agencies' joint road to pass by pathing back of sand and located to the last end. This helps people more from Galtimari to Tashan Bama Various committees both from state and federal government come for observation and report.

### 2.4 Dyke one

Prevent water initial chaining construction of the main drainage because of the flood may decide to build the dam. This is an auxiliary field we can't control, if water rises it comes down 3.8m and crashes above the sea, land design determined September 10th 2024.

Water comes from the main gate and part goes into the river, record has been taken at its fixed.

There was this river Barukadirram where people used to catch snakes in those days. This dyke is between Barakadiram and another dyke separate from Barakadirram.

If water is more than the capacity of the reservoir, it would also send the water bank.

If we also combined the four gates collectively is 18km dyke is make of solid the water over flow the top of the dyke and collapsed but if it is concrete, it would collapse

### 2.5 Effect of climate change

Given us excess water e.g. if their heavy rainfall in Adamawa Rongi state the same thing people in Niger were affected by heavy rainfall, the water pass is passing between the solid particles, climate change resulted in supply more water.

### 2.6 Dyke three

The objective of the dyke 3 is a control of the excessive water. When the dyke collapsed the excessive water filled the function of the dyke 2 first to prevent water from giving out. The collapse of dyke 3 also.

#### 2.6.1 Flood vulnerability

- Gwange
- Lammisula
- Mafoni
- Shehuri North
- Fizzan
- Bolori
- Meshemeri
- The height of blue areas
- At height than green
- Area this year meets Maiduguri
- When dyke nets were constructed this technique put into effect the possibility of growth of Maiduguri.

The water reaches Maiduguri. The blue line is Gombe is separate and the water may not sustain the Maiduguri problem because excess water chemicals have permanently flow.

#### 2.6.2 Element at Risk

- College of Agriculture
- Lake Chad Institution
- Gwange
- UMTH
- Abattoir
- Ramat Square
- Specialist Hospital
- Monday Marke

- Custom Market
- Shehu place
- Zoo
- Maimalari
- Power of remote sensing and cutaneal.
- Typography
- Elevation
- Soil Laying
- Land use mapping
- Deposition

Before the flood after the flood height is 3km after the flood the deposition in particular along the lake.

### 2.7 Brief analysis of the results of question administrated at Fori and Galtimari

Actually, as we did the question at Fori and Galtimari, we get so much information on the various damages and loss of life and properties.

One of the older old man interviews with him emphasizes that he had lost almost all of his livestock like goat and sheep getting 20 percent carried away by the flood. His house is completely destroyed, he lost his 2 sons and he is homeless now.

Another young woman, I went through interview with her, she also emphasis that all her business collapse even the building of her shop in Fori near the river bank demolished all her profit never been been to school similar assistance from government.

Two of her sons were injured and complained that they never received anything from government and non-government organizations (NGO).

She is a secondary and married with four children. Even the four children are not schooling because of the poverty they lost access to education. Many houses collapsed the bridge were broken all these people living near to the river bank has lost many properties and house collapse.

**Figure 4: Collapsed Dyke**

**Figure 5: Collapsed Fori Bridge**

**Figure 6: Effect of the Flood at Fori**

## 3 REPORT ON URBAN FLOOD MANAGEMENT AT THE 505, CHAD BASIN AND COLLEGE OF AGRIC AXIS

Urban flood management in Chad Basin, actually around the college of Agric is crucial due to the region's unique hydrological characteristics, the Chad basin which spans across eight countries in central Africa including Nigeria faces significant challenges in managing its water resources.

### 3.1 Key Challenges

#### 3.1.1 Transboundary water Management

The Chad Basin is shared by multiple countries making it essential to develop cooperative management, strategies to ensure equitable water distribution and sustainable use.

#### 3.1.2 Climate Variability

The region experiences frequent drought and floods which can have devastating effects on local communities and agriculture.

#### 3.1.3 Human Activities

The growing population, agriculture expansion and urbanization in the Chad Basin have increased the demand for water resources leading to concern about water scarcity and degradation.

#### 3.1.4 Report on relief distribution at the College of Agric

The distribution of relief material has been done in large quantity with assistance of (NGO) and Centre for Disaster Risk Management and Development Studies university of Maiduguri volunteer the items for distribution such as bedsheet, Fabric (Attampa), and children wears,

The individual has received the gift, since I have participated physically, in the first place the item was presented to the Bulama at his main gate and removed his share before distribution took place. The major challenges of the relief distribution is the material was not enough to the members of the individual.

### 3.2 IMAGE OF RELIEF MATERIALS

**Figure 7: Distribution of cloths**

**Figure 8: A river behind college of Agric/ farm center**

**Figure 9: River at 505 housing estate**

### 3.3 Report on Urban Development Control and Efforts to Curb future occurrence of floods along the major rivers in Maiduguri

Control and effort to curb future occurrence of flood along the major river in Maiduguri.

Urban development control measures enforcing building code: building code constructed with flood resilient material and design can help to reduce the risk of the damage from flooding.

Flooding management regulating development in flood areas can help prevent damage to properties and infrastructure.

Drainage system maintenance regular maintenance of drainage can help to ensure that they function properly during heavy rainfall.

### 3.4 Effort to prevent future flood occurrences

Urban plantation the city is working on degradation that a comprehensive urban plan of takes into account the risk of flooding

flood control infrastructure is investing in flood control infrastructure such levels and flood walls, to protect the city from flooding.

Community engagement: community engagement and education programs are being implemented to raise awareness about the risk of flood preparedness.

### 3.5 International Best Practices

Other cities around the world are also implementing innovation solution to address the flooding for example

Sponge city concept

China sponge city concept aims to absorb and filter rain water reducing the risk of flooding.

Green infrastructure cities are incorporating green infrastructure such as green roof and permeable parameters to storm water runoff and elevated prone to flooding.

By adopting this measure and learning from international best practice Maiduguri can reduce the risk flooding and create a more resilient and sustainable urban environment

### 3.6 Brief analysis of the results of the questionnaire administered by your individual groups at Shetimari

Based on an individual analysis of the questionnaire results, I conducted interviews with two respondents, one female and one male.

The female respondent stated that she lives with her husband and eight children, making a total of ten family members. She has never attended school and reported that she lost nearly half of her belongings, including household items. Her home was severely affected, forcing them to evacuate for three days before returning. She mentioned that government assistance was minimal, and their residence is in a highly vulnerable area near the river.

Similarly, the male respondent, an Islamiyah teacher, shared that he lost his entire house and property to the flood. He lives with his wife and seven children. Unlike others who received some support, he has not received any assistance from the government, relying solely on help from his family.

### 3.7 DAY 3: SETTLEMENT AND RIVER FLOODING RISKS

#### 3.7.1 SHETIMARI NEAR NUJ

- Coordinates: Latitude 11.813307, Longitude 13.169540
- The area is a valley settlement, making it highly vulnerable to flooding.
- The September 10, 2024, flooding severely impacted low-income residents, many of whom settled there due to affordable land prices.
- The closer the settlement is to the river, the higher the risk of flooding.
- Houses marked for demolition belong to the most vulnerable groups.
- River Flooding and Urban Planning Challenges

River Coordinates: Latitude 11.810262, Longitude 13.171102

- The team met with Liman Gana Mustapha, General Manager of the Borno State Planning Management Board and Fellow of the Nigerian Institute of Town Planners.
- The site, previously farmland, has seen unregulated housing development in recent years.
- State town planners prohibited construction in water-prone areas, but many illegal structures emerged.
- Over 2,000 substandard buildings were identified, many occupied by individuals who avoid official documentation.
- Google Maps was used to assess illegal developments.
- The government plans to compensate only those with legal Certificates of Occupancy while implementing flood mitigation measures such as tree planting and dyke construction.
- Community awareness efforts include live radio broadcasts warning residents about flood risks.

**Figure 10: Shettimari River**

## 4 CONCLUSION

### 4.1 Summary of Findings from the Fieldwork

The fieldwork conducted at Alau Dam, Galtimari/Fori Bridge, and Shetimari near NUJ provided valuable insights into the causes, impacts, and vulnerabilities associated with the 2024 Maiduguri flood disaster.

The flooding was primarily caused by heavy rainfall and the collapse of Alau Dam. Additionally, poor urban planning led to settlements being established in flood-prone areas, while inadequate drainage systems worsened water accumulation. Climate change has also intensified extreme weather events, further increasing the risk of flooding.

The floodwaters were characterized by rapid flow and high flood peaks, making conditions extremely dangerous for residents. The water carried debris, waste, and contaminants, posing severe health risks. Some of the most affected areas included Gwange, Lamisula, Mafoni, Shehuri North, Bolori, and Meshemeri, where water levels rose significantly.

Government agencies and international partners provided emergency assistance to displaced persons. Water quality assessments were conducted to prevent disease outbreaks. In total, over 400,000 people were relocated to emergency sites as part of the containment strategy.

The Chad Basin region, including the College of Agriculture area, experienced significant water mismanagement and infrastructural weaknesses. Human activities such as agricultural expansion and rapid urbanization have further exacerbated the flooding problem.

NGOs and local volunteers facilitated the distribution of essential materials such as bedsheets, fabrics, and children's clothing. However, inequities in distribution were noted, as local leaders took portions before the relief materials reached the wider affected population.

### 4.2 General Observations and Shortcomings of the Exercise

- While various agencies responded, there were gaps in coordination among relief providers, leading to delays and uneven resource distribution.
- The relief materials distributed were inadequate, leaving many affected persons without essential items.
- Drainage systems remain poorly maintained.
- The dykes protecting Maiduguri were insufficient, and the collapse of Dyke 3 exacerbated the crisis.
- Many residents were unprepared for the flood, highlighting the need for better disaster risk education.

- There were inconsistencies in reported flood levels and damages, making it harder to assess long-term recovery needs.

### *Recommendations*

- To mitigate the impact of flooding in Maiduguri, several measures should be implemented. Strengthening Alau Dam and conducting regular inspections will help prevent future collapses, while improving urban drainage systems will enhance floodwater management. Additionally, developing flood-resistant infrastructure, including reinforced dykes and levees, is crucial.
- Better urban planning and land use control should be enforced by implementing building codes that prohibit settlements in high-risk flood areas and establishing zoning laws to guide development in flood-prone districts. Furthermore, the relief distribution system needs improvement by ensuring transparent and fair distribution of aid and increasing government stockpiling of emergency supplies for future disasters.
- To enhance climate resilience, flood management plans should integrate climate adaptation policies, while adopting green infrastructure solutions such as flood-absorbing landscapes and permeable pavements. Community awareness and engagement should also be prioritized by conducting flood preparedness education programs for vulnerable communities and establishing early warning systems to provide timely alerts before extreme weather events.
- Finally, adopting international best practices, such as the "Sponge City" concept used in China, which promotes natural flood absorption, and developing rainwater harvesting systems to reduce excess water runoff, can significantly improve flood resilience. By implementing these recommendations, Maiduguri and other flood-prone areas can effectively reduce flood risks, protect lives, and enhance overall disaster preparedness.

## **STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS**

### *Acknowledgments*

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### *Statement of ethical approval*

The research was conducted in compliance with the academic and ethical guidelines of the University of Maiduguri.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.