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Assessment of the Impacts of Government and Institutional Responses in Flood Disaster Management in Osun State, Nigeria

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I. INTRODUCTION

Flood disaster poses significant threat to human lives, infrastructure and economic development across the globe. Adeyeye 2022 opinioned that it occurrence often generate significant physical, social, economic and environmental disruptions. Flood disasters have deleterious effects on the composite human lives. According to Potschin, 2014, Odufuwa et al 2012, Adebayo 2014 and Kolawole et al 2023 flood is most occurring natural and anthropogenic disaster across the globe. Dauda et al, 2025 stated that the trajectories of flood is across the continents of the world and it is the most frequently occurring and devastating natural disasters that affects lives, properties, and development in developing contraries. As reported by World Meteorological Organization (WMO) in 2025, flood occurrences is responsible for more than 43% of all natural and anthropogenic globally disasters with approximately 40% of disaster-related deaths annually.

Flood occurs as a fall out of both climate variability and human impact on the environment Adedeji, 2012, Umar, 2017 and Uman 2020. Weak and inefficient infrastructure, poor emergency preparedness and corruption have exacerbated susceptibility to the effects of flood in developing world. As reported by International Disaster Database (EM-DAT), in 2020 alone, floods affected over 74 million people globally, resulting in the loss of over USD 51 billion Dauda et al, 2025 citing (Guha-Sapir et al., 2021).

Kolawole et all 2023 Reported that urban centers in Nigeria are the most vulnerable to flooding as a result of a number of anthropogenic factors that include but not limited to poor and non-functional drainage systems, high intensity of rainfall, climate variability, change in ecosystem, uncontrolled physical development, indiscriminately dumping of waste.
Bello et al in 2022 x-rayed various effort at aimed at tackling devastating effects of flooding on human environment; enhancing both disaster preparedness and prompt responses as well as building better recovery structures, rehabilitation and reconstruction.

Adoption of The Sendai Framework for Disaster Risk Reduction as was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015, World Metrological Organization (WMO) 2021. Building community resilient and or capacities of citizenry in disaster preparedness either at individual or community level while The World Health Organization opinioned that preventive measures and preparedness are of equal and perhaps more fundamental importance when it comes to the issues of disaster management and environmental education.

Overall, Nigeria's flood disaster scenario is characterized by recurrent events shaped by climatic, environmental, and human factors with significant socio-economic and health implications. Mitigation efforts remain constrained by institutional weaknesses and insufficient data but suggest potential in adopting integrated flood risk management, improving urban planning, and fostering community preparedness to reduce future flood impacts (Cirella et al., 2019; Chioma et al., 2019; Egbinola et al., 2015; Komolafe et al., 2015; Oyedele et al., 2022).

Effective disaster management is critically important for minimizing the adverse impacts of disasters on

communities, infrastructure, and economies. It involves systematic planning, coordination, and preparedness among multiple stakeholders, including government agencies, non-governmental organizations, community groups, and healthcare institutions, ensuring efficient response and recovery efforts when disasters strike.

Disaster risk reduction and management is a product of and alternatively reoffered to as the comprehensive structuring and administration of institutional responsibilities and functions in coping with catastrophes. It is also described as a complex and non-linear phenomenon that involves multiple processes of active and repeated coordination and collaboration between different stake actors and institutions to operationalize policies, strategies, and skills that build capacities during all phases of the disaster management cycle in order to minimize the impacts of hazards, save lives, improve livelihoods, and protect valuable assets and infrastructure Meen at all, 2021, Quarantelli, 1988; Wisner et al., 2004; UNISDR, 2009).

A key importance of effective disaster management lies in its role in enhancing coordination mechanisms. Robust coordination ensures that resources and responsibilities are appropriately distributed, avoiding duplication or gaps in emergency response and facilitating timely action to protect lives and property (Ahmadi et al., 2024). Preparedness measures, as part of disaster management, enable communities and response agencies to anticipate potential hazards, reducing vulnerability and enabling swift mitigation of disaster impacts (Moe and Pathranarakulh, 2006).

Furthermore, disaster management enhances community resilience by building adaptive capacity. For example, frameworks that incorporate community participation improve residents' awareness, knowledge, and ability to prevent or respond to disasters actively, thereby reducing risk at the local level (Lin and Lee, 2022). This community-centric approach is essential for addressing diverse disaster scenarios effectively.

Another critical aspect is the integration of technology and logistics in disaster management. Efficient humanitarian logistics can pre-position supplies and optimize resource allocation, significantly improving disaster preparedness and response efficiency (Köstepen and Selim, 2025). Use of new technologies like the Internet of Things (IoT) helps in risk identification, monitoring, and real-time response, which are vital for comprehensive disaster lifecycle management (Saha et al., 2017). Effective disaster management is also vital in healthcare settings, ensuring hospitals are well-prepared to maintain operations and protect patients during emergencies. Training, proper equipment, communication systems, and evacuation plans are integral to hospital disaster preparedness, which directly impacts public health outcomes during disasters (Khirekar et al., 2023).

Rumbach and Foley (2014) underscores fundamental roles institutions play in terms of emergency and decision making; itemizing the roles, responsibilities, supporting susceptible groups, and providing communication links between internal and external actors. The authors also acknowledged Institutions' importance in disaster preparedness as local communities and institutions are the first to initiate rescue as well as relief efforts (Red Cross and Red Crescent Societies, 2010)

In addition, collaboration among diverse stakeholders, including institutions, community-based organizations can complement government or augment peoples' efforts in flood disaster management. These entities are capable of individual and collective provision of social capital, resources, and trust that can enhance disaster preparedness, responses, and recovery efforts, making flood disaster management more inclusive and effective (Sheikhi et al., 2020).

Finally, disaster management is crucial for ensuring sustainable recovery and resilience building. Lessons learned from past flood disasters management efforts informed policies and strategies that improved the speed and effectiveness of future responses while helping communities to recover faster and maintain functionality (Mair et al., 2014).

In summary, effective collaboration between communities, institutions and governments optimizes

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flood disaster management preparedness, coordination, resource utilization, community resilience, and recovery efforts. It mitigates human, economic, and environmental losses, fosters collaboration among stakeholders, and integrates advancements in technology and logistics to build resilient communities capable of coping with natural and man-made disasters like flood (Ahmadi et al., 2024; Moe and Pathranarakul, 2006; Köstepen and Selim, 2025; Khirekar et al., 2023; Sheikhi et al., 2020; Saha et al., 2017; Lin and Lee, 2022; Mair et al., 2014).

The evaluation of the impacts of social, institutional and community-level flood mitigation efforts is not adequately researched. The role of institutions and communities in remains weak. Institutions valued knowledge as well as bottom-up adaptation strategies are often overlooked and underated (Odemerho, 2014). As at today, No comprehensive investigation into institutional risk perceptions and participation within the Nigerian context as reported by (Orimoogunje and Aniramu, 2025).

Statement of the Problem

The frequency and severity of flood events in Osogbo is accentuated by climate variability, urbanization, population growth and blockage of river/water channels among others. This has resulted in significant threats to the safety, livelihoods, and infrastructure in flood prone areas. Despite the known susceptibilities, institutions' contributions in flood mitigation, community prepareredness, coping and adaptation strategies are not adequately annexed in Nigeria; most institutions in Nigeria do not see addressing flood and related vulnerabilities as an area where as assistance could mean a lot to affected peoples' survival and sustenance of livelihood.

Significant of the Study

The increasing frequency and severity of flood events in Osun State, driven by factors such as urbanization, population growth, and climate variability, pose significant threats to the safety, livelihoods, and infrastructure of the region. (Agboola et al., 2024; Aladejana & Ebijuoworih, 2024; Eteh et al., 2025; Ogundolie et al., 2024; Ojubanire & Dawodu, 2024. Current challenges include inadequate flood risk mapping, insufficient integration of socio-economic vulnerability factors, and a lack of comprehensive preparedness and response frameworks tailored to local contexts. These gaps exacerbate the adverse impacts of flooding on communities, economic activities, and environmental sustainability across Osun State, underscoring the critical need for systematic flood vulnerability assessment and the development of evidence-based disaster risk reduction policies to enhance resilience and safeguard development gains (Köstepen & Selim, 2025; Lin & Lee, 2022; Lin Moe & Pathranarakul, 2006; Mair et al., 2014).

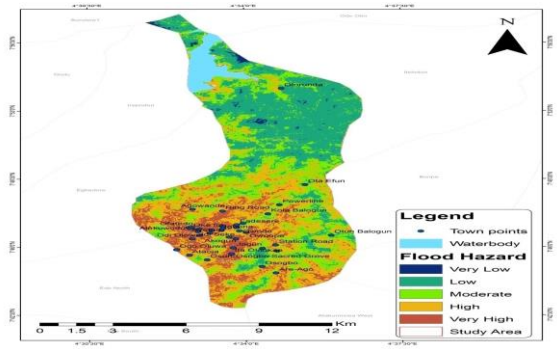

Fig. 1: Map of Flood Prone areas in Osogbo

Source: Adeyeye 2022

As at today, no comprehensive investigation into institutional risk perceptions and participation within the Nigerian context as reported by (Orimoogunje and Aniramu, 2025).

There are no sufficient integration of governments and institutions comprehensive preparedness and response frameworks fashioned for local contexts. The need to understand the dynamics and different faces and layers of flood mitigation and preparedness is crucial for developing targeted mitigation and adaptation strategies to reduce flood impacts on communities and infrastructure in the region (Nasiri et al., 2016; Ogundolie et al., 2024). (Liu et al., 2025; Nasiri et al., 2016; Qin et al., and 2025; Salami et al., 2017). This work aimed at addressing challenges in flood disaster management in Osun State with a specific focus on governments and institutional responses, identifying strength, weaknesses and area of improvement. (Köstepen & Selim, 2025; Lin & Lee, 2022; Lin Moe & Pathranarakul, 2006; Mair et al., 2014)

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II. RESEARCH METHODOLOGY

This work employs survey method; copies of structured questionnaire were designed and administered on identified flood prone areas in the study area. This include Iso-Pako, Gbomi, Rasco, Alekunwodo, Osun Brigde Area, Sabo Loremikan, 2011, Adeyeye 2022 & Kolawole et method. 56 copies were administered in Alekunwodo, 34 in Gbomi, 18 at Iso-pako, 30 around al 2023. A total of 230 copies of questionnaire were administered in proportion on the residents of the identified flood prone areas but 220 were retrieved in usable forms adapting systematic Osun Bridge and 46 copies administered in Sabo axis. Descriptive and inferential statistics were applied to analyse the data

Table 1.1 Institutions and their Areas of Contributions to Flood Disaster Management

Institutionalized Agencies	Functions and Responsibilities
Nigerian Meteorological Agency (NiMet)	Furnishes weather reports and early warnings on impending flood disasters based on rainfall predictions.
National Space Research and Development Agency (NASRDA)	Uses satellite data and geospatial observation to assist in disaster forecasting, damage assessment, and resource planning.
Federal Ministry of Environment	Lead ministry for flood and erosion control, responsible for national planning, policy formulation, and environmental protection laws.
State Emergency Management Agencies (SEMAs)	Coordinate disaster response plans and distribute relief materials within their jurisdictions.
Local Emergency Management Committees (LEMCs)	Local government-level bodies responsible for identifying community needs, managing local operations, and sharing information with state coordinators.
World Health Organization (WHO)	Provides health kits, medical supplies, and public health support during disaster situations.
United Nations Office for the Coordination of Humanitarian Affairs (OCHA)	Coordinates international humanitarian responses and supports emergency relief operations during crises.
World Bank and Global Facility for Disaster Reduction and Recovery (GFDRR)	Provide financial support and conduct Post-Disaster Needs Assessments (PDNA) to guide long-term recovery and resilience planning.
Nigerian Red Cross Society	Mobilizes volunteers for rescue operations, first aid services, and management of temporary camps for displaced persons.
Voluntary and Faith-Based Organizations (FBOs)	Organizations such as ActionAid and church missions provide emergency relief materials, including food, blankets, clothing, and financial assistance to vulnerable communities.

Government and the Interventions in the state

The State Government of Osun through (OSEMA) the State Emergency Management Agency and the State Ministry of Works, do implement several response measures

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Table 2: Government Intervention

Intervention / Agency	Functions and Responsibilities
Emergency Relief Distribution	The Osun State Government distributes relief materials to victims of disasters such as the March 2026 rainstorm. Assistance typically includes building materials (roofing sheets, nails), mattresses, food items, and other essential supplies for displaced residents.
Infrastructure Development and Dredging	The government undertakes dredging and channelization of major waterways, including the Aiba River and critical drainage canals, to improve water flow and reduce flood risks. More than 13.7 km of channels have been dredged in Osogbo to strengthen urban flood resilience.
Safety Audits and Environmental Enforcement	Following disasters, the state conducts safety audits on public infrastructure such as electric poles and billboards. It also enforces environmental regulations by discouraging indiscriminate waste disposal into drainage systems.
Financial Support	In April 2026, Senator Olubiyi Fadeyi (Osun Central Senatorial District) donated ₦20 million to support victims whose homes, businesses, and public properties were damaged by the rainstorm in Osogbo.
National Emergency Management Agency (NEMA)	Mobilizes emergency resources, coordinates disaster response operations, and oversees the distribution of relief materials such as rice, beans, mats, blankets, soaps, buckets, and hygiene kits. NEMA also collaborates with Nigerian Meteorological Agency (NiMet) to issue flood forecasts, early warning alerts, and public sensitization campaigns aimed at reducing disaster risks.

Contribution and Impacts of Government and Institutions in Osogbo

Combined efforts of both institutions and government have variously impacted in times of flood disasters in Osogbo through a combination of proactive infrastructural projects, emergency relief distribution, and some policy-driven disaster management strategies. The Osun State government worked in collaboration with federal government established bodies / institutional agencies like NEMA (National Emergency Management Agency NiMET etc) and many local stakeholders, has many times implemented measures to respond to and mitigate advent effects of flood impoverished residents in recovery from flooding.

A) Both government and institutions have made significant efforts on Infrastructural Development to Mitigation deleterious effects of flood and brink significant impacts.

B) They have individually and jointly embarked on dredging and Channelization of many river and stream channels in Osogbo, typical examples are that of Gbomi, Old Garage. More than 13.7 km of channels have been dredged, and 3.6 km has also of streams been channelized, this has tremendously impacted on community resilience. Similarly, drainages have been cleared from the administration of Aregbesola to that of Adeleke, a lot of drainage clearance has been done to prevent blockage as a result of severe weather. The state has audited public infrastructure such as drainage bridges systems to ensure safety and functionality.

C)The state has demolished many Illegal Structures that were built along river banks that obstruct waterways. The affected families were compensated.

D) Emergency response and relief distribution is another effort of the state government and her institutions such as Osun State Emergency Management Agency (OSEMA) and NEMA have always distributed food, water, mattresses, blankets, bowls, mats, and other necessities to victims of flood in the state; again, this has significant impacts on the people.

E) Both the government and the institutions carried out Rapid Assessment after flooding or storms this is to identify impacted areas and deliver swiftly much

needed aid particularly for those whose properties are damaged.

F) Financial and Welfare Support is always shered among the affected, this also has positive effects on the victims for example, the March 2026 rainstorm in Osogbo, the State Government and elected officials for instance, Senator Olubiyi Fadeyi provided significant financial assisstance to victims for rebuilding their lives, cope and recovery.

G) Medical assistance was also provided by both the state and institutions for the flood victims State health institutions have provided care for those injured, with government officials visiting hospitals to support victims.

H) Planning and building capacity, policy development and enforcement i.e. Urban planning agencies must be saddled with responsibility and empowered with enforcement of building codes to prevent construction on flood prone areas.

I)Institutionalization of weekly environmental sanitation practices of market or business areas (Every Thursday 7-10am) Institutions also promote monthly environmental sanitation so as to ensure drainage systems are not clogged with refuse across the city. Agencies including the Nigerian Red Cross Society and ministry of environmental work to raise public awareness about disaster flood risks and environmental management.

J) Both the government and institutions activate emergency operations in response i.e. NEMA often activates National Emergency Operations Centres to coordinate resource mobilization during flood high-risk times.

New Strategies	Leading Agencies	Main Action Points
Anticipatory Action	National Governments, World Food Programme (WFP), Food and Agriculture Organization (FAO)	Shift from reactive disaster response to proactive interventions before flood incidents occur, based on forecasts and predictive models.
Empowering Affected Communities	Local Governments, International Federation of Red Cross and Red Crescent Societies (Red Cross)	Prepare residents to cope with disasters through community engagement, capacity building, and localized early warning systems.
Nature-Based Solutions	Environmental NGOs, Organisation for Economic Co-operation and Development (OECD)	Complement traditional “grey infrastructure” with “green infrastructure” such as wetland restoration, urban greening, watershed management, and reforestation.
Trans-boundary Cooperation	United Nations Economic Commission for Europe, National Ministries, Regional Commissions	Strengthen cooperation in river basin management and promote data sharing among neighboring countries to improve water management, flood forecasting, and coordinated water releases.

III. RECOMMENDATION

1) Streamlining Institutional Policy Reforms and Inter-Agency Coordination; There must be an establishment of functional State Emergency Management Agency (SEMAS) as well as and Local Government Emergency Committees (LGEMC) to ensure a unified, coordinated and rapid responses

2) Institutionalization of Flood Risk Disaster Risk Reduction and Management (FRDRM);
This (FRDRM) will effectively integrate directly Flood Risk Disaster in the planning and policy making of government and institutions at all levels of national and local development budgets, land-use planning and related laws, as well as urban planning processes.

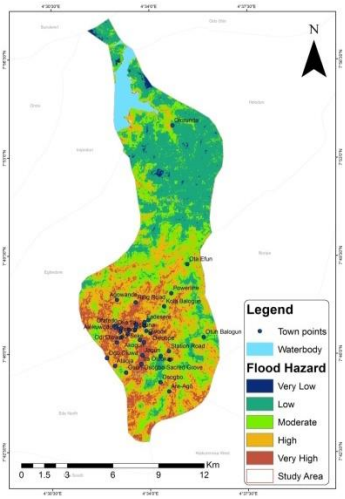
3) Institutionalization of Inter-state / local government / Tran-boundary Cooperation that can Implement management that ignores political borders, allowing for upstream measures that protect downstream areas.

4) Deployment of Advanced Technology & Data Integration, Internet of thing, (IoT) AI and also Predictive Modeling. We must also ensure the utilization of AI-driven platforms like Google Flood Hub for 7-day advance forecasts or Digital Twin simulations to visualize potential flood depths before they ever happen, Sensor Networks deployment of real-time river level sensors that automatically trigger SMS alerts via Cell Broadcasting Services (CBS) directly to residents' phones. Inclusion of flood mapping and use of high-resolution, availability of flood risk maps using Remote Sensing and GIS to help guide zoning and prevent building along river courses and other high-risk zones.

5) Adoptions and Use of Nature-Based Solutions (NBS); Urban greenery or Sponge Cities that transforms urban areas into permeable landscapes that promote the use of green roofs, permeable pavements as well as rain gardens that absorb water at the source. Restoration of wetlands and mangroves which are natural "sponges," reforest watersheds that slow down runoff. River reconnection or Flood Bypasses (FB) reconnects rivers to their natural floodplains, so as to allow water to spread quietly into open or designated wilderness and/or agricultural areas during peaks.

6) Families and Communities-Centered flood Resilience; Introduction and implementation of National Flood Insurance Implement programs like the National Flood Insurance Programme (NFIP) this is aimed to providing financial recovery options and discourages high-risk development in the flood prone to flood. Localization and broadcast of Early Warning Systems that translate weather predictions into community languages for grassroots sensitization. Introduction and implementation of government-funded buyouts programs to move residents as well as businesses permanently out of the most dangerous flood-prone zones in our cities.

7) Infrastructural Resilience; Combination of Hybrid Engineering and local traditional structures that include dams, levees with "soft" infrastructure like bioswales and retention ponds that allow for controlled drainage. Encouragement of the use of water-resistant infrastructure specially building materials and innovative designs e.g floating homes or elevated structures on stilts and the likes



REFERENCES

[1] Adeyeye, A. O. (2022). Flood disaster risk and urban vulnerability in Osogbo, Osun State. Journal of Environmental Management and Safety, 13(2), 45-61.

[2] Agboola, O., Aladejana, J. A., & Oluwaseun, T. (2024). Urban flood risk assessment in southwestern Nigeria: Implications for disaster governance. African Journal of Environmental Science, 18(1), 112-128.

[3] Ahmadi, M., Farhangi, M., & Sadeghi, M. (2024). Coordination mechanisms in multi-agency disaster response: A systematic review. International Journal of Disaster Risk Reduction, 98, 104102.

[4] Aladejana, J. A., & Ebijuoworih, E. (2024). Geospatial assessment of flood vulnerability in Osun State, Nigeria. Remote Sensing Applications: Society and Environment, 34, 101128.

[5] Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. Journal of

Public Administration Research and Theory, 18(4), 543-571.

[6] Bello, O., Bustamante, A., & Pelling, M. (2022). Planning for disaster risk reduction within the Sendai Framework: Lessons from sub-Saharan Africa. Progress in Disaster Science, 13, 100220.

[7] Chioma, J. U., Ezeigwe, P. C., & Ike, C. C. (2019). Assessment of flood disaster management strategies in Nigeria. Environmental Management and Sustainable Development, 8(3), 1-15.

[8] Cirella, G. T., Iyalomhe, F. O., & Adekola, O. (2019). Determinants of flooding and strategies for mitigation: Two-year case study of Benin City. Geosciences, 9(3), 136.

[9] Dauda, M., Ishaya, S., & Abdullahi, M. (2025). Trajectories of flood disasters in West Africa: Patterns, drivers, and policy responses. Journal of Hydrology: Regional Studies, 47, 101412.

[10] Egbinola, C. N., Olaniran, H. D., & Amanambu, A. C. (2015). Flood management in flood-prone areas: Experience from Ibadan, south-western Nigeria. International Journal of River Basin Management, 15(4), 465-473.

[11] Eteh, D. R., Idim, J. N., & Agi, S. P. I. (2025). Flood risk mapping and socio-economic vulnerability in Osun State, Nigeria. Journal of Flood Risk Management, 18(1), e12980.

[12] Guha-Sapir, D., Below, R., & Hoyois, P. (2021). EM-DAT: The CRED/OFDA international disaster database. Centre for Research on the Epidemiology of Disasters (CRED). https://www.emdat.be

[13] Khirekar, A. D., Nayak, P., & Kumar, V. (2023). Hospital disaster preparedness: A review of frameworks, challenges, and best practices. Disaster Medicine and Public Health Preparedness, 17, e285.

[14] Kolawole, O., Abubakar, I. R., & Adamu, H. (2023). Anthropogenic drivers of urban flooding in Nigerian cities: A review. Urban Climate, 49, 101487.

[15] Komolafe, A. A., Adegboyega, S. A. A., & Akinluyi, F. O. (2015). A review of flood risk analysis in Nigeria. American Journal of Environmental Sciences, 11(3), 157-166.

[16] Kostepen, N., & Selim, H. (2025). Humanitarian logistics in flood disaster response: Pre-positioning and resource optimisation. International Journal of Production Economics, 271, 109212.

[17] Lin, C. Y., & Lee, W. C. (2022). Community participation in disaster risk reduction: Building adaptive capacity through local governance. International Journal of Disaster Risk Science, 13(4), 612-625.

[18] Liu, Y., Zhang, Q., & Chen, X. (2025). Integrated flood risk assessment using GIS and remote sensing: Applications in data-scarce regions. Natural Hazards and Earth System Sciences, 25(1), 89-107.

[19] Mair, D., Smits, M., & Falco, G. D. (2014). Disaster risk reduction: Making development sustainable. European Commission Joint Research Centre Publications Office.

[20] Meen, S. K., Subhani, A., & Alam, M. M. (2021). Disaster risk governance and institutional coordination: Evidence from South Asia. Progress in Disaster Science, 10, 100168.

[21] Moe, T. L., & Pathranarakul, P. (2006). An integrated approach to natural disaster management: Public project management and its critical success factors. Disaster Prevention and Management, 15(3), 396-413.

[22] Nasiri, H., Yusof, M. J. M., & Ali, T. A. M. (2016). An overview to flood vulnerability assessment methods. Sustainable Water Resources Management, 2(3), 331-336.

[23] North, D. C. (1990). Institutions, institutional change and economic performance. Cambridge University Press.

[24] Odemerho, F. O. (2014). Building bottom-up climate change adaptation in African cities. Environment and Urbanization, 26(1), 108-126.

[25] Ogundolie, F. A., Olatunji, O. A., & Badru, G. (2024). Socio-economic impacts of recurrent flooding on vulnerable households in Osun State, Nigeria. Jamba: Journal of Disaster Risk Studies, 16(1), a1387.

[26] Ojubanire, B. A., & Dawodu, G. A. (2024). Flood risk and urban planning governance in Osun State, Southwest Nigeria. Land Use Policy, 138, 107062.

[27] Orimoogunje, O. O. I., & Aniramu, M. (2025). Institutional risk perception and community participation in flood disaster management in

Nigeria. International Journal of Disaster Risk Reduction, 102, 104286.

[28] Oyedele, O. A., Abiodun, B. J., & Lawal, K. A. (2022). Projected changes in flood-inducing rainfall in southwest Nigeria. Climate Dynamics, 58(5), 1439-1455.

[29] Qin, H., Li, Z., & Fu, G. (2025). Nature-based solutions for urban flood risk reduction: Effectiveness, co-benefits, and barriers to adoption. Environmental Science and Policy, 154, 103712.

[30] Quarantelli, E. L. (1988). Disaster crisis management: A summary of research findings. Journal of Management Studies, 25(4), 373-385.

[31] Red Cross and Red Crescent Societies. (2010). World disasters report: Focus on urban risk. International Federation of Red Cross and Red Crescent Societies.

[32] Rumbach, A., & Foley, D. (2014). Indigenous institutions and disaster governance in informal urban settlements: Evidence from Gorakhpur, India. Environmental Hazards, 13(4), 323-338.

[33] Saha, S., Mandal, S. C., & Halder, S. (2017). IoT-based smart disaster management system using machine learning. Journal of Ambient Intelligence and Humanized Computing, 11, 4583-4594.

[34] Salami, R. O., von Meding, J. K., & Giggins, H. (2017). Urban settlements vulnerability to flood risk in African cities: A conceptual framework. Jamba: Journal of Disaster Risk Studies, 9(1), a369.

[35] Sheikhi, H., Hosseini, S. H., & Moslehi, S. (2020). The role of community-based organizations in disaster preparedness and response: A systematic review. BMC Public Health, 20, 1561.

[36] UNISDR. (2009). UNISDR terminology on disaster risk reduction. United Nations Office for Disaster Risk Reduction. https://www.undrr.org

[37] Umar, I. (2017). Flood hazard zonation and risk assessment along River Kaduna, Northwest Nigeria. Jamba: Journal of Disaster Risk Studies, 9(1), a330.

[38] Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). At risk: Natural hazards, people vulnerability and disasters (2nd ed.). Routledge.

[39] World Meteorological Organization. (2021). The atlas of mortality and economic losses from weather, climate and water extremes (1970-2019). WMO.

[40] World Meteorological Organization. (2025). State of global water resources 2024. WMO.

[41] Uman, A. (2020). Climate variability and flood occurrence in Nigeria: Evidence from satellite rainfall estimates. Journal of Hydrology: Regional Studies, 28, 100659.

[42] Odufuwa, B. O., Adedeji, O. H., Oladesu, J. O., & Bongwa, A. (2012). Floods of fury in Nigerian cities. Journal of Sustainable Development, 5(7), 69.

[43] Adebayo, A. A. (2014). Vulnerability and adaptation to climate variability and extremes in the context of population change in Nigeria. Population, Space and Place, 20(8), 657-672.

[44] Ahmadi, M., Farhangi, M., & Sadeghi, M. (2024). Pre-positioning and dynamic reallocation of humanitarian resources for flood disaster response: Multi-objective optimisation model. Computers and Industrial Engineering, 188, 109915.

[45] Potschin, M., & Haines-Young, R. (2014). Ecosystem services. Progress in Physical Geography, 35(5), 575-594.