

Climate Resilience in African Coastal Areas: Scaling Up Institutional Capabilities in the Niger Delta Region

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Abstract

African coastal areas are increasingly prone to coastal challenges. The Niger Delta coastal areas are exposed to physical alterations due to natural and anthropogenic influences. In addition to current and projected extreme events such as flooding, erosion, sea-level rise, and heat waves, other conflicting factors increasing the vulnerability of the coastal Niger Delta range from the rapid shift in demography, urbanization, unsustainable land use, and inadequate implementation of relevant policies to oil spillage and gas flaring. All these issues, in addition to climate variability, increase the vulnerability and threaten the resilience of the human and natural environment. This chapter highlights the effects of climate- and weather-related extremes in the vulnerable riparian Niger Delta, based on existing facts and an empirical study, which gives insight on institutional challenges derived from the views of relevant technocrats, nongovernmental organizations, and stakeholders. Analysis of stakeholder views indicates some weaknesses and potential strengths of relevant institutions in addressing climate change issues through effective governance. Hence, scaling up institutional capabilities would enhance the resilience of communities and improve adaptive capacities. Key strengths involve employing existing institutional frameworks under relevant MDAs to climate-proof future coastal, riverbank, or lakeshores development.

Keywords

African coast · Climate resilience · Institutions · Capabilities · Strengths and weaknesses · Niger Delta region

Introduction

Several studies have anticipated the severe impacts of climate extremes in the low-lying coastal settlements of developing countries (DCs). According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), African coastal zones are made up of narrow, low-lying coastal belt consisting of continental shelf and coasts of 32 mainland countries. Characterized by variety of ecosystems such as barrier/lagoons, deltas, mountains, wetlands, mangroves, coral reefs, and shelf zones. The width of the ecosystems in African coastal zones differs from few hundred meters in the Red Sea area and to larger ones spanning up to 100 km, for example, the Niger and Nile Deltas (IPCC 2007a). According to the IPCC, the East African coastal zones and wetlands include the near-shore islands off the coast of Tanzania and Mozambique and the oceanic islands of Madagascar, the Seychelles, Comoros, Mauritius, and Reunion. A large proportion of these coastal zones are vulnerable to various physical transformations including overexploitation of natural resources, pollution, biodiversity loss, and climate change. The Fifth Assessment Report of the IPCC reveals that the global coastal systems are sensitive to three major drivers, which are climate change related, including sea-level rise, ocean temperature, and ocean acidity.

Among these three key drivers, impacts of sea-level rise due to global warming are of more concern to the sustainability of coastal systems (IPCC 2014a). The United Nations Framework Convention on Climate Change (UNFCCC) posits that by the end of the twenty-first century, sea-level rise could affect low-lying areas and populations located in vulnerable coastal regions of Africa. The Nigeria's Niger Delta is one of the most important deltas in West Africa, in recent times, very vulnerable to potential effects of extreme weather, climate variability, and climate change (Federal Ministry of Environment 2015). The Nigeria's Nationally Determined Contribution (NDC) reemphasizes on the vulnerability of the Niger Delta to sea-level rise. It states that accelerated sea-level rise (ASLR) of about 0.5 m would lead to the loss of 35% of the highly productive part of the region's coastline, while ASLR of 1.0 m about 75% of the Delta coastline is expected to be lost by the year 2100 (Federal Ministry of Environment 2015).

The rationale behind this research is derived from the review of facts and information from Nigeria's Nationally Determined Contribution (NDC) to the Paris Agreement, which made specific reference to increasing coastal vulnerability in the Niger Delta due to global warming-induced accelerated sea-level rise (Federal Ministry of Environment 2015). Similarly, the findings from the various Fifth Assessment Report (AR5) of Intergovernmental Panel on Climate Change and Nigeria's NDC emphasized on the adverse effects of current and future climate impacts on coastal zones. In particular, the IPCC proclaims that up to 70% of the coastlines worldwide are estimated for a potential sea-level change within $\pm 20\%$ of the global mean (IPCC 2013, 2014b). In this regard, low-lying coastal areas especially those in coastal countries of West Africa are gradually witnessing flooding, submergence, and erosion and sea-level rise due to climate change and intense storms (IPCC 2014a, b). To this end, the significance of this chapter lies in giving perspectives on how existing and potential coastal governance structures could be strengthened to contribute to resilience mechanisms in the Niger Delta coastal zones, wetlands, riverbank, and lakeshores. In addition, it establishes how institutional weaknesses and challenges can be overcome to address risks brought about by current and expected climate-related events in the area. Furthermore, the study also extends to the need to strengthen institutional capabilities essential to apply the strengths to take advantages of potential benefits and how to overcome the weaknesses that could reduce the chances of maximizing essential resilience and adaptation opportunities.

Literature Review

Overview of Vulnerability of African Coastal Zones

African coastal zones cut across the continent extending from West Africa and Central Africa to East Africa and South Africa, Tanzania, Egypt, Mauritania, and Namibia. Climate impacts could "exacerbate existing physical, ecological/

biological, and socioeconomic stressors on the African coastal zones” (IPCC 2007a, 2014a). While the coastal zones in Africa were affected by climate change, the effects are likely to be incongruent as coastal countries of West Africa (West Africa’s Atlantic Coast) could experience more negative impacts than those in East Africa (IPCC 2007a, 2014a). The West African coastal zones are vulnerable mainly due to potential relative rise in sea level that could inundate and erode low-lying areas or increase coastal flooding and coastal erosion exacerbated by storm surges and intense rainstorms (IPCC 2007a, 2014a). In West Africa, the coastal zone hosts various economic activities that support the national and regional economic growth.

About 31% (105 million) of West African’s population live in coastal areas across sub-Saharan Africa (World Bank 2015, 2016). This population generates 56% of the region’s gross domestic product (GDP). The IPCC 2014 report pointed out that large urban centers located on mega-deltas (e.g., Alexandria in Egypt in the Nile Delta and Benin City and Port Harcourt and Aba cities in the Niger Delta region) would experience the impact of climate change. These urban centers are exposed to the challenges of urbanization through migration (IPCC 2014a). The West African coastal zones also accommodate important cities, ports, fisheries landings, and agro-industries. Moreover, estuaries and lagoons account for the huge agricultural production of the region including offshore petroleum exploration and production (World Bank 2015). According to the World Bank Report, the West African coasts account for 56% of West Africa’s gross domestic products. The World Bank Report also posits that “More than 1.6 million tons of fish are legally captured in West African waters each year, with an estimated wholesale value of USD 2.5 billion” (World Bank 2015).

In West Africa, a significant number of people who live and sustain their livelihoods in the coastal areas cut across coastal cities of Benin, Cote d’Ivoire, Ghana, Mauritania, Nigeria, Senegal, Sao Tome and Principe, Sierra Leone, and Togo. The changing climatic conditions, recurrent extreme weather, and their potential effects on sea-level rise amplify the overflow of water bodies and the probability of flooding in African coastal areas, as extreme flood events are expected to become more in many coastal areas accommodating vast population (AGRA 2014; Wetzel et al. 2012). According to a World Bank Report, about 500,000 people are affected by coastal floods in West Africa annually (World Bank 2016). A key challenge to resilience in Africa is its rapid urban growth. Urban growth can be seen as both an opportunity and a challenge (UNECA 2017). Urbanization in Africa is estimated to be about 40%. By 2035, Africa’s urban population could reach 49% presenting considerable demands on infrastructural services (UNECA 2017). Africa’s urban population is expected to triple in 40 years, from 395 million in 2010 to 1.339 billion in 2050, corresponding to 21% of the world’s projected urban population (Güneralp et al. 2017; UN 2014).

Projections indicate a whopping loss of 18,000 km² of West African coastline from a 1 m rise in sea level (World Bank 2016). Even though West African coastal areas are said to be more vulnerable, an impact assessment on coastal flooding due to sea-level rise in East Africa shows that by 2030, about 10,000–86,000

people would be affected, with an estimated economic cost ranging between USD 7 million and USD 58 million (IPCC 2014b). In this regard, the potential sea-level rise has affected several lagoons and mangrove forests in both East and West Africa and affects urban centers and ports, such as Cape Town, Maputo, and Dar es Salaam (UNFCCC 2007).

The challenges of urbanization may intensify as people migrate from low-lying vulnerable coastal areas to safer areas and from vulnerable rural coastal communities to urban centers to avoid the vulnerability created by extreme weather and coastal climate-related impacts (IPCC 2014a; Ogbonna 2014; Ogbonna and Albrecht 2015). For instance, the current rate of population growth in Nigeria and urbanization is a recipe to increase vulnerability, through inappropriate land use and waste disposal and land fragmentation that has become part of the urban fabric. This situation reduces the resilience to a range of climate risks. Some accounts of recent events are mind-blowing. For instance, the International Displacement Monitoring Centre (IDMC) and Norwegian Refugee Council (NRC) Report, published in 2013, clearly expressed the magnitude of damage brought about by floods which displaced several millions of people in some coastal, lakeshore, and riparian areas of Nigeria and Niger Delta in 2012 (IDMC 2013).

Some urban and rural settlements in Africa are already at risk of climate change-related extreme events from drought, heat waves, floods, inundation, and other hazards that may lead to changes in economic values (UN-Habitat 2011). The Nigeria's NDC posits that low-lying coastal settlements of the Niger Delta region of Nigeria could be vulnerable. In this regard, the IPCC (2014a) asserts that risk on coastal systems is attributable to integrating drivers' associated hazards, exposure, and vulnerability as indicated in Fig. 1.

The adaptation deficit for African countries with regard to coastal flooding is likely to reach over USD 300 billion (Hinkel 2011; IPCC 2014a). Yet, in several African countries, coastal policies have not considered longer-term climate change (Bunce et al. 2010; IPCC 2014a). Apparently, this is a huge threat to climate resilience in the continent. In this regard, the IPCC Fifth Assessment Report suggests that proactive planning by coastal communities in consideration of climate change moderates the risk of harm from such impacts (IPCC 2014a). According to the IPCC, proactive planning minimizes the need for a reactive response to the effects of extreme events. In other words, effective and proactive planning is expected to increase the resilience of the natural and human environment. Moreover, reactive planning could be more expensive and less efficient (IPCC 2014a). However, adaptation strategies can be used in reducing the hazards, exposure, and vulnerability that erupts because of the climatic changes (IPCC 2014a).

According to IPCC (2007a), responses for carrying out coastal adaptation would include protection, accommodation, and retreat (Fig. 2). These responses when conscientiously applied would make coastal zones, lakeshores, wetlands, and riverine areas more resilient. The big challenge is now shouldered on institutional capabilities and intuitive to apply such context-specific measures.

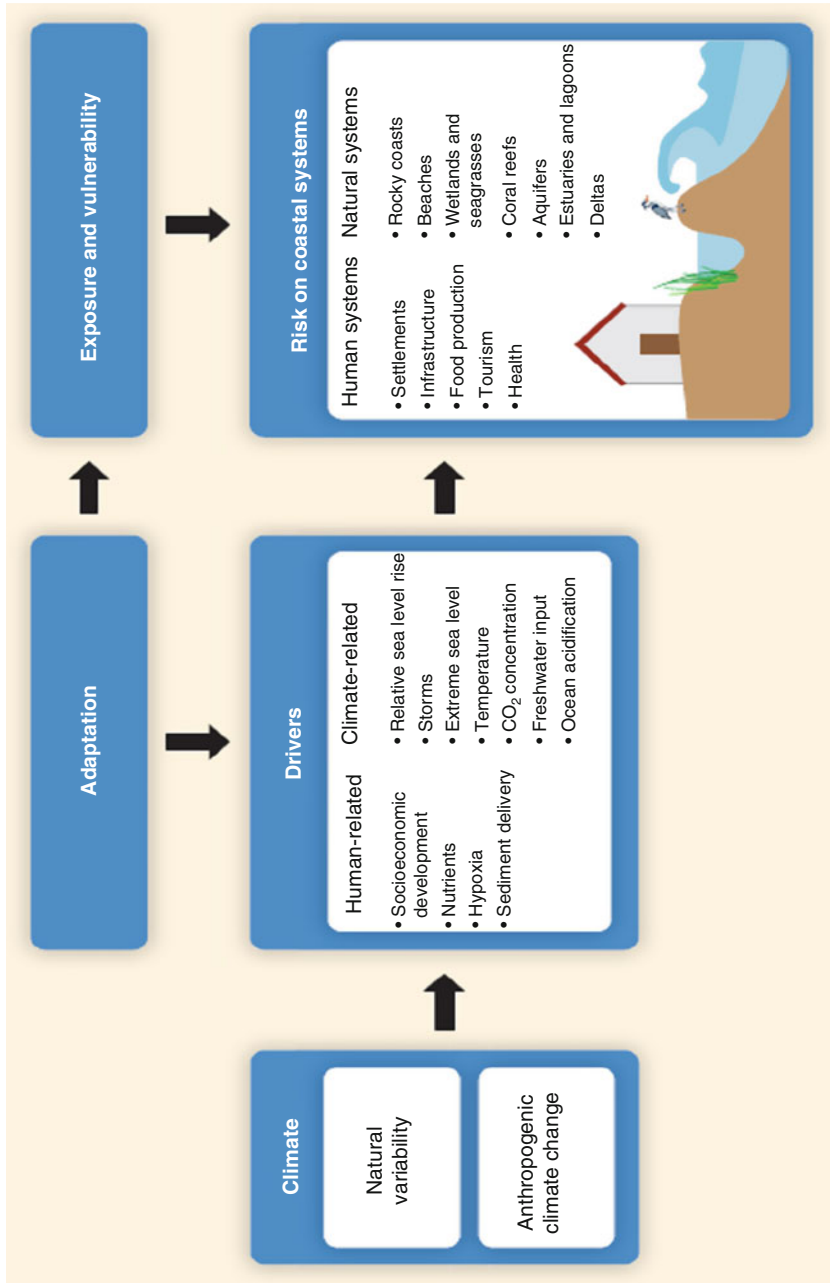


Fig. 1 Climate risk on coastal system. (Source: IPCC 2014a)

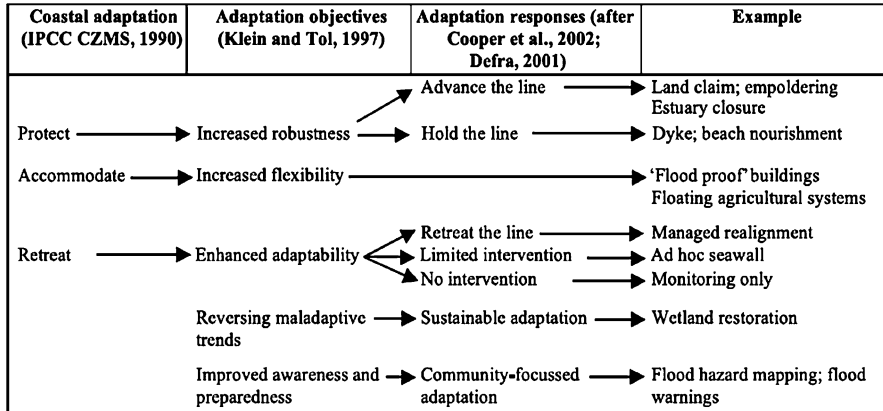


Fig. 2 Planned coastal adaptation actions. (Source: IPCC 2007b)

Climate Risks and Vulnerability in Niger Delta

The coastal wetland covers about 3% of Nigeria’s land surface (Delta State Government 2013). The Niger Delta accommodates a major part of Nigeria’s coastal and marine environment covering about 70,000 km² making it one of the largest wetlands in the world (FRN 2014). Nigeria’s Second Communication to the UNFCCC acknowledges the fact that the Niger Delta ranked highest regarding vulnerability when compared with other vulnerable parts of the country (FRN 2014). The vulnerability of the Niger Delta is aggravated by the challenges of climate variability, coastal flooding, and erosion due to rising waters as well as environmental problems and social impacts of oil and natural gas exploration and exploitation. The vulnerability of Niger Delta communities to climate variability and change exacerbates high poverty levels of rural people (Ogbonna et al. 2017). The expected effects and impacts on wetlands include siltation, which leads to the reduced capacity of lakes and rivers that sustain local communities and ecosystems (FGN 2015a).

Flooding has become prevalent in the coastal urban and rural areas of the region due to high precipitation and runoffs from rivers (Agumagu and Todd 2015). In fact, a rise in sea level of 0.462 m (above sea level) was recorded around the 1960s and 1970s (Boateng 2010). Sea-level rise is occurring and has reached several communities located close to shorelines; consequently, many coastal fishing communities have raised the foundation of their houses to keep them above unwanted water (Musa et al. 2016). The problem is worsened by the fact that the Niger Delta is the hub of Nigeria’s natural gas production as virtually all the oil and gas resources and mining infrastructures are mostly located on the coastal environment of the Niger Delta (FRN 2014; FGN 2010). The vulnerability of the region is also intensified due to the increasing trend in population growth and urbanization. With a rapid population growth of 2.9% per year in Nigeria with nearly 50% of the population, living in the urban areas portends increases in demand for public infrastructural services (BNRCC 2011; Ogbonna and Albrecht 2015).

Role of Relevant Institutions in Contribution to Climate Resilience

Initiating climate resilience strategies in a region or community entails engaging several institutions; therefore, cooperation and collaboration of various institutions are needed to take actions that focus on reducing the vulnerabilities induced by climate change. Pradhan et al. (2012) pointed out that a strong cooperation between different institutions functioning at multiple planning scales might perhaps result in better resilience and adaptation outcomes. In this regard, McGray and Sokona (2012) assert that a well-set institutional framework in response to climate change is a prerequisite in facilitating collaboration among relevant stakeholders who could offer robust decisions on a specific program across relevant sectors. In the face of climate change, institutions, especially affected ones, may need to adjust organizational rules and norms and adapt substantially to the adverse impacts of climate change.

Coastal Management in Nigeria

The federal government bestows the overall obligation to protect the coastal areas of Nigeria under section 20 of the Nigeria's 1999 Constitution which provides that the "State shall protect and improve the environment and safeguard the water, air and land, forest and wildlife of Nigeria." In this regard, coastal management falls on various agencies and all levels of governments in Nigeria. The Erosion, Flood and Coastal Zone Management of the Federal Ministry of Environment is responsible for controlling flood and erosion along the 853 km of the Nigeria's coastline. The National Environmental Standards and Regulations Enforcement Agency (NESREA) is tasked with the implementation and enforcement of relevant regulations for the coastal zone protection as contained in the National Environmental (Coastal and Marine Area Protection) Regulations 2011. According to Mwalimu (2009), the Nigerian Institute for Oceanography and Marine Research supports protection and monitoring of the coastal zone by providing relevant data that shows widespread erosion and flooding of barrier island as well as in the Niger Delta.

Mmom and Chukwu-Okeah (2011) averred that Nigerian policies on coastal development are not well linked to the nation's policy on the environment, as this does not provide a requisite attention to coastal zone management. In the same vein, the Economic Recovery and Growth Plan (ERGP) listed poor coastal management and weak environmental governance as major problems of environmental sustainability in Nigeria (MBNP 2017). The challenges of coastal management in Nigeria seem to revolve on duplication of duties, unclear responsibilities, and mandates. For instance, one of the challenges of applying the Land Use Decree of No. 6 of 1978 in reducing environmental degradation and coastal protection stems from duplication of powers and control rights, given to different tiers of government in Nigeria, which usually lead to weak enforcement and conflicting interest in control and management of land resources. In retrospect, the

litigation concerning the Attorney General of Lagos State versus Attorney General of the Federation in 2003, where Lagos State challenged the physical planning powers of the Nigeria federal government over land in the territory of Lagos State, is such an example of conflicting interests and institutional and administrative challenges. Such issues expressed in litigation could also be detrimental to reducing coastal vulnerabilities due to climate risks; hence, adaptation planning is stronger at the federal level due to financial prowess and institution capabilities, whereas relevant state and local institutions that are supposed to be closer to the grassroots lack appropriate capacities. Implementation of integrated coastal zone management in the Niger Delta has become urgent to improve the livelihoods of coastal communities while building the resilience of coastal communities.

Climate Change Resilience Responses and Governance in Nigeria

Nigeria became a signatory to the United Nations Framework Convention in 1992 as a Non-Annex 1 party and ratified the Kyoto Protocol in 1994 (FGN 2012). Nigeria is committed to fulfilling its national pledge under the Paris Agreement to reduce greenhouse gas emissions and adapt to climate change. The Nigerian government through its Ministry of Environment submitted its initial National Communication on November 17, 2000 and its second National Communication on February 27, 2014. The Federal Ministry of Environment plays a pivotal role in facilitating the provisions of the Convention and the Protocol in the country. In 2006, the Special Climate Change Unit (SCCU) was established under the Ministry of Environment for implementing the Convention and the Protocol. So far, the Ministry of Environment has focused on several climate mitigation options such as Clean Development Mechanisms (CDM) and reforestation strategies (FGN 2012). In the light of implementation purpose, recently the Special Climate Change Unit of the Federal Ministry of Environment was made a full-fledged department. Furthermore, a committee on Environment and Climate Change has also been established in the Nigerian House of Representatives. More so, some states, local government areas, and nongovernmental organizations in Nigeria are making efforts to enhance resilience strategies by introducing awareness campaign, for example, even though challenges remain.

Policy and Programs

In 2011, the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN) was published. The broad objectives of NASPA-CCN are to minimize risks, improve local and national adaptive capacity and resilience, leverage new opportunities, and facilitate collaboration with the global community, all to build resilience and to minimize Nigeria's vulnerability to the adverse impacts of climate change. On the other hand, the National Climate Change Policy Response and Strategy (NCCPRS) 2013 identified climate change as one of the major threats to sustainable economic development and human well-being. The policy documents also listed the coastal areas as the most vulnerable part of the country as it reiterates

the prediction that a 0.5–1 m climate change accelerated sea-level rise (ASLR) would worsen the existing environmental conditions of the coastal areas in Nigeria, particularly in the Niger Delta (FME-DCC 2013). This can have a pernicious impact on the socioeconomic sector and the economy of the Nigerian nation as oil mining and natural gas investments in the coastal Niger Delta amount to over USD 13 billion and such investments are already under threat due to the predicted sea-level rise and recurrent flooding (FME-DCC 2013; TACC 2013). The policy document seems to be comprehensive and inclusive therefore augmenting the existing national initiatives to adapt to and mitigate climate change, thereby initiating measures relevant for a resilient society.

Regulatory Response

The Nigeria's Legislative Council initiated the National Climate Change Commission Bill that has been passed by both Houses of National Assembly. The general goal of the National Climate Change Commission Bill is to establish the National Climate Change Commission as a statutory body, charged with the responsibility to regulate and coordinate policies and action plans on climate change and other environment-related matters. The Bill is **still for too long** pending for presidential assent. Nigeria lacks a comprehensive national climate change law to support the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN), but there are a number of environmental legislations and policies, which could be relevant to enhance resilience of coastal and natural environment in the region. However, it is assumed that the new Climate Change and Green House Gas Emission Reduction Bill of 2016 being considered at the National Assembly would support the implementation of the National Adaptation Strategy. The Climate Change Bill of 2016 is an act to provide measures to address climate change with a view to assist in achieving a sustainable future for the country. The Climate Change Bill has passed its second reading at the National Assembly (SFRN 2016). It is expected that such Climate Change Bill will support the achievement of the relevant policies and strategies by facilitating the early development of policies and programs with a focus on addressing climate issues and building resilience of the entire country. The National Assembly adopted the National Policy on Climate Change in 2012; the country also joined other parties in submitting the Nigeria's Nationally Determined Contribution in 2015 in view of achieving the goal of the Paris Agreement. In addition to strengthen its commitment to pursuing climate resilience goals, Nigeria signed the Paris Agreement on September 22, 2016, and ratified it on May 16, 2017, which entered into force on June 15, 2017.

Case Study and Method

Niger Delta pertains to Delta of the Niger River situated on the Gulf of Guinea on the Atlantic Ocean in Nigeria. The Niger Delta is centered right on the Atlantic Coast, where Niger River splits into numerous tributaries.

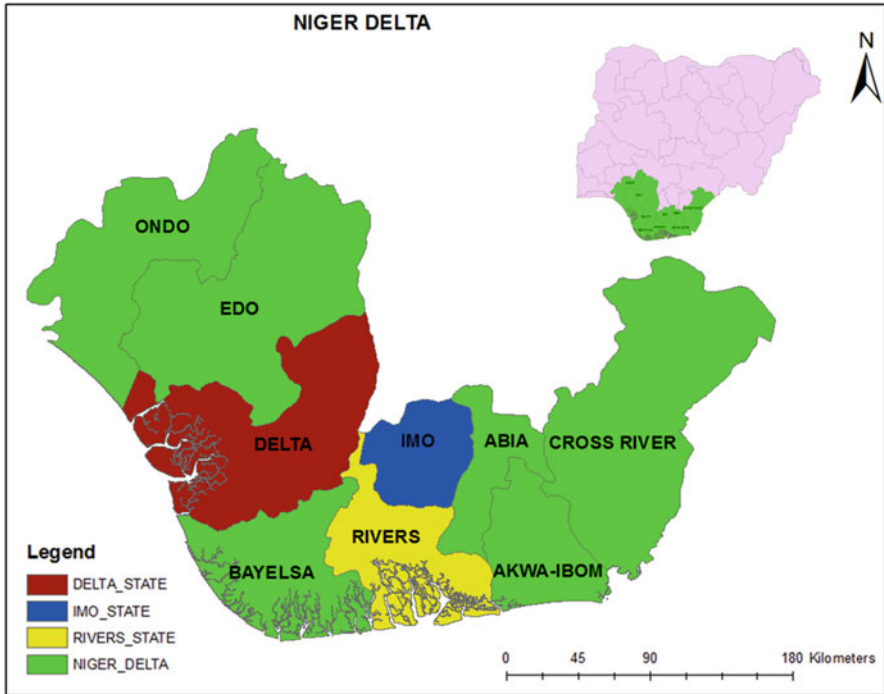


Fig. 3 Map of Nigeria

The area is bordered to the south by the Atlantic Ocean. Figure 1 depicts a map of Nigeria indicating the study area. Nigeria's population is currently the seventh largest in the world; it is estimated to be about 191 million in 2017 (UNECA 2017). Average growth rate of urban population by settlement size from 2010 to 2020 indicates that Port Harcourt is growing at the rate of 6.83% (Bloch et al. 2015). Estimates show that the population of the Niger Delta region could reach about 40 million by 2020 (FRN 2006). The region accommodates about 25% of the country's population and various economic opportunities and resources (FRN 2014). The Niger Delta region is a multicultural region having more than 140 ethnic groups comprising the Annang, Ibibio, Efik, Ijaw, and Igbo people, speaking about 250 dialects (Oyewo 2016). The region is one of the world's largest wetlands with significant biological diversity (UNDP/GEF 2013). The region is made up of nine states (Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo, Rivers States); for the purpose of this research, four states where extreme weather and climate impacts have become visible were purposively selected including Bayelsa, Delta, Imo, and Rivers State. Climate resilience approach is therefore imperative to reducing coastal and estuarine decadence in the selected states (Fig. 3).

Description of the Method

The research is based on extensive literature review, legal analyses, and primary data obtained from interviewing relevant stakeholders. Responses from the interviews were coded, transcribed, and grouped into qualitative themes and analyzed descriptively. The chapter stems from the academic research of the first author in the Niger Delta region of Nigeria, which was conducted in 2014 with a follow-up study in 2016. One of the limitations of this chapter is not being able to assemble stakeholders for group discussions. This is because of time constraints on the part of the stakeholders and convenience of the researcher and the interviewees. The interviews targeted stakeholders who are more or less directly involved in environmental management in their various ministries, departments, and agencies (MDAs).

Semi-structured Interviews

This chapter adopted a case study approach. In this regard, semi-structured interviews were crucial data collection method for this study (Barnett et al. 2013). Climate resilience and adaptation policy research is still a relatively new concept in the areas visited; thus, a semi-structured interview was preferred. Interviewees exist as anonymous in the data set for ethical reasons and were represented thus (R#1), meaning the first respondent on the interview list. The study also relied on the analysis of various secondary materials and literature including available climate change policies existing in various states. A variety of sampling techniques were employed to elicit the stakeholders' opinion. For instance, **snowball sampling** was very helpful in connecting different sectors and stakeholders that could provide expertise information relevant to the research in the respective study areas. The interaction with the stakeholders was helpful to elucidate and understand the strengths and weaknesses of institutions in the study areas. The data elicited from relevant institutions were analyzed qualitatively to determine the strengths and weaknesses of relevant institutions in carrying out resilience and adaptation strategies. As climate change resilience and adaptation in the study area involve strategic initiatives, it may be essential to identify institutional strengths and weaknesses.

Characteristics of Institutional Respondents

The stakeholder interviewees included government officials from several government institutions, NGOs, university professors, and environmental consultants. Fifty-two experts who could give relevant information on climate change resilience and adaptation participated in the research. The breakdown of the participants who took part in the interviews is presented in Table 1.

Table 1 Institutional respondents

| Institutions | No. of respondents (stakeholders) (<i>n</i> = 52) |
|--|---|
| Dept. water resource, utility, and rural development | 2 |
| Environmental nongovernmental organizations | 6 |
| Federal and state ministry of environment | 12 |
| Federal and state ministry of urban development | 8 |
| Ministry of agriculture and forestry | 4 |
| Ministry of health | 2 |
| National environmental standards and regulation agency | 2 |
| NEMA and SEMA | 5 |
| Universities and academic institutions | 11 |

NEMA and SEMA means National and States' Emergency Management Agency

All the respondents have more than 10 years of professional experience in environmental protection

Research Findings and Discussions

Institutional Weaknesses and Potential Strengths in Building Climate Resilience in the Niger Delta

This section stems from the SWOT analysis applied to the information gathered during interviews with various staff of institutions that participated in the research. Therefore, this section narrates the weakness and strengths of relevant institutions in building resilience in the selected Niger Delta States. It sought to identify ways to incorporate climate resilience and adaptation into relevant institutional frameworks. Apparently, reduction of climate risks in the selected states will be informed through internal forces; these forces will be better weighed to implement robust adaptation strategies. During the course of this research, the SWOT showcased some elements of strengths and weaknesses of relevant institutions, which are internal factors associated with the institutions' "efforts to reduce potential impacts of climatic changes while building a resilient society" (Yohe and Tol 2002; Hill et al. 2010).

Strengths

One of the key strengths of relevant institutions in the selected states is the existing institutional environmental frameworks under the respective ministries of environment, agencies, and physical planning, which can be adapted to build resilience and carry out adaptation in the vulnerable areas. For instance, Strategic Environmental Assessment (SEA) can be easily applied using existing Environmental Impact Assessment (EIA) institutional structures in climate proofing future implementation of programs and projects. Therefore, the introduction

of SEA as an assessment tool for climate change adaptation and other related environmental planning issues could be possible. Some of the respondents who were aware of SEA procedures and good practice were of the opinion that such tool would help in reducing climate risks. In this regard, R#8 stated that:

Application of SEA produces credible community-based adaptation projects. The goal of community-based adaptation projects is to build up the capacity of communities and increase their resilience to cope with less predictable changes as a result of climate change effects. In other words, it is an approach, which ensures that environmental disharmony does not arise in the course of new program development. On the other hand, according to R#47: “most of the SEA are theoretical, that is, they exist only on paper or are discussed in workshops. They need to be applied and implemented so that they tackle adaptation and poverty strategies in an effort to achieve sustainable development goals.”

In addition, strengths of relevant institutions and ministries lie within applying existing knowledge to abate environmental deterrence in the area and build capacities of vulnerable communities. Most technocrats and staff working within relevant ministries such as ministries of environment, urban planning and agriculture, water, and other relevant agencies are eager to broaden their knowledge and offer insights on climate change management. In this case, capacity building and training of administrative staff would be cost-effective. As R#14 pointed out:

There is need to create more awareness at the community level, organize training programs, share information, organize meetings, show graphic images of what is happening and sensitize people on the exposure to climate change.

This could allow technocrats to apply their skills to reduce vulnerability to impacts of climate change. Availability of climate change desks in Bayelsa and Delta States constitutes institutional strengths within the state ministries of environment, respectively. Additionally, provision of climate change policies to be implemented by the climate change department under the ministries of environment of the two states can be argued to constitute institutional strengths in the face of implementation challenges. Table 2 provides the summary of strengths and weakness factors surrounding resilience and adaptation practices through institutional arrangements in the study areas. There are various resilience strategies that are being put forward in the study area. For instance, R#13 from Delta State highlights such initiative and mandates within the Climate Change Unit of Delta State Ministry of Environment to include:

Research on vulnerability assessment; community consultation; free, prior and informed consent (FPIC) approach; meeting with vulnerable communities and collaborating with nongovernmental organizations and community-based organizations to see how to address and execute the resilience and adaptation options in their communities.

Weaknesses

Key weaknesses of MDAs in the study area range from the inadequate capacity to reduce climate risks to the lack of reliable information and inventories relating to

Table 2 Summary of strength and weakness factors facing institutional resilience and adaptation

| Strengths | Weaknesses |
|--|---|
| Existing environmental tools (e.g., EIA) | Lack of reliable climate information inventories |
| Existing institutional knowledge and capacities | Inadequate and accurate scientific baseline data |
| Climate change policies already in place in Bayelsa and Delta States | Inadequate legal frameworks and political will to execute existing climate change policies in Delta and Bayelsa |
| Availability of climate change units in Bayelsa and Delta States | Inadequate collaboration between relevant institutions and MDAs |
| Training of few experts on climate change management in Bayelsa and Delta States | Insufficient institutional knowledge/capacities on climate management in all the states particularly in Imo State |

climate information and accurate scientific baseline data, which are prerequisite for coastal resilience and adaptation planning in the area. Furthermore, lack of legal frameworks to execute existing climate change policies amounts to institutional weakness. According to R#25:

there is no comprehensive law covering the environment, but a law on public sanitation exists. Rather, we apply laws and national regulations made by the federal legislature on environmental issues specific to Bayelsa State.

In this regard, it should be noted that relevant national environmental laws and regulations are mostly silent on addressing and reducing climate risk. In addition, inadequate collaboration among relevant environmental departments and the meteorological department may hamper the development of robust adaptation strategies as well as discourage resilience practices. Notably, collaboration can enhance awareness of stakeholders on the potential impact of the changing climate, thereby leading to an informed decision on the ways to incorporate resilience actions and initiate appropriate adaptation strategies. Another key weakness of relevant institutions relates to ineffective policies, plans, programs, and incentives to promote resilience strategies.

Other Challenges

It has been established that inadequate implementation of relevant policies in vulnerable coastal communities is one of the impending challenges in Nigeria. For instance, due to weak enforcement of Nigeria's Environmental Impact Assessment Act of 1992. To strengthen the process, Ijaiya (2015) suggests the amendment of the EIA Act to provide for public participation at every stage of the EIA process. In this regard, according to Agbonifo (2016), regulatory agencies have failed to protect communities against the impacts of environmental degradation and other consequences of oil and gas exploration activities in the Niger Delta. Apparently, such failures of regulatory agencies reduce resilience and increase the vulnerability of the ecosystems and communities.

Analyses of Regulatory Frameworks

Within the four case study states selected for this research, Delta and Bayelsa States are the two states that have own climate policies. Both states have also established climate change departments under their respective ministries of environment. The Bayelsa State Climate Policy advocates the establishment of legal frameworks, while the Delta State Climate Policy suggests that the policy be revised every 3 years, taking into account emerging issues and trends on climate change at the local, subregional, regional, national, and global levels including the ongoing international climate policy debates (Bayelsa State Government 2011; Delta State Government 2013). However, while Rivers State has some relevant programs that target climate change, Imo State is yet to design such policy. Overall, at the time of the research, the four states do not have any comprehensive legal and regulatory framework on climate change.

Environmental regulations are imperative for future environmental development in the country (Okorodudu-Fubara 2012). At the moment, Nigeria has no efficient legislative oversight framework that can enhance Nigeria's climate resilience even though the impacts of climate change on the environmental sectors and coastal resources are increasingly acknowledged (ICLG and Makinde 2016; This Day 2 August 2016). As stated earlier, the Climate Change Bill of 2016 is expected to provide measures to build a resilient future for the country. Although the relevant NESREA Regulations are silent to climate change, they can be adapted for planning resilience actions and for reducing the impact of climate change and extreme events. Some of such existing environmental regulations are those that target coastal and marine area protection, soil erosion and flood control, wetlands, riverbank, and lakeshores protection.

- **National Environmental (Coastal and Marine Area Protection) Regulations 2011**

The Coastal and Marine Area Regulations contains the most important aspiration relevant to coastal resilience and adaptation as part of the general objective, precisely Regulation 2(b), is comprised of a regulatory provision for the application of preventive, precautionary, and anticipatory approaches relevant to manage the coastal and marine environment in Nigeria. The challenges of implementing regulations therein stem from the business-as-usual approach of the enforcement agencies. Therefore, relevant institutions including NESREA and State Environmental Agencies and local planning authorities must propel adequate enforcement of the regulations. For instance, local government authorities must be capable and should possess the know-how to deal with coastal challenges and natural hazard risks by applying modern planning approaches. There is a need for a compulsory vulnerability assessment and precautionary principle in making planning applications and development decisions in the coastal and riparian parts of the Niger Delta. For instance, see the case of Gippsland Coastal Board versus South Gippsland Shire Council where the Gippsland Coastal Board made a legal decision using climate change as a reason for refusing a coastal development.

- **National Environmental (Soil Erosion and Flood Control) Regulations 2011**

In view of the urgent need to resolve potential risks through anticipatory adaptation measures, the National Environmental (Soil Erosion and Flood Control) Regulations of 2011 is of relevance for climate change resilience and adaptation in Nigeria and the Niger Delta. This is so given that the regulation laid down relevant flood prevention activities that can be considered to reduce potential flood risks. The general objective of the flood regulation is to protect human life and the environment and minimize losses due to flood and erosion and their effects on vulnerable areas by controlling accelerated soil erosion, flood, and sedimentation deposition in water bodies and watercourses in order to prevent pollution of water resources in Nigeria (Regulation 2(a–c)). However, the regulation dwells more on approval and requirements of proponents for earth-disturbing activities and infrastructure development but falls short of mentioning how community resilience could be supported and how recovery plans can be executed after storms and extreme flood events and disasters such as the 2012 flood. Often until now, inhabitants of vulnerable communities still apply inadequate makeshift strategies to contain or ward off floodwater from adjacent riverbanks.

- **National Environmental (Wetlands, River Bank and Lakeshores) Regulations 2009**

The Niger Delta currently has three sites listed as Ramsar Wetlands of International Importance. The sites include the Apoi Creek Forest in Bayelsa State with an area of 29,213 hectares; Oguta Lake in Imo State, which covers about 572 hectares; and the Upper Orashi Forest in Rivers State with a size of 25,165 hectares (FRN 2014). The National Environmental (Wetlands, River Bank and Lakeshores) Regulations of 2009 is a key related regulation that should be enforced to promote resilience of such wetlands to potential climate- and weather-related events. The core objectives of the regulations include to provide for the conservation and wise use of wetlands and their resources, ensure the sustainable use of wetlands for ecological and tourism purposes, ensure that wetlands are protected as habitat for species of fauna and flora, and control pollution. Although the Regulation provides a succinct view on its application, part II of the regulation specifies the need for the government to protect the people, riverbanks, and lakeshores for the benefit of the inhabitants in the surrounding wetland areas. This institutional task is yet to be seen in the Niger Delta, largely because of inadequate enforcement of the regulations. However, interviews with stakeholders pointed to the challenges of over-centralization of powers and inadequate resource availability to accelerate the enforcement of such provisions.

Concluding Remarks

Observations on recent extreme weather and changing climatic conditions and their effects on riparian and coastal areas call for resilience actions to avoid intensification and damages that emanate from river flooding, coastal erosion, as well as sea-level

rise so as to reinforce African coastal areas. Considering the outcome of the findings, scaling up institutional capabilities and enforcement and strengthening of planning and regulatory frameworks in the Niger Delta are pivotal for climate resilience. To build climate resilience in and around the coasts, riverbanks, and lakeshores of the Niger Delta, institutional frameworks and capacities must be strengthened to deliver positive environmental outcomes.

To overcome the identified institutional weaknesses and strengthen capacities of staff, adequate mandates are needed to start the initial process of mainstreaming resilience and adaptation into existing coastal zone, wetlands, riverbanks, and lakeshores management policies, programs, and regulations. MDA staff should incorporate resilience strategies in their future development and land-use planning activities. For example, taking soft actions like planning and climate proofing new infrastructure, planting wetland trees/shrubs along the creeks and riverbeds, as well as maintenance of wetlands that serve as storage reservoirs for floodwaters would enhance the resilience of natural and human environment. Nevertheless, removing the hurdles surrounding institutional effectiveness and building stronger institutional strengths would be relevant for enforcement of international conventions and agreements such as the Paris Agreement. Article 6 of the UNFCCC is relevant here and can be achieved through organizing professional seminars and workshops that involve education and training of administrative staff of relevant environmental MDAs, as this would help strengthen institutional capabilities and capacities required for climate resilience.

The relevant planning and regulatory authorities could encourage resilience actions through accelerating the enforcement and compliance of environmental standards especially those that relate to coastal and marine area protection, soil erosion and flood control, and wetlands, riverbanks, and lakeshores regulations. Thus, functional governance systems are imperative to drive climate change management in the study area, especially now that the Nigerian government has ratified the Paris Agreement. Maximizing existing institutional strengths and reducing identified institutional weaknesses would help in addressing climate risks at the same time support efforts in building a resilient future with the aim of supporting sustainable development pathways in the Niger Delta region.

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