Article

Flood Policy and Governance: A Pathway for Policy Coherence in Nigeria

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Abstract: In recent years, Nigeria is witnessing increasing frequency of flood occurrence with devastating impact translating into significant loss of lives (in Nigeria, over 300 people died in September 2022) and properties. Addressing flood disaster requires holistic approach from policy and governance perspectives, integration of policies and programs and synergies between institutions. Using synergies and eliminating trade-offs, flood governance and policy coherence integrate all relevant policy fields and institutions to achieve common policy outcomes. The objective of this study is to examine and understand how flood governance and policy coherence are approached, as well as institutional design and implementation for coherence in Nigeria. The findings revealed that there is no single flood policy in Nigeria. Due to this, there is no focus and no defined objectives for flood governance, prevention, control, and management, and no imperative for the government to seek both short-term and long-term flood solutions. There is no synergy and coordination among institutions for flood governance in the country. Since the country established the federal ministry of environment in 1999, the environment, floods, and climate-related hazards were given less priority. State and local governments handle most flood disasters and emergencies. Federal assistance is provided, however, when flood disasters exceed the capabilities of local and state governments. This study recommends that across the country, flood policy needs to be designed, formulated, and implemented while assigning governance responsibility and decentralizing policy to state and local governments.

Keywords: flood; policy; governance; institutions; Nigeria

Introduction

Flooding is regarded as one of the most dangerous natural disasters confronting the world today [1]-[2]-[3]-[4]-[5]. In many countries around the world, particularly developing nations, flooding has become a major issue because of its social, economic, and environmental consequences [2]-[6]-[7]-[8]-[9]. In the last three decades flood alone affects over 2.3 billion people, accounting for 74% of all recorded natural disasters, and responsible for 43.5% all death in 2019 from natural disaster globally [9]. It has wreaked havoc

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on development infrastructure and increased human casualties all over the world. Between 1960 and 2000, floods displaced 5 million people globally [8]

Flood in Nigeria was as a result of several factors namely, climate change, rapid urbanization, the drainage network is poorly planned and has flaws, construction and installation of other assets along the coastal shores, impervious surfaces that prevent infiltration, informal housing development practices, physical development is inadequately controlled, planning laws are poorly implemented due to corruption, poor or non-existent drainage systems and waste management practices, sea level rise, intense rainfall, in some instances, tropical cyclones and increasing tidal activity, climate variability and storm surges [10]-[11]-[12]-[13]-[14]-[15]. Associated with climate change, heavy rainfall is one of the main natural causes of flooding. Asare-Kyei et al. [16] and Li et al. [17] argued that as a result of growing populations, socioeconomic changes, and agricultural expansion, in recent years, flooding has been frequently reported in Nigeria and elsewhere in West Africa. Many flood studies in Nigeria have found that rainfall amounts were above normal during the rainy season, notably in the coastal, Sudanian and Sahelian regions (July-September) resulting in severe flash floods, and causing the major rivers (Niger, Benue, Hadejia e.tc.) to overflow and cause catastrophic damages to lives and properties [18]-[10]-[19]-[20]-[13]-[14]-[15]-[21]-[22]. Etuonovbe [23] and Umar and Gray [24] observed that throughout the millennium, Nigeria has experienced increasing numbers of extreme wet events, resulting in severe flooding. The most notable occurrences were in 2002, 2003, 2005, 2006, 2007, 2008, 2009, 2010, 2012, upto 2022 [14]-[24].

In 2001 collectively 500 people died as a result of flood in Abia, Adamawa and Akwa Ibom states respectively [25]. Recently in September 2022 flood claims lives of more than 300 and displaced over 100, 000 people in Nigeria and the counting contnues [26]. In 2011, 2,105 buildings were destroyed by floods in Ibadan [25]. In September 2022 97 people died from flood in Jigawa State [27]. Approximately 43,155 people have been displaced by floods in Borno, Adamawa and Yobe states in 2022 [28]. In Benue over 3,274 people were displace while about 1,213 houses were destroyed in 2022 flood [28]. Lagos alone loses about 3.9 billion dollars to flood yearly [29]. In Nigeria, in 2012 the total losses to flood were put at US$16.9 billion [15]. In Nigeria, flooding has become one of the major threats to deal with given the poor and limited infrastructure, and political-will. In addition, the lack of human and financial resources of local governments and a lack of coordination between relevant stakeholders contributing to the inadequate response to flood disasters [19]-[30]-[13]-[14]-[15]-[31]. Many programs were put in place to combat the flood threat in Nigeria. These include "The National Disaster Response Plan (NDRP), National Disaster Management Framework (NDMF), National Flood Preparedness Plan (NFPP), and National Environmental (soil erosion and flood control) Regulations, 2011".

Previous literature reviews from Nigeria and West Africa dwells on and exploring the link between flood and diseases [32]-[33]-[34]-[9]. Other studies focused on the socioeconomic impact of flood in Nigeria [12]-[14]-[15]. Other studies review the flood risk, hazard and vulnerability within the West African sub region [35]-[36] [14]-[8]-[37]-[38]-[31]-[39]. Other reviews discuss about flood adaptation, mitigation, and management measures [36]-[40]-[38]-[31]. This study has not found any review (Published in high impact journal) on the nexus of flood governance, policy coherence and institutional mechanism in flood management in Nigeria. As a result, this study investigates the policy and governance and institutional design and implementation practices in flood governance management in Nigeria.

There has been discussion about the importance of building place-based policies within national frameworks, and about the shared responsibilities between government, private industry, and civil society in managing floods [41]. This study aims to enhance the understanding of governance and policy design and implementation practices in flood management and, identify good practice examples and provide recommendations for future flood-hazard management practices and policy. To support risk-informed development and to minimise the negative effects of development policies, coherence is primarily concerned with maximizing synergies between policies and leveraging mutual benefits.

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The target audience for this study includes academia, policymakers, technical partners and other stakeholders in Nigeria working on flood, disaster risk reduction, sustainable development, policy design and implementation. Furthermore, this study provides useful insights for other government/non-governmental stakeholders in Nigeria and elsewhere, in supporting the role of policy coherence and institutional framework in flood management. Drawing upon these insights, this study provides key messages and priority actions for enhancing institutional capacity and policy coherence in flood management practices in Nigeria.

Table 1. Summary of the major existing studies regarding flood in Nigeria.

Author and year	Title of the article	Research objective	Significant findings
[42]	Recent retreat and flood dominant areas along the muddy Mahin coastline of Ilaje, Nigeria	"To understand the present evolution of the coastal area in order to manage the environmental and human risks in the future".	In recent years, the retreat has dominated areas that were once accreting. It is interesting to note that some areas are gaining more land compared to those that have receded.
[43]	Indigenous flood control and management knowledge and flood disaster risk reduction in Nigeria's coastal communities: An empirical analysis	"To examines indigenous flood control and management knowledge with the intent to identify its effectiveness in risk reduction of flood disasters in Nigeria's coastal communities"	The finding shows that indigenous flood control and management practices account for 61.2% of flood risk reduction strategies in coastal communities in Nigeria.
[44]	Examination of international law and flood management	"To evaluate the efficiency and effectiveness of legal and institutional framework on flood related disasters in Nigeria"	The findings revealed that effective disaster risk management at the national, regional, and global levels depends on disaster risk governance.
[45]	Assessment of flood vulnerability in some communities in Lokoja, Kogi State, Nigeria, using Participatory Geographic Information Systems	"To conduct a vulnerability assessment in Lokoja as a pre-flood strategy that involves the communities"	The results revealed that there is a strong correlation between flood vulnerability and elevation, as well as land use, among other parameters
[46]	Impacts of Flood on Food Crop Production and the Adaptive Measures Among Farmers in the Northern Guinea Savannah of Agro ecological Zone of Kaduna State, Nigeria	"To analysis the impact of flood on food crop production and the adaptive measures among farmers in northern guinea savannah of agro ecological zone of Kaduna State"	The findings revealed that flood has multidimensional impact on crop production. The impact is viewed differently by farmers.
[15]	The impact of flooding on Nigeria's sustainable development goals (SDGs)	"To highlights the impact flooding has on Nigeria reaching SDGs and enumerates the specific SDGs most directly impacted"	The findings revealed that unregulated urbanization, poor planning laws, corruption, and a poor waste management system are the major causes of flooding in Nigeria.
[14]	Impacts of flood disasters in Nigeria: A critical evaluation of health implications and management	"To reviews flood disasters in Nigeria and how they have been managed over the past two decades"	This study found that flood-related health indicators are poorly managed and that flood response and planning are not well coordinated.
[47]	Flooding Conceptual Review: Sustainability-Focalized Best Practices in Nigeria	"To utilize a conceptual framework to assess and identify areas within Nigeria prone to flooding and examine possible means of alleviating damage and harm"	The results of this study indicate that several factors contribute to the frequency of flooding, including different precipitation patterns, urbanization, and increased paved surfaces.

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[48]	A gender perspective on the impact of flood on the food security of households in rural communities of Anambra state, Nigeria	"To examined gender perspectives of the implications of the severe 2012 flood on household food security in rural Anambra state, Nigeria"	The findings revealed that households in Nigeria may be able to remain food secure after future floods by diversifying their income away from agriculture, building early warning systems, and improving women's education.
[49]	Geospatial Techniques for the Assessment and Analysis of Flood Risk along the Niger-Benue Basin in Nigeria	"To assess the spatial impact of the October 2012 flooding of the Niger-Benue basin on the surrounding areas"	The findings of this study indicate that flooding along the Niger-Benue basin can be mitigated and monitored using geospatial methods

How climate change exacerbate flood in Nigeria?

Historically, West Africa (including Nigeria) has been subject to extreme climate variability and severe weather events, such as floods, that can be attributed to climate change [50]. Climate change is believed to exacerbate floods across Nigeria by increasing rainfall intensity and duration [51]. Due to global warming, extreme precipitation events and flooding risks, especially along riverbanks, will intensify, increasing the intensity of the hydrological cycle [52]. Tabari [52] observed that several areas of the globe, including Nigeria, are projected to experience increased flood intensity in upcoming years. As a results of climate change, several climate models predict increase in flood occurrences in Nigeria e.g. [53]-[54]-[50]-[55]. As highlighted by Kundzewicz et al. [2] changes in precipitation and temperature regimes as a result of changing climate are responsible flood occurrences. Hirabayashi et al. [56] in their global flood analysis revealed that climate change enhances the occurrence of floods in in 21st century.

What are the most common causes of flood in Nigeria?

Causes of flood in Nigeria are generally divided into three factors (i) meteorological factors: oceans storms and tidal waves usually along the coastal areas, heavy rainstorms; (ii) physical factors: insufficient drainage management, and catchment area; (iii) human factors: poor land use planning; siltation, deforestation, collapse of dams, lack of flood management policies, and institutional arrangements etc., [10]-[19]-[57]-[58]-[51]-[59]. Nwigwe and Emberga [57] observed that in Nigeria flood occurs either in forms coastal flood, rriver flooding, flash floods, uurban flooding, fluvial flood, dam burst leave failures, and dam spills.

What are the common impacts of flood in Nigeria?

When flood occurs, its impact is inevitable. Depending on the intensity and location of the flood in the country. Agbola et al. [60] broadly categorized the impact of flood in Nigeria into economic, infrastructural, physical displacement, environmental, and psychological impacts where (i) economic impact: lost in productivity, reduction in working hours, loss in gross domestic product, and labour productivity, insurable losses, temporary or permanent loss of business and wages, destruction of farms and plantations, loss of livestock, disruption of services, destruction of properties, (ii) infrastructural impact: floods increase the risk of structural damage, deterioration, and accelerated aging, raising maintenance and replacement costs [15]-[61]. The (iii) environmental impact: reduce coastal production, contaminate coastal food supplies, and degrade aquatic habitats [11]. The (iv) physical displacement: human and animal displacement; (v) psychological impact: affects well-being, social cohesion, and post-traumatic stress disorder (PTSD) [62][63]. Further, the flood caused diarrhea and waterborne diseases as well as infestations and deaths [60]-[57]-[12].

An overview of flood risk, exposure and vulnerability in Nigeria

Flood risk is the combination of the likelihood of a flood occurring and its adverse outcomes [64]. Flood risk is the product of the flood hazards probability, the vulnerability

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and the exposure of the environment, people and the economy [35]. As highlighted by various studies flood risk probability is high in Nigeria, every region is vulnerable to flood [19]-[35]-[64]. In terms of climate change, Nigeria ranks as the 7th most vulnerable country in the world because the country is located in one of the most vulnerable regions in the world (Verisk Maplecroft's Climate Change Vulnerability Index 2016) [65]. The combined effects of climate change and global warming increased the country's flood risk, exposure, and vulnerability [64]. In the country, climate change has resulted in a significant increase in the frequency and severity of both inland and coastal floods [64]. Documented evidence shows that flood occurs in Nigeria since 1947 [64]. The recent or millennium floods occurs widespread in Nigeria from 2000 to date with varying degrees of impact [25]-[64].

Nigeria's planning system

Flood and climate-related disaster risk reduction and management are the responsibilities of the Federal Ministry of Environment at the national level [14]. In terms of climate change, floods, and coastal erosion, the ministry is responsible for developing national planning policies and legislation. In addition, there are other key institutions related with flood including Federal Ministry of Water Resources, Nigerian Hydrological Service Agency (NIHSA) and National Emergency Management Agency (NEMA) [66]. Both NIHSA and NEMA coordinate and predicts and issues early warning on flood [67]. The local and state governments are usually responsible for handling disasters and emergencies [68]. When a disaster exceeds the abilities of state and local governments, the Federal Government is called upon to provide supplemental assistance [69]. A wide range of federal resources may be mobilized to assist states and local governments if necessary [69].

Environmental policy in Nigeria started from colonial masters' era in 1900s when environmental protection efforts were through the colonial bye-laws, concerned with water pollution and burial at homes, the 1958 Health Act. (i)The National Policy on Environment, first published in 1989 and revised in 1999, The National Agenda 21 (published in 1999) and the establishment of the Federal Ministry of Environment in 1999 to control the environmental challenges in the country. There are laws governing environmental use and protection in state and local governments [70]. As part of its commitment to long-term development, Nigeria has developed a national environmental policy [71]. Consequently, human needs must be balanced with the carrying capacity of the environment via proactive and reasonable planning. This necessitates the implementation of a number of complementary policies, strategies, and management approaches, which should ensure, among other things, that: "environmental concerns are integrated into major economic decision- making process; environmental remediation costs are built into major development projects; economic instruments are employed in the management of natural disasters such as flood; environmentally friendly technologies are applied; Environmental Impact Assessment is mandatorily carried out before any major development project is embarked on". Nigeria currently does not have a flood policy. [13]. As a result of a lack of relevant legal and policy frameworks, flood control and management in Nigeria receives low priority.

Environment policies, strategies and plans

A new set of environmental concerns led to a revision of the 1989 National Environmental Policy in 1999 [72]. Efforts are being made to achieve sustainable development under the new policy. As part of the National Policy on Drought and Desertification, (2007) and the Drought Preparedness Plan, (2007), relevant government agencies, institutions, and citizens are appropriately equipped to collect, analyze, and use climate data in order to alleviate drought and combat desertification [73]. In accordance with the National Forest Policy and National Forestry Action Programme (NFAP), sustainable forest management should be ensured, participation in the development process should be promoted, and private sector involvement should be supported [74]. In 2005, the National Policy on Erosion, Flood Control, and Coastal Zone Management was developed to

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ensure coordinated and systematic measures for managing and controlling erosion and flood hazards on environment and humans [75]. Nigeria's National Forest Policy, 2006; National Biodiversity Strategy and Action Plan, 2004 (NBSAP) are dedicated to developing strategies and instruments for conserving the biodiversity of Nigeria [76]. Coastal and Maritime environment policy which concerned with management of coastal areas and provide legal framework capable of preserving natural ecological conditions. The purpose of the energy policy/plan is to establish guidelines for the exploitation of Nigeria's fossil fuels in a way that minimizes environmental damage [77]. Governments, civil society, the private sector, communities, and individuals are encouraged to take steps to reduce the impacts of climate change through the National Adaptation Strategy and Plan of Action for Climate Change in Nigeria (NASPA-CCN) [78].

In addition to the above-mentioned policies and strategies, Nigeria has several laws and regulations promoting sustainable environmental management. As reported by Federal Ministry of Environment [75] among the critical laws that may influence climate change response, particularly as they relate to ecosystem adaptation, are (a) the National Park Service Act, retained as part of Cap N65 Laws of the Federation of Nigeria (LFN) 2004 in national parks; (b) the Endangered Species (Control of International Trade and Traffic) Act, retained as part of Cap E9 LFN 2004

Climate change adaptation is a state and local government responsibility at the regional and grassroot levels, usually in form of tree plantations awareness and extension services e.t.c. Local authorities play a key role in shaping climate action in their communities and are key mobilizers at the local and community levels of action [79]-[80]. As a result, local authorities are required to develop an adaptation and mitigation strategies in accordance with national guidelines. By integrating climate adaptation into day-to-day operations and county-level development plans, these strategies help inform statutory plans as well as economic development plans [80]. Civil Society Organizations, Community-Based organizations and Faith-Based organizations play the role of catalysts at the adaptation frontline. At international level, Nigeria Partners with the International Community in adaptation and mitigation to climate change [81]. These communities include; "United Nations High Commissioner on Refugee, World Bank, World Health Organization, Intergovernmental Panel on Climate Change, United Nations International Children's, European Union, United States Agency for International Development, Department for International Development, Emergency Fund, United Nations Framework Convention Climate Change" e.t.c. Frequently, bilateral and multilateral donor agencies provide financial assistance to governments, although they are also often involved in technical assistance

Policy for disaster management in Nigeria

Disaster risk reduction is defined as the "concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse effects" [82]. For countries to deal with issues like flood disasters, policies, laws, and legislation are essential tools. Countries benefit from such legislation by reducing disaster risks, responding to disasters, and managing emergencies [69]. In addition to risk assessment, economics, policy and planning, disaster law also encompasses other aspects of environmental and insurance law [69]. These programs (Table 2) help Nigeria in reducing the risk of flood and other disasters.

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Table 2. Summary of DRR strategies and the expected outcomes.

Sector	Strategy	Expected outcome
All form of disaster	National Disaster Response Plan (NDRP)	Major disasters and emergencies are addressed effectively, efficiently, and in a systematic manner
All form of disasters including flood	National Disaster Management Framework (NDMF)	Preparation, prevention, mitigation, response, and recovery from disasters should be ensured at all government levels.
Flood	National Flood Preparedness Plan (NFPP)	State participation in disaster relief, including coordination of humanitarian actors and resources
Environment, soil and flood	National Environmental (soil erosion and flood control) Regulations, 2011	Prevent floods and erosion, protect human life and the environment.

Climate change policy in Nigeria

In response to the changing climate, Nigeria formulates a National Policy on Climate Change focusing on adaptation and mitigation. As Nigeria's overarching national document on climate change, the NPCC was approved by the Federal Executive Council in 2013 [83]. The objectives of the National Climate Change Policy Response and Strategy (NCCPRS) is to implement mitigation measures, strengthen national policies to adapt to climate change, increase public awareness on climate change and establish a suitable and functional framework for climate change governance by strengthening national institutions and mechanisms (policy, legislative, and economic). This policy (National Policy on Climate Change) cut across various sector of the economy (agriculture, energy, water, coastal areas, forestry and land use, transport, health culture and tourism, population, human settlement, and information and communication) which directly or indirectly affected by climate change.

There has been a serious response to climate change in Nigeria. The First National Communication was produced in November, 2003 [84]. A stakeholders' initiation workshop on the Second National Communication (SNC) took place in December 2009, and is being finalized and a National Adaptation Strategy and Action Plan (NASPA) has been concluded. Currently, the Federal Ministry of Environment has a Department of Climate Change (CCD). Climate Convention and Protocol are implemented by CCD. Additionally, it coordinates the activities of the Inter-ministerial Committee on Climate Change.

A number of policies and initiatives have already been put in place in Nigeria as part of its adaptation and mitigation strategies for climate change. These include the National Action to Combat Desertification and the National Policy on Drought and Desertification. In other words, these can be viewed as anticipatory adaptation measures and plans that can be fine-tuned into policy options to deal with climate change [83]. These policies will be translated into effective inter-sectorial environmental management activities through the National Policy on Climate Change and Response Strategy.

The building blocks for enhancing flood policy coherence

Generally, climate hazards are defined as natural or human-induced physical events or trends that may cause death, injury, or other health impacts, as well as damage to property, infrastructure, livelihoods, services, ecosystems, and environmental resources [85]. Interlinkages within Disaster Risk Reduction reveal new policy interdependencies that challenge sectorial structures and decision-making processes in many countries including Nigeria (OECD, 2018). In order to enhance policy coherence, governments must break down institutional silos and find new ways of working to expand participation, develop consensus, and create ownership across actors and institutions [86]. One goal of mainstreaming climate policy is to achieve coherence across sectors.

Policy coherence in flood management and control in Nigeria is coordinated by five sectors. The Federal, States and Local Governments, Civil Society and Organized Private sector. The Federal government provide overall leadership through relevant ministries such as the ministry of environment, NEMA ministry of water resources in flood risk reduction and formulation of policies. The State governments provide leadership at the state

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levels and establish ministries to coordinate flood risk reduction and adaptation [87]. Local governments provide early support to victims and support communities in flood disaster recovery and resilience [69]. The civil society organizations usually act as a pressure group for government to provide support for flood to victims and contribute to national and states programmes in policy formulation and assessment of the policies and budgets for flood risk reduction and other climate related disasters [88]. The organized private sector especially faith-based and community-based organizations participate actively in climate and flood adaptation and provide support to the victims [89]. Achieving coherence in flood risk reduction, adaptation and resilience there must be a synergy between the eight-building block of policy coherence namely; "political commitment, policy integration, long-term planning horizons, policy effects, subnational and local involvement, stakeholder engagement, monitoring and reporting" [86]. These seven principles of policy coherence act as a lens to identify good institutional practices and help us understand flood governance system in Nigeria.

Political commitments in flood planning, control and management in Nigeria

Prior to independence there was no political commitment to flood in Nigeria [90]. Flood is managed by the affected individuals or group of affected areas [14]. The federal government's pioneer intervention agency came into being during the First, Second and Third National Development Plans of 1962-68, 1970-74 and 1975-80 respectively, through the establishment of the federal and state ministries of works [91]. Under the Federal Ministry of Works and Housing, the Federal Environmental Protection Agency (FEPA) was established in 1988 [70]. In order to protect Nigeria from natural disasters, FEPA has been charged with developing policies and programs. Refugee camps or suitable accommodations for internally displaced people are prepared by the National Commission for Refugees (NCFR) [90]. The federal ministry of environment was established by the federal government in 1999 to oversee environmental challenges, including floods. In addition to assessing the flooding potential of watersheds across the country, the ministry determines, designs, develops, authorizes, and/or develops appropriate flood mitigation measures [90]. After these were established, the 36 states of the federation of Nigeria then established respective state ministries of environment. Leadership and strong political commitment are essential for greater policy coherence [86]. There are clear indications that in recent times the government of Nigeria is committed to manage flood and other environmental challenges. Prioritizing policy objectives requires clear, public political commitment at the highest level. Local, state, and national commitments must be translated into concrete measures and actions in line with the ministries' mandate.

Flood policy integration in Nigeria

Integration is facilitated by policy coherence [92]. In respect to flood management and control policy, programmes and plans integration exist usually between the three tiers of government federal-to-states and states-to-local governments. In case of floods that exceed the capacity of state governments, the federal government steps in to assist [93]. A variety of aid is provided, such as relief materials, food, drugs, and resettlement services e.t.c. [69]. There is no clear evidence of synergies between policies, plans or programmes between federal and state agencies and ministries in dealing with flood disaster. The Nigerian Meteorological Agency (NiMet) translates flood predictions to various agencies, ministries and public to prepare for the flood [94]. Unfortunately, we only see government presence when the flood had already occurred [95]. It is difficult for existing government bodies to coordinate and integrate flood control initiatives because they often operate independently of one another.

Long-term planning horizons

The trend of climate change which trigger flood as result of overwhelming rainfall requires long-term planning and precautionary decisions and mechanisms to maintain

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commitment over time [96]-[97]. In Nigeria, government decision making rarely goes beyond the electoral cycle of four years which is insufficient time to take intergenerational and long-term considerations into account [98]. We have seen lack of continuity of some projects, programmes and policies initiated by previous governments in both federal and state levels which hamper long-term planning in flood control and management [99]. Currently, in Nigeria there is no long-term planning for flood risk reduction and resilience [100].

Policy effect

As mentioned earlier there is no flood policy in Nigeria therefore there was no any assessment as of now. However, after the most devastated flood in 2012 the country set a committee for post-disaster assessment and forward recommendations to federal government [83]. Over 430 people died and over 566,466 were displaced in Nigeria in March 2012 from serious flooding [101]. This flood was as result of overwhelming rainfall and the the release of excess water from the Lagto Dam into river Benue from the Republic of Cameroon [101]. By October 2012, more than 7.7 million people in Nigeria had been affected by floods, and more than 2.1 million were internally displaced [102]. The flood caused damage or destruction to over 618,000 homes and killed more than 363 people [103]. Other report gives different figures, for example, the impact of the 2012 flooding was very high in terms of human, material, and production loss, with 363 people killed, 5,851 injured, 3,891,314 affected, and 3,871,53 displaced [104]. From November to December of 2012, Nigeria conducted a Post-Disaster Needs Assessment to assess the flood damage and losses and estimate the socioeconomic impact of the floods [105]. There was no assessment on policies and programmes directly or indirectly related to flood such as climate change policy to ascertain their effectiveness in flood risk reduction and resilience. Enhancing policy coherence requires enhancing capacity to measure policy impacts. Identifying trans boundary impacts and refining or reprioritizing policy objectives can help inform decision making [86].

Subnational/state and local involvement

In the SDG 2030 Agenda, government and public institutions are urged to collaborate closely with local and state governments on implementation policies for development [86]. State and local governments are essential for delivering a wide range of public services in flood risk reduction [106]. Local governments have a unique position to identify and respond to flood disasters since they are the closest level of government to the people [107]. States and local governments identify and coordinate disaster resources, assist local agencies in preparing a local disaster management plan, and manage local disaster operations [69].

Stakeholder engagement – pre and post flood

It is imperative that businesses and industries, civil society, science and academia play a key role in reducing flood risk and increasing resilience [86]. In addition to mobilizing resources, providing solutions and innovations, and advocating and ensuring accountability, these activities enable under-represented communities to express their concerns and needs [86]. Abdulmajid et al. [108] disclosed stakeholders support and engagement are usually form of clearing of waterways, early warning system, evacuation, development control, rehabilitation of flood affected areas, provision of building materials, public awareness, enhances the resilience of communities to flood disasters, and enables them to respond, recover, and endure. In addition, the stakeholders provide food, clothes temporary shelter, money and medicals to marginalized and vulnerable groups in the societies that are affected by flood. Nigeria has traditionally focused on flood response after disasters rather than pre-disaster such as flood control. As part of the Nigerian government's disaster risk management agenda, reducing flood risk has become a national priority [93]. In a country like Nigeria, stakeholder consultation is paramount to the

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formulation, implementation, and monitoring of national flood plans and strategies. In general, institutional stakeholders do less than necessary when it comes to proper management, which includes; mitigation (flood risk assessment, planning, and sensitization), preparedness, response to flood hazards, and recoveries, such as rehabilitation and reconstruction [108].

Monitoring and reporting

In Nigeria, one of the most lacking aspect in flood risk reduction and management is monitoring and reporting [64]. The flood monitoring system is not holistic and no institutional coordination among agencies that concern with forecasting and monitoring of flood and other climate disasters [69]. NIHSA and NiMet provide weather forecasts, especially those regarding flooding, but the system for monitoring flood disasters is ineffective [93]. The monitoring of floods was conducted in a standalone mode by several agencies and institutions, which collected data, forecasted, disseminated warnings, and prepared emergency responses. The country requires coordinated flood monitoring and early warning systems for the reduction of flood disasters [109]. In most river systems across Nigeria, there are no functional water level gauges, while the rivers that have stage and discharge stations are not integrated [110]. Majority of river basins in the country have inadequate hydro meteorological data collection and monitoring for flood warnings [111]. To ensure coherence in flood monitoring, governing bodies should monitor progress, report to the public, and provide feedback to allow actions and sectoral policies to be adjusted accordingly [86]. It is possible to collect evidence on the effectiveness of institutional mechanisms in order to coordinate policy and facilitate more integrated approaches for flood monitoring, as well as critical trade-offs and synergies between policies across different domains, by using monitoring and reporting systems.

Flood governance, Institutional structure and responsibilities

The institutional structure in (Figure 1) concern with ministry of environment. Outside ministry of environment there are other agencies such NIHSA (NIHSA annual budget USD 2,488,048.23 in 2017) [112] under ministry of water resources and NiMet (annual budget NiMet USD 12,895,027.67 in 2020) [113] under ministry of aviation mainly concern with forecasting. The federal ministry of environment oversees the climate related disasters such as flood and design policy, plans and programmes to monitor manage and control climate disasters. In this study, we are not assessing the strengths and weaknesses of the major organs involved in planning and managing flood disasters in Nigeria. Instead, emphasize these institutions' structures and functions.

Four divisions were established under the Erosion, Flood and Coastal Management department of the federal ministry of environment (see figure 1) (i) coastal zone management: flood control and erosion control along the national coastline, (ii) flood forecasting, monitoring and control: concerned with forecasting of anticipated flood event (iii) erosion control and monitoring: responsible for controlling and monitoring inland erosion across the country (iv) water management and harvesting: in addition to interbasin water transfer, this division has a mandate to prevent flash floods by harvesting water from microcatchments etc [114].

The department of erosion, flood and coastal zone management is mandate to coordinate and formulate policies and programmes in flood forecasting, prevention and control [114]. Initiate and execute measures to minimize flood and coastal degradation, create awareness and practices that minimize flood and coastal degradation. Develop integrated biotechnological measures for managing of flood hazards, national policy formulation on flood, flood forecast, prediction and early warning and flood hazard vulnerability analysis [115]. Flood water can be used to recharge surface aquifers under water harvesting management. The Water Enabler Compact (WEC) of Technologies for African Agricultural Transformation (TAAT) was used in Jigawa state to provide water harvesting initiatives [116]. Over 600 constructed underground reserviors were constructed to harvest

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water at strategic locations in the state [117]. These projects are no longer existing due the lack of continuity from the successive governments.

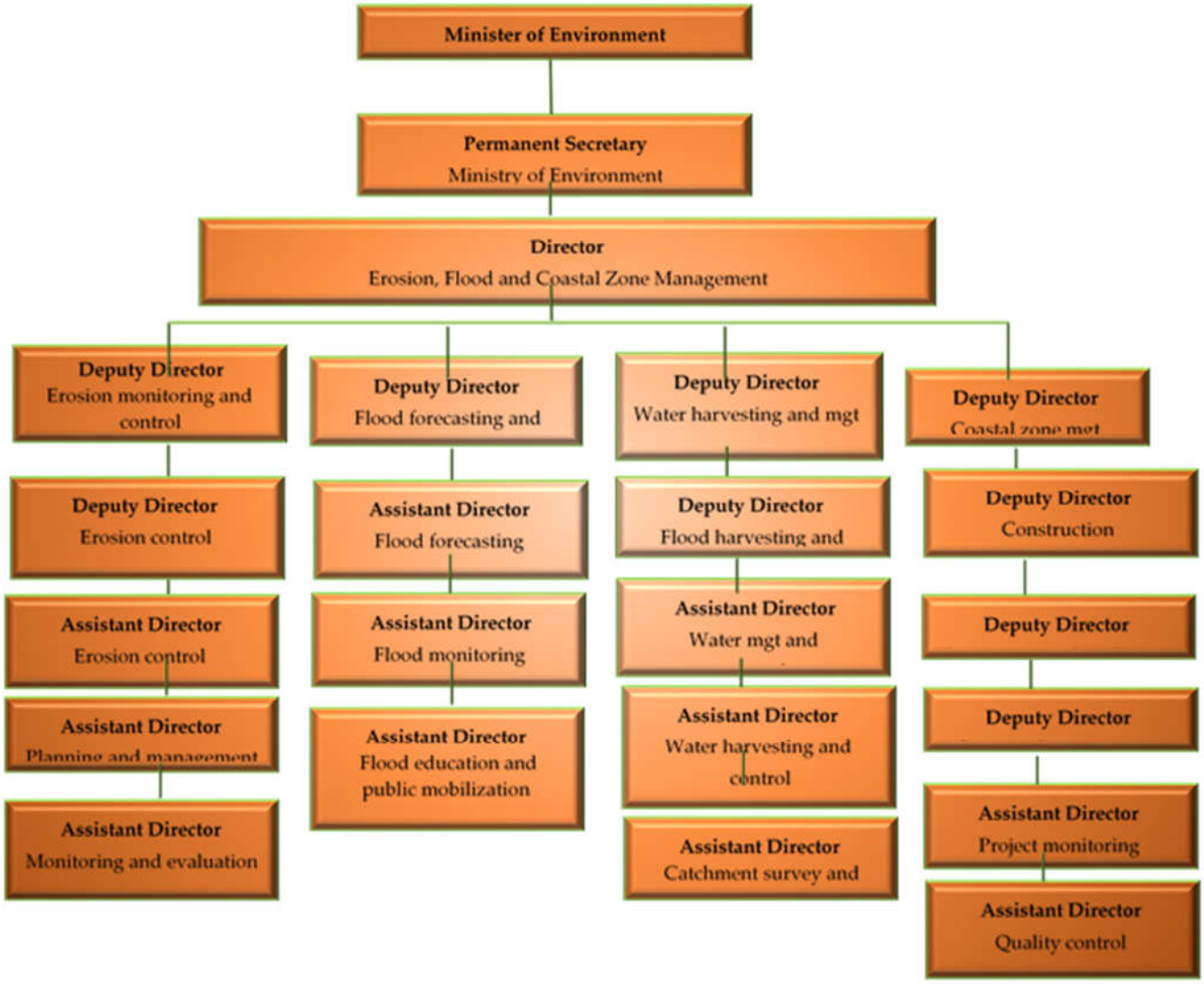

Figure 1. Institutional Structure of Flood governance in Nigeria.

Federal government through ministry of environment and other related agencies play major role in flood governance, risk reduction, monitoring and management. These included raising general populace awareness and fostering understanding of environmental connections. Developing partnerships with environmental NGOs, MDAs, and private sector. A flood relief system and emergency flood management have been developed, and funding and aid delivery systems have been developed to assist victims after a disaster usually through NEMA [118]. Figure 2 illustrates the role of federal government in flood governance, risk reduction, and policy coordination.

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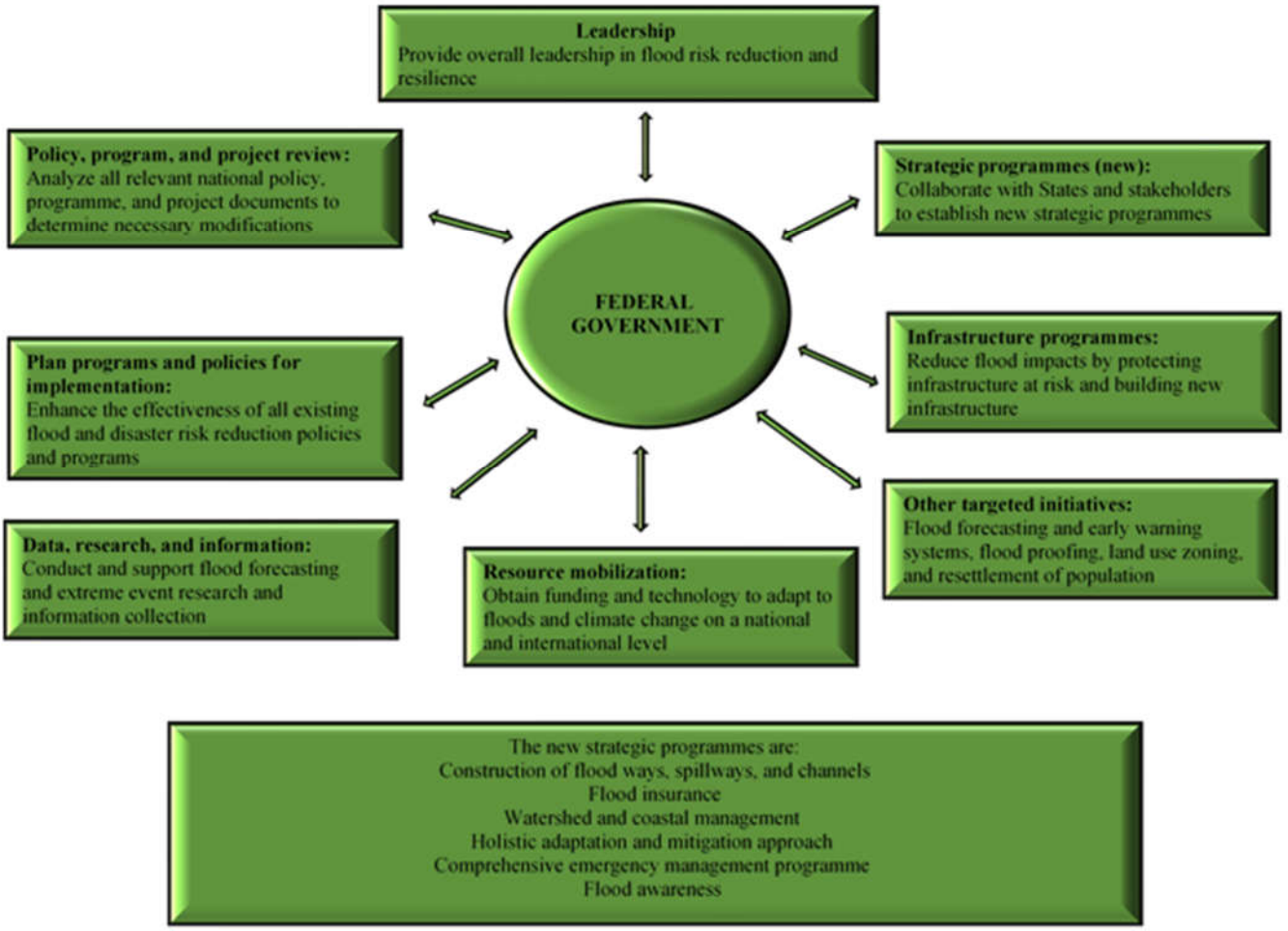

Figure 2. The role of federal government in flood governance, risk reduction and policy coherence.

At the 36 states of the federation there are ministries of environment that manage and control flood and environmental hazards. Some states, apart from ministry of environment they have other agencies that directly or indirectly manage and control flood. For example, Lagos state has Lagos State Environmental Protection Agency (LASEPA) and Jigawa state Environmental Protection Agency (JISEPA) among others [119]-[120]. Many states have also established state emergency management agencies (SEMA) to formulate policies and coordinate disaster response plans. Although there is no category or demarcation of the level of disaster in which the federal government can take over flood operations. The role of state governments in flood governance, risk reduction, and policy coherence is illustrated in Figure 3.

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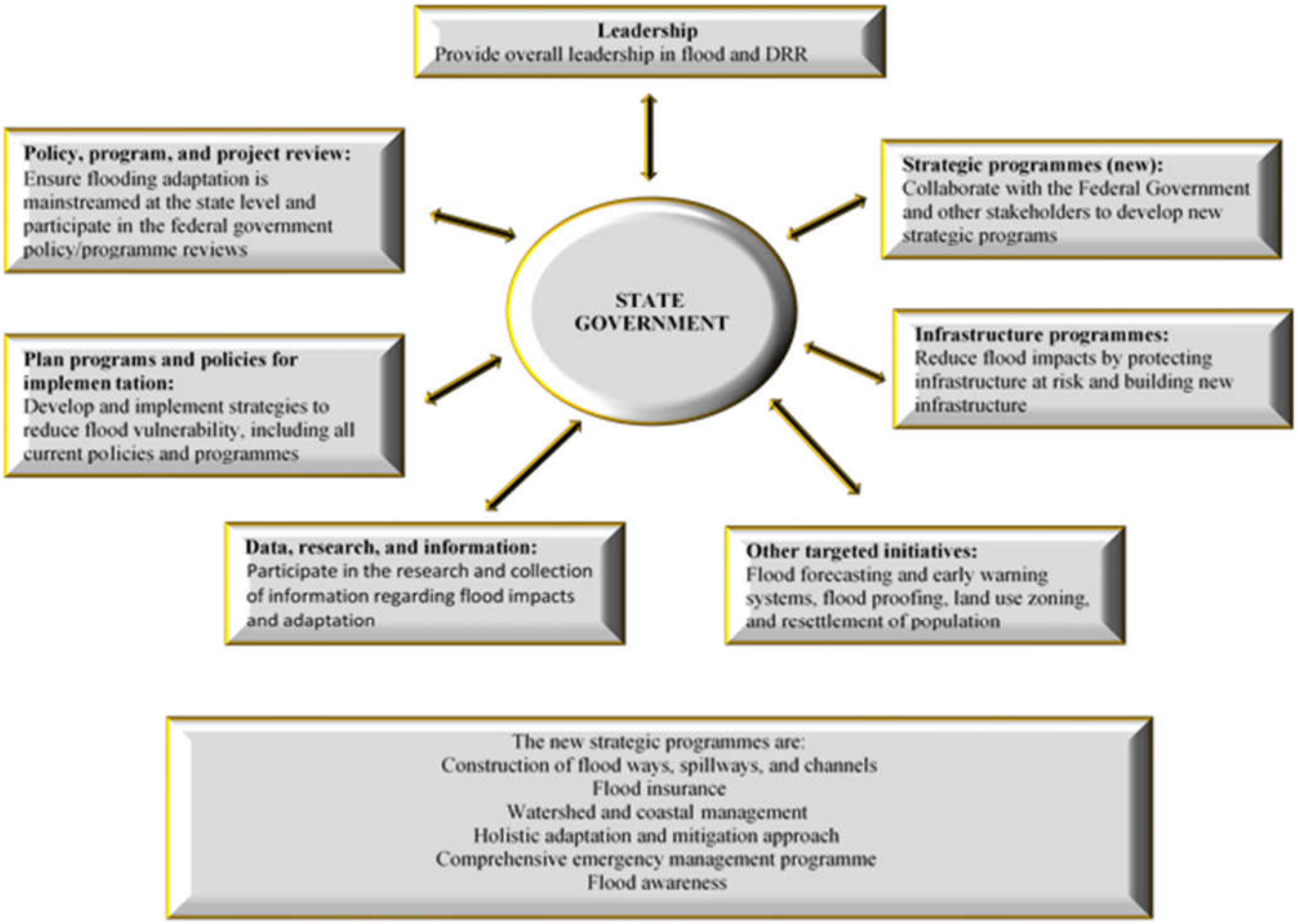

Figure 3. The role of state government in flood governance, risk reduction and policy coherence.

The local government is uniquely positioned to offer support in the event of a flood due to its first-hand knowledge of the needs of the community on social, economic, infrastructure, and environmental levels. Under disaster management, local governments are responsible for disaster response, approval of a local disaster management plan, and prompt sharing of local disaster information with the local flood disaster coordinator [121]. In addition, local flood disaster management groups should also be established in order to review, develop, and assess effective flood management practices, assist local governments in preparing local flood management plans [122]. Manage local flood operations and ensure local flood disaster management and flood disaster operations integrate with state disaster management [123]. Make sure the community is prepared to respond to a flood disaster, identify flood disaster resources, and coordinate flood disaster response. The functions of local governments in responding to flood and other disasters is minimal due to lack of capital as a result of joint-account between states and local governments. Temporarily, flood victims take refuge at nearby schools in flood-free areas [124]. The role of local governments in policy coherence, risk reduction, and flood governance is illustrated in Figure 4.

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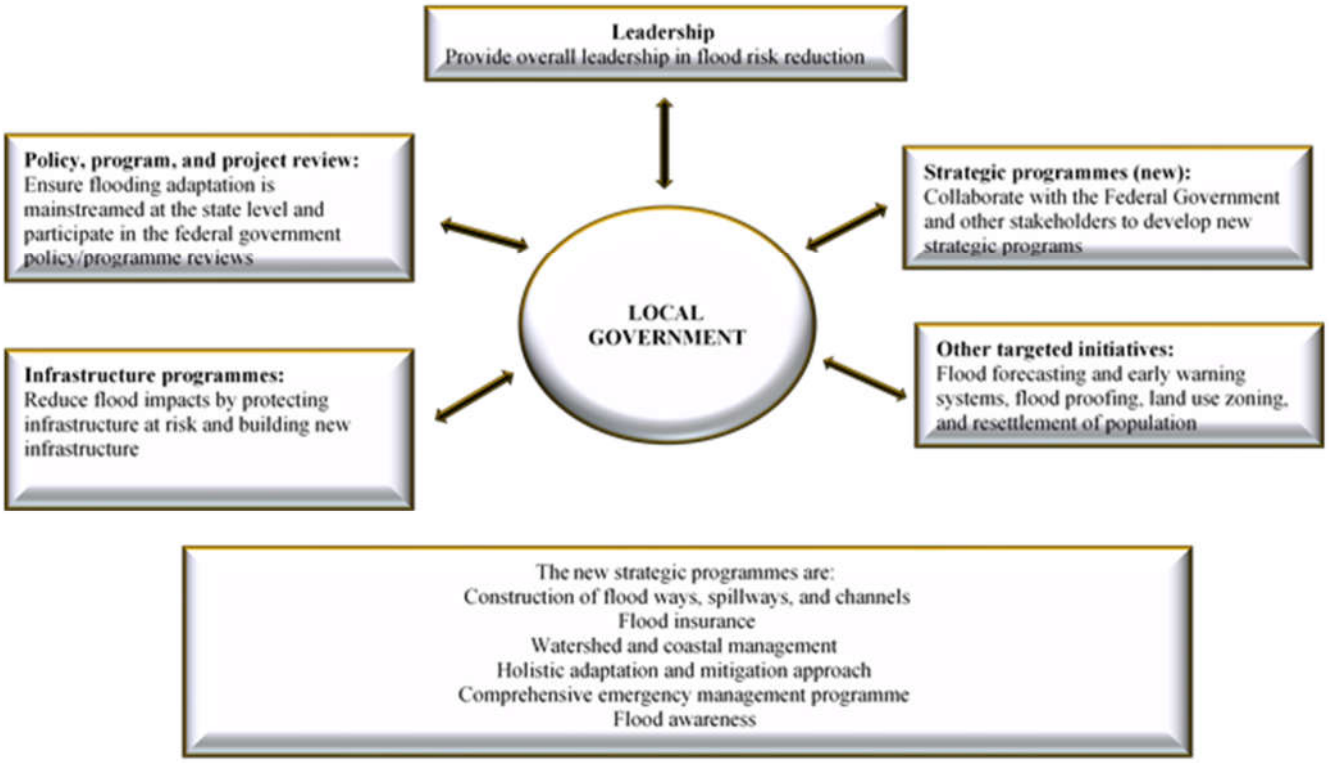

Figure 4. The role of local government in flood governance, risk reduction and policy coherence**.**

Civil Society Organization Engagement Can Strengthen Flood Governance, and Risk Reduction

Changing flood disaster narratives can be achieved in part by civil society groups (CSOs). They are effective implementers, expert, watchdog, capacity builders, definer of standards, representative, citizenship champion, solidarity supporter, knowledge brokers, incubator, service provider, connectors, and advocates because of their strategic relationships with policymakers, communities and extend local and global reach [125]. As first responders to flood disasters and knowledge keepers for local areas, CSO volunteers are the first responders to flooding. It is crucial for CSOs to ensure that flood relief facilities are designed to benefit flood-affected people, particularly women, children, people with disabilities, and other marginalized groups [125]. However, the CSOs should contribute to formulation and implementation of national policy priorities and evaluation of the impact of the policies and the mechanism of policies implementation. Ensure effective vulnerability assessment of present and anticipated flood-hazard on population [125]. Ensure building resilience to the affected communities by improving social protection schemes and gender inclusivity in participatory flood governance discourse. In addition, CSOs strengthening flood governance, contingency planning, preparedness, early action and delivering humanitarian response. Usually, CSOs are able to access remote areas and respond on time to flood disasters. CSOs enhance flood governance, monitoring, and evaluation as well as transparency and accountability which drive performance and reduce risk. Hillier and Vaughan [125] point out that CSOs have extensive experience in flood disaster risk reduction and microcredit, with strong ties to their communities. The role of CSO in policy coherence, risk reduction, and flood governance is illustrated in Figure 5.

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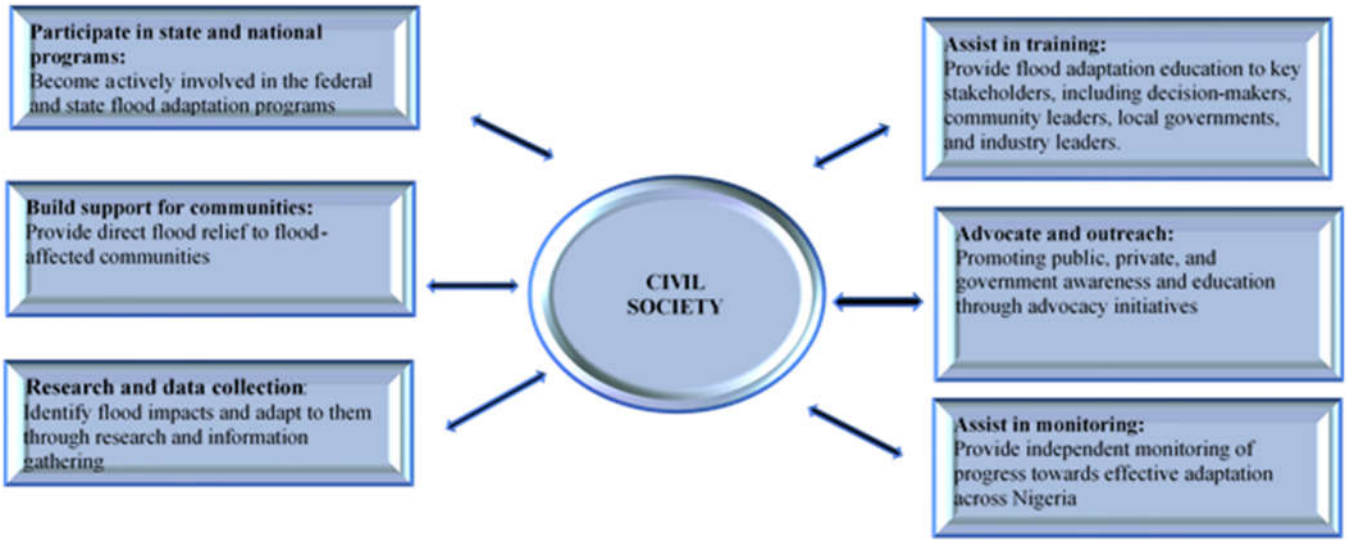

Figure 5. The role of civil society in flood risk reduction and policy coherence.

Organization Private Sector Engagement Can Strengthen Flood Governance

As pointed out by Chandra et al. [126], a variety of ways are provided by the private sector to assist flood-damaged communities in the recovery process, including "early response, long-term recovery, collaborating with the public sector, driving innovation and facilitating technology use, helping smaller communities manage the influx of funds, and supplementing federal disbursements". Therefore, there is a need for private sector involvement in developing and implementing flexible financing models [126]. In addition, it plays a crucial role in the development of flood resilience over time [127]. Further, the private sector increases efficiency and effectiveness when it comes to flood disaster management, reduces the burden placed on the government, and tracks funding flows and timings [128]. Figure 6 illustrates how organized private sector plays an important role in the reduction of flood risk and in the coordination of flood policy.

Figure 6. The role of organized private sector in flood risk reduction and policy coherence.

Citizen Engagement in Flood Governance

Hillier and Vaughan [125] argued that by targeting and implementing interventions more effectively and monitoring government and service provider performance more closely, citizen engagement can improve development outcomes in flood governance. Flood-disaster interventions can improve the intermediate and final development outcomes by providing citizens with policy dialogue, programs, projects, advisory services, and analytics [129]. Therefore, the 'dimensions of Citizen Engagement' demonstrates how

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the intensity of public participation increases from 'inform' to 'consult', 'collaborate,' and finally 'empower' [125]. Flood hazard mapping involving citizen is an example.

Policy synergy: linking policies for coherence

To achieve Pareto optimality and improve policy efficiency, policy synergy involves coordination of multiple policies to achieve different policy objectives [130]-[131]. Presently, there is no synergy between flood management programs and plans of action and other disaster related policies as well as insurance policies in Nigeria. A number of factors hamper policy coherence in flood management, including inconsistencies and rigidity within the institutional structure that governs sectoral policies, vested interests, and perverse incentives, as well as differences in policy goals [41]. In order to promote long-term, human-centered, and resilient flood recovery, it is important to build synergies between the flood plan of action and disaster risk reduction. For Nigeria to achieve an effective flood-disaster management policy, political and legal commitment was required, public awareness, scientific knowledge was required, careful planning for development was necessary, policies and legislation were enforced responsibly, early warning systems were essential, and disaster response mechanisms were essential [132]-[133].

Institutional synergy: linking institutions for coherence

In order to reduce flood risk, government agencies, ministries, and other key stakeholders must establish appropriate coordination mechanisms to share information, define responsibilities, and allocate resources efficiently [86]. To reduce risks associated with weather related disasters, both Nigeria Meteorological (NiMet) and Nigeria Hydrological Services Agency (NIHSA) services and disaster managers such as National Emergency Management Agency (NEMA), Federal Emergency Management Agency (FEMA) State Emergency Management Agency (SEMA) must work in synergy and propose work under one ministry to aid synergy and coodination. This will assist in better national prevention, preparedness, and response strategies". In order to minimise the risk of weather disasters, government agencies, particularly those responsible for disaster management, need to work together in synergy. NiMet recognizes the importance of synergies between disaster and climate related organizations and partnered with some federal and state institutions, including the Nigerian Maritime Administration and Safety Agency (NIMASA), the Federal Ministry of Agriculture and Rural Development (FMARD), as well as nongovernmental organizations like Human and Environmental Development Agenda (HEDA), Agro-Processing, Agricultural Productivity Enhancement and Livelihood Improvement Support (APPEALS), International Fund for Agricultural Development (IFAD), Value Chain Development Programme (VCDP), and Livelihood Improvement Family Enterprises Project for the Niger Delta (LIFE-ND), as well as state airports like Asaba and Anambra [134]-[135]. By working together, institutions can enhance coordinated disaster management, reducing risk, controlling and managing floods, reducing costs, and enhancing opportunities for growth in Nigeria. It is important to engage a broad range of government departments and stakeholders in ensuring that a holistic perspective is taken, that diverse interests are heard, that potential trade-offs are addressed, and that public awareness is raised [86].

Effectiveness of flood governance

At different levels of government, flood governance is considered effective when it defines clear sustainable flood policy goals and targets, implements these policy goals in a manner that meets expected objectives or targets, and assesses the strengths and weaknesses of institutions and policies [136]-[41]. Could link with country SDG2030 commitment? In terms of meeting reduce number of fatalities during disaster

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The strengths and weaknesses of institutions and programs/policies

The identified strengths of institutions and policies in flood governance include having plan of actions and establishment of flood disaster framework, response plan, preparedness plan and flood control regulations. As a result of the law establishing flood-related institutions, these institutions are subject to safeguards that seek to ensure their durability and the extent to which these rules are followed in institutional practice and enforcement [137]. Institutional weaknesses include lack of define flood policy, decentralization of flood-disaster management, lack of resources and planning, coordination, distribution, awareness, education [138], rivalry between governments or agencies, underfunding in institutions, administrative capacity and corruption in bureaucracies, as well as a lack of enforcement powers [67]. In addition, there are poor attitudinal disposition on the side of Nigeria, low institutional/staff capacities [67], financial recklessness, corruption, abuse of budgetary procedures, as well as failures by Ministries, Departments, and Agencies to follow due process during appropriation processes. lack of updating the flood plan of action to meet the present challenges, obsolete tools, top-bottom approach, no centralize flood adaptation and mitigation activities, relief materials provided are not based on actual assessment and there is genuine reconstruction plan. In different contexts, different strategies are needed due to the physical conditions and existing institutions [139]. Therefore, Nigeria may benefit from Japan's flood disaster response strategies, policies, and plans.

The need to improve flood governance

The conventional approach (dams, dikes, embankments, levees etc.) in flood management in Nigeria needs to be integrated into more comprehensive multifaceted governance approach [41]. To include structural and non-structural measures for flood prevention. Rees [140] argued that conventional approaches cannot be stand alone as the basis for flood governance and decision making. These conventional approaches do not encompass stakeholders, lack of holistic connections with policies, cost expensive "incompatibility between water and land management, technical and methodological challenges [41]. In order to manage flood risks, trans-boundary, national, regional and local arrangements must be made that are resilient to uncertainty and complexity [141]-[142]-[143]-[41]. An integrated approach to flooding that incorporates territorial specificities is necessary, rather than a single governance response [41]. It is important to design governance systems in accordance with the challenges they need to address [143]-[41].

The need for institutional and policy coherence in flood governance

Policy coherence cannot be achieved through one-size-fits-all approaches [86]. Institutional mechanisms and sequencing of actions must be determined [86]. Coherence among institutions and policies can enable goal areas to be identified, trade-offs to be managed, synergies to be promoted, and negative effects to be addressed. By assessing how efforts to attain a target in one sector could affect efforts in another sector. For example, some support programmes in urban planning such drainage construction would help in managing urban flood. In addition, environmental impact assessment policies provide mechanism in assessing the impact of projects on flood and blockage of water-ways. These can help in managing and control of flood. In Nigeria, these kinds of project are usually done by ministries of works and water resources. These highlights the needs for policy coherence and synergies between these two ministries and the ministry of environment. Coherence can minimize negative effects and obstacles to flood management and control in Nigeria by avoiding contradictions, addressing inconsistent policies, and reducing inefficient spending. Institutional and policy coherence can assist policymakers in better understanding how their current policy choices affect anticipated floods in the face of climate change, as well as how their choices may impact wellbeing and sustainable development in Nigeria [144]-[86]-[41].

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Policy recommendations, research gaps and research needs

Flooding is one of the most severe challenges Nigeria faces, and it is projected to become more serious as climate change unfolds. As a critical issue, flooding is recognized at all levels of the Nigerian government as well as by non-governmental organizations and individuals. It would be helpful for Nigerian federal government to draft a national policy on floods through the Federal Ministry of Environment, in collaboration with other agencies, since the country does not have a flood policy at the moment. This is anticipated to provide holistic approach on flood governance and management. A flood policy can contribute to planning, analysing, researching, demonstrating, and evaluating the flood risk. In various areas of government policy, the government should identify conflicts and synergies that affect flooding risk. To achieve this, governments should improve their leadership capabilities in converging cross-cutting policy goals and identifying tradeoffs while also ensuring vertical alignment with global objectives. Flood risk management approaches must be developed based on the available evidence in order to be more cost-effective and sustainable. This should be done by focusing on the physical, social, and economic aspects of floods. A flood-resilient policy can be developed using this approach. With flooding changing, it is critical to review existing programs and approaches. An understanding of the spatial-temporal nature of flooding is necessary in order to reflect changing patterns of flooding. In designing and formulating policies, it is important to understand the differences between different types of flooding and the links between them.

In order to maximize impact and avoid conflicting outcomes, departments and institutions delivering flood risk, governance, and management initiatives should work more closely together and flood data should be made accessible for all. The flood policy should be better integrated across government agencies and actors to make it more effective. This should be given full consideration. In addition, we recommend that governments to address the strategic and implementation issues within the current planning system. Increasing public awareness about flooding and flood risk management should be a priority for the government and flood-related institutions. This study also recommends demarcation on the level of flood disaster by which state or federal governments can take over flood operations. Flood management governance and policy coherence will be informed by these recommendations.

In Nigeria, flood and flood-related studies focus on addressing the causes, impact, risk, remedy, management, adaptation and mitigation of floods. Other studies focus on occurrence, monitoring, assessment, evaluation, modelling and prediction of flood. This is the pioneer research that address flood governance and policy coherence in Nigeria. There are a lot of research gap in addressing flood from the policy, institution and governance perspective in the country. Future research should focus on investigating flood policy formulation, legislation, budget allocations, and oversight on flood hazards management. There is also a substantial research gap in flood insurance. Is there any flood insurance in Nigeria? Who purchases flood insurance, and for what reasons? how can government agencies relate better to local needs? In addition to assessing whether or not existing hazards-related programs are effective, institutions coordinating these programs must be evaluated for effectiveness. In order to determine flood hazards' relative success or failure, it will be necessary to establish criteria for evaluating programs throughout flood-hazard cycle. Flood guidelines and programs need to be re-evaluated for effectiveness. Further research is needed to determine whether flood risk management can be integrated with other forms of risk management. It is necessary to investigate further the planning, integration, and coordination of flood risk management programs as well as the legal aspects of flood risk management.

Conclusion

There is no doubt that flooding is the most widespread weather-related hazard in the world. A catastrophic event can cause death, property damage, and critical infrastructure

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damage to public health services. Flood policy and governance entails the need of a coordinated system in dealing with this natural disaster. Herein we examine how flood governance and policy coherence are approached, as well as institutional design and implementation for coherence in Nigeria. The country is lacking define policy objective in flood policy and governance. Flood Policy provides guidance, consistency, accountability, efficiency, and clarity on how flood-related institutions operates. The coherence of flood policy contributes to achieving agreed objectives by integrating policy actions across different government departments and agencies. Despite the fact that, in practice, policy coherence in flood governance is compromised by a number of factors, including: policies and programs with differing objectives, perverse incentives and vested interests, inadequate consultation and coordination, and sectoral policies are governed by inconsistent and rigid institutional structures. Flood policy and governance is multifaceted and complex phenomenon therefore must be approach from multidisciplinary approach and perspective, and should be all encompassing.

Declaration

Ethics approval and consent to participate: The study did not use any human or animal data.

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Consent for publication: This study did not include any children or individual details.

Data availability statement: The references and data used in this study are cited and acknowledged. First authors or corresponding authors can obtain the data upon request.

Competing interest: There are no competing interests between the authors.

Author Contributions: "Conceptualization, A.A and S.S.D.; methodology, A.A..; software, X.AA.; validation, M.Y.I., and J.Z.; formal analysis, A.A.; investigation, A.S.Z.; resources, S.A.H.; data curation, M.H.A.; writing—original draft preparation, A.A..; writing—review and editing, A.A., S.SD..; visualization, M.H.A.; and A.S.Z.; supervision, J.Z and MYI.; project administration, S.S.D.; funding acquisition, Z.J.;. All authors have read and agreed to the published version of the manuscript.

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