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Proposing a Communication Framework for the Public Administration of Climate Change Mitigation and Adaptation Policies and Action Plans in Nigeria

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Abstract

The study proposes a communications framework for disseminating action plans and polices relating to mitigation of and adaptation to the impacts of climate change to relevant stakeholders. This is viewed from the point of efficiency in public administration of climate change policies to the numerous stakeholders who must support the Federal Government in attaining its Nationally Determined Commitments (NDCs) to the UNFCCC Paris Agreement of 2015 to which Nigeria is a signatory. The study is exploratory in nature, using secondary data from various published and documented sources. The study presupposes that the public sector has the largest contribution in the efforts towards boosting mitigation and adaptation to climate change impacts, hence the focus on public administration. Relying on qualitative data and document analysis, the study concludes that the challenges of climate change are real and will continue to escalate, and the efforts of government in mitigating the effects of climate change on the populace can only be meaningful when the people participate fully in the developed plans and policies to scale down the effects at all relevant levels (from different communities to the LGAs, States and National governments). The study concludes that, in isolation, the cognitive, experiential and normative approaches are unlikely to induce behavioural change needed for effective adoption of communication of climate change action plans and policies. Instead, the study suggest that future interventions are more likely to reduce the gap between public communication and behavioural change when public campaigns: (1) effectively integrate cognitive, experiential and normative aspects of human behaviour in their message design; (2) make the climate change context explicit; and, (3) foster a strong link between the behaviours that need to be changed and their psychological determinants.

Keywords: *Climate change, communicating climate impacts, mitigation and adaptation, public administration.*

1. Introduction

One of current major global concerns is the problem of increasing climate hazards triggered by the rapidly changing climate due to uncontrolled (or poorly controlled) natural resources exploitation and utilization. There is an increasing need to use resources in a sustainable way such that there is concurrent increase in production while also protecting the environment, biodiversity, and global climate systems. This type of compromise requires careful resource planning and decision-making at all levels (Ujoh, 2013). Based on the verifiable data, 2023 is the warmest year in the 174-year observational record (Figure 1), surpassing the previous joint warmest years, 2016 at 1.29 ± 0.12 °C above the 1850–1900 average and 2020 at 1.27±0.13 °C, while the past nine years (2015–2023) are the nine warmest years on record. The long-term increase in global temperature is due to increased concentrations of greenhouse gases - GHGs (carbon dioxide, methane, and nitrous oxide) in the

atmosphere which reached record high levels in 2022, the latest year for which consolidated global values are available - 1984–2022 (World Meteorological Organisation, 2023).

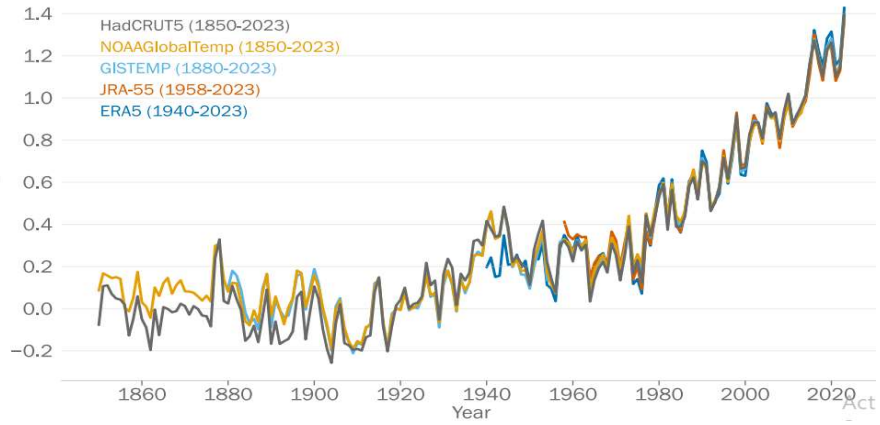


Figure 1: Annual global mean temperature anomalies (relative to 1850–1900) from 1850 to 2023. The 2023 average is based on data to October 2023 (Source: World Meteorological Organisation, 2023).

It is becoming evident that the universality of the threat of climate change today cannot be over-emphasized, although the resulting impact will be felt differently across different regions of the world (World Meteorological Organisation, 2023). The severity and pattern of the impact, as well as the rate of occurrence, will differ across the various regions of the world. However, there are ample reasons to believe that the extent to which climate change will affect a region or a community will depend a lot on their capacity to adapt to the impacts. Incidentally, basic needs, like food security, water availability, health, and shelter are already being threatened by climate change especially in the global south where most of the poor nations are located. Currently, the poorer countries from the global south that often lack the mechanisms to cope with these impacts are likely to suffer the worst effects of climate change. This underscores the urgency of communication and advocacy for carrying out the actions and interventions that are needed to address the challenges of vulnerable communities in the face of a constantly and rapidly changing climate.

Nigeria's environment (at both urban and rural levels) has suffered an accelerated depletion of natural resources, leading to micro-climatic changes and other related impacts such as diminishing soil fertility, soil erosion, increasingly severe water scarcity and drought (Ujoh et al., 2011a; Ujoh et al., 2011b; World Meteorological Organisation, 2023), among others. Environmental degradation was aggravated because most of the development activities that took place up to 1992 were conducted without recourse to environmental impacts assessments (EIA) until 1992 when the EIA Decree 86 of 1992 was promulgated to guide high impact development activities that damage the environment and aggravate climate change. These activities include mining (crude oil, gas, limestone, coal, etc.), fuel wood harvest, timber industry, unsustainable agricultural practices, and other activities that introduce GHGs into the atmosphere.

It is clear that sound climate change policy planning and administration, communication and management are essential to tackling the aforementioned problems and to bring about sustainable development. Therefore, there is a need for climate change information and adequate communication

of policy at all levels in order to support the decision-making process and planning for sound environmental practices. This is expected to lead to sustainable development and environmental protection at local/neighbourhood and community levels where micro-climatic changes are triggered.

As societies globally and Nigeria, in particular, seek to reduce emissions and enhance sinks of greenhouse gases while curbing vulnerability of the environment and increasing the resilience of humans to the adverse effects of climate change, the role of the public sector increasingly becoming fundamental, thus the public sector must become effective and efficient if the efforts must yield the required results (London School of Economics and Political Science & Grantham Research Institute on Climate Change and the Environment, 2023).

As the impact of climate change continues to spread across various facets of Nigeria, the need to interrogate measures for mitigation and adaptation have received academic and policy attention (Kemper & Chaudhuri, 2020; Federal Ministry of Environment, 2021; Itua & Esambe, 2021; Oladipo, 2021; Onyimadu & Uche, 2021; Geuskens & Butijn, 2022; Stout and Meattle, 2022 and Nwankpa, 2022). Despite the focus on these aspects of climate change in Nigeria, there has been limited interrogation of the public administration of climate change action plans and policies driving mitigation and adaptation. This study seeks to provide the knowledge required to understand the relevant adjustments that must be made in the theoretical and practical applications of policies to achieve the aims of climate change financing and combating the effects of climate change in Nigeria through mitigation and adaptation pathways.

1.1. Conceptual Clarification

The relevant concepts that require clarification for this paper are climate financing, climate change mitigation and adaptation, and public administration.

1.1.1. **Climate Financing:** To "cover the costs of transitioning to a low-carbon global economy and to adapt to, or build resilience against, current and future climate change impacts," financial resources are typically put in place under the umbrella term "climate finance," as defined by Falconer & Stadelmann (2014). This includes multi-actor and cross-sectorial funding activities from the public sector through national governments and agencies representing them, international organisations, private sector institutions and other partners that would otherwise not have occurred, argues the Global Environment Facility (2023). The United Nations Framework Convention on Climate Change (1993) provides a concise description of climate financing as efforts to reduce emissions and enhance sinks of greenhouse gases. These efforts also aim to maintain and increase the resilience of human and ecological systems to the negative impacts of climate change. This article takes a look at the crucial role of public policy makers and administrators in ensuring widespread adoption of mitigation and adaptation plans and programmes by all other stakeholders.

1.1.2. **Climate Change Mitigation and Adaptation:** The term encompasses a wide range of actions taken by humans with the goal of mitigating greenhouse gas emissions, both in the present and in the future, as well as the process of adapting to these various climatic impacts. Climate change mitigation and adaptation essentially seek to manage harm and/or exploit beneficial opportunities from climate change challenges (United Nations Environment Programme, 2023: iv). Global Environment Facility (2023) opines the concept comprises policies and strategies, essentially emanating from representative of governments in collaboration with experts from diverse fields and non-state actors of the international

community. This paper adopts the technical conceptualization of climate change mitigation and adaptation as expatiated.

1.1.3. **Public Administration:** There is now a distinct academic and public discourse niche for public administration. A thorough and methodical application of legislation is what public administration is all about, says Woodrow Wilson. It takes an act of administration for any legislation to be applied specifically. The government's administration stands out the most. Here we see the government at work. "The executive branch is the branch of government that is most visible to the public," (Wilson, 1887). Public administration is the action element of the government, the methods by which the aims and goals of the government are accomplished, according to Corson and Harris, who contributed to the notion of government functionality (Dash & Barik, 2023: 9). Public administration, broadly speaking, is a modern idea of governance and a subfield of management. What we have here are coordinated efforts by the state or its agents to achieve a goal or advance a national interest. Its primary focus is on the management of government programs and policies and the actions of those officially charged with overseeing them. Consequently, many individuals who work for the government are viewed as public administrators. This includes, but is not limited to, heads of state, public agencies, commissions, departments, and ministries, as well as directors, managers, and secretaries (Dash & Barik, 2023: 6).

1.2. Justification of the Study

Mitigation of and adapting to the potential effects of climate change will always be a complex and non-conclusive/on-going process requiring multi-stakeholder actions by individuals, communities, governments and international agencies as confirmed by the COP28 held in Dubai, UAE in December 2023 where 199 countries were in attendance to negotiate a sustainable future for the world. In order to make informed decisions and policymaking, public officers and administrators will be required to have involved concern for, robust understanding of the consequences and timely response to critical issues of climate financing, mitigation and adaptation. The end goal would be to distinguishing between available adaptation options, and the benefits of slowing the rate of climate change. It is therefore, extremely important to develop a viable and scientifically verifiable climate change mitigation and adaptation strategy especially for Nigeria where levels of awareness/literacy on environmental standards and application is limited.

Additionally, the outcome of this study is intended to improve knowledge of Man's use of geographical space through time. This is crucial because today's world desperately needs men and women with a clear view and an involved concern for Man's use of geographical space, over time.

Finally, the outcome of this study is also to advance the understanding of climate change, its effects/consequences and the role of individuals, communities and businesses (anthropogenic activities) in reducing (or otherwise aggravating) climate change drivers (such as spatio-temporal variation in vegetation cover, air, water and soil quality, etc.). This is critical as the resolution of central global issues of climate change actually resides at the local level. Therefore, an agglomeration of efforts at the local levels would, in turn, produce regional, then global effect.

1.3. Literature Review

This study reviews literature on climate change financing and public administration of climate change, focusing on Nigeria specifically. Cull et al. (2014) looked at financial inclusion as a pathway to pursuing and achieving development that is climate resilient. Global and national policymakers

have recognized the importance of financial inclusion as a development objective since the G20 Pittsburgh Summit in 2009, when the issue was first raised. Following this, other national regulatory and policymaking organizations have pledged to implement national financial inclusion initiatives (Cull et al., 2014). Abraham and Fonta (2018) state that in October 2013, the World Bank Group established the worldwide target of providing basic transaction services to all individuals. In order to achieve financial inclusion, improve the livelihoods of the poor, and reduce vulnerability, they also stressed the crucial need of being able to access financial services.

As a means of adaptation, Abraham and Fonta (2018) study how farmers see their vulnerability to climate change and how important it is for them to have access to capital. They also look at how this perception relates to the topic of climate change and financing adaptation. The study takes place in rural northern Nigeria. Rising temperatures, longer dry seasons, floods, and droughts all contribute to poor harvests and income for rural farmers as a result of climate change. The necessity for finance as a means of adaptation is significantly related to the degree to which farmers are exposed to climate change, according to a non-parametric test. At the time, the loan facilities were meant to help lessen the effects of climate change. Therefore, it was stressed that the government should play a role in funding farmers' adaptation and mitigation plans. According to Abraham and Fonta (2018), it was stated that the involvement of the global community in this endeavor would be significant.

Definitions of climate finance and suggestions for efficient monitoring of climate financing were both brought to by Hongo (2023). In order to help developing nations adapt to and mitigate the effects of climate change, it has been noted that funding and technology transfer are essential. However, it is tough to mobilize the required finances in order to reach the climate financing target. To give just one example, developing nations simply cannot afford the yearly sum of $100 billion. In order for countries to reach their climate finance targets, they should consider various forms of financing and policy measures. These encompass a range of approaches, such as public-private partnerships, tax breaks, incentives for low-carbon investment, regulation of inefficient investments, elimination of subsidies, and public risk mitigation for private investment. At its core, climate financing is about supporting effective and efficient projects that lower emissions of greenhouse gases. According to the article, in order for climate financing to be successful, its policies, programs, and activities must adhere to the Measurement, Reporting, and Verification (MRV) Model. In order to achieve climate finance goals, the MRV Model proposes a number of actions to take. The steps involve being straightforward, practical, and objective; promoting investments with minimal carbon emissions; and being adaptable and considering different investment climates (Hongo, 2023: 2). Unfortunately, emerging nations like Nigeria don't appear to be giving these evaluations any weight.

The UNFCCC framework's common but differentiated responsibilities fundamental approach to climate financing was the focus of the COP15 in Copenhagen, according to Shakya's (2022) contribution. Because climate change is happening all around the world, we need a comprehensive strategy to combat it through funding. Few climate finance providers are responding, even though this type of funding is critical for mitigating climate change's negative effects. "We have over-counted the amount of climate funding that has gone to nations in need and failed to reach the $100 billion target set at COP15." It was stated by Shakya (2022: 1). One example is the 264% overreporting of total climate money, according to an Oxfam study (Carty & Kowalzig, 2020).

Migley et al. (2017) revealed that the SEMed region received a total of USD 4.6 billion in climate money in their Final Report on a Climate Money Study. In 2016, USD 252 million and USD 4.3 billion were contributed by climate-specific funds, respectively. Turkey, Morocco, Egypt, Jordan,

Israel, Libya, Palestine, Syria, Albania, Bosnia and Herzegovina, Mauritania, and Montenegro are among the nations that will be receiving aid.

International financing, local budget allocations, and the private sector are the sources of resources for the many regional and national channels and funds that developing nations have set up, according to Watson and Schalatek (2020). For example, this is the situation with the Climate Change Trust Fund in Indonesia, the Amazon Fund in Brazil (run by the Brazilian National Development Bank, or BNDES), and similar funds in South Africa, Guyana, the Maldives, Mali, Mexico, the Philippines, Rwanda, and Benin. A number of nations' plans and strategies for combating climate change include calls for national climate funds. Due to their promptly implemented projects that were in line with national priorities and their independent governance structures that fulfilled high standards of openness and inclusivity, national climate change funds garnered early interest. It would appear, however, that national trust funds have little to no influence on improving national ownership and coordination. Still, there are a handful of developing nations that are keeping tabs on climate-related spending and factoring climate risk into their national budget frameworks. This provides more evidence that public climate change adaptation and mitigation efforts are related to climate finance. In light of the situation in Nigeria, this paper will analyze the phenomenon.

1.4. Global Climate Change Projections

IPCC (2007) defines climate change as a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and /or the variability of its properties, and that persists for an extended period typically decades or longer. Although the length of time it takes the changes to manifest matters, the level of deviation from the normal and its impacts on the ecology are most paramount. It simply means a long-term shift in weather conditions identified by changes in temperature, precipitation, winds, and other key indicators.

Climate Change, alongside with biodiversity loss, is often described as being the major contemporary environmental challenge humankind is facing nowadays (UNFCCC, 2002; Martin, 2001; Watkiss *et al.,* 2005). It is clear that the earth is in a state of constant change and evolution, and the earth's climate has always varied naturally. However, the Intergovernmental Panel on Climate Change (IPCC, 2001) attests that the vast quantity of international literature commenting on these matters, the majority of scientists are now convinced that the current trend is distinct, especially in terms of the rate at which the change is happening, with the previous decade being the warmest globally (IPCC, 2001) in recent times. Observations and measurements indicate a global average temperature increase, snow and ice covers decrease, global average sea level rise, change in precipitation patterns, as well as an increase of the intensity and frequency of extreme weather events (IPCC 2001; Greenpeace 2005). All these changes have been measured as occurring over a relatively short period of time (see Figure 1 for projections).

It is important to state that the aspiration for socio-economic development is undeniable, most especially for parts of the world which are most grossly underdeveloped (as Nigeria). However, Nussbaumer (2006) states that development paths over the last couple of centuries clearly demonstrate strong unsustainable characters, with adverse effects on the climate in particular. It is therefore, of utmost importance to elaborate a different pattern of development, one that promotes the preservation of environmental assets. The challenge is thus to work out conditions in which both developing and developed countries can enjoy a decent life at a minimum environmental cost (UNFCCC 2004).

As rightly observed by Nussbaumer (2006) and several other studies, the difficulties and uncertainties of modelling an extremely complex system, such as the earth's climate, lead to a wide range of estimates and strongly depend on different hypotheses and models used. Nevertheless, IPCC (2001) predicts an increase of the mean surface temperature of 1.4°C to 5.8°C over the next 100 years (see Figure 2.2). An important driver of this rapid global climate change is believed to be the particularly high concentration of Greenhouse Gases (GHG) in the atmosphere (UNFCCC, 2005), which is influenced by human activity. IPCC (2001) claims there are new and strong evidences that most of the warming observed over the last 50 years is attributable to human activities.

Pre-occupations for anthropogenic Climate Change emerged on the political agenda in the mid-1980s. Indeed, the scientific evidence of human interference with the climate system started to raise public concern (UNFCCC, 2005). The consequences of a global average temperature rise of a few degrees are numerous, diverse and alarming. The projected changes in the climate patterns could alter ecosystems which are fundamental to humankind and, amongst other effects, disrupt agricultural production, water cycles and resources. Such potentially disastrous effects underline the fact that the stakes are high (IPCC, 2001).

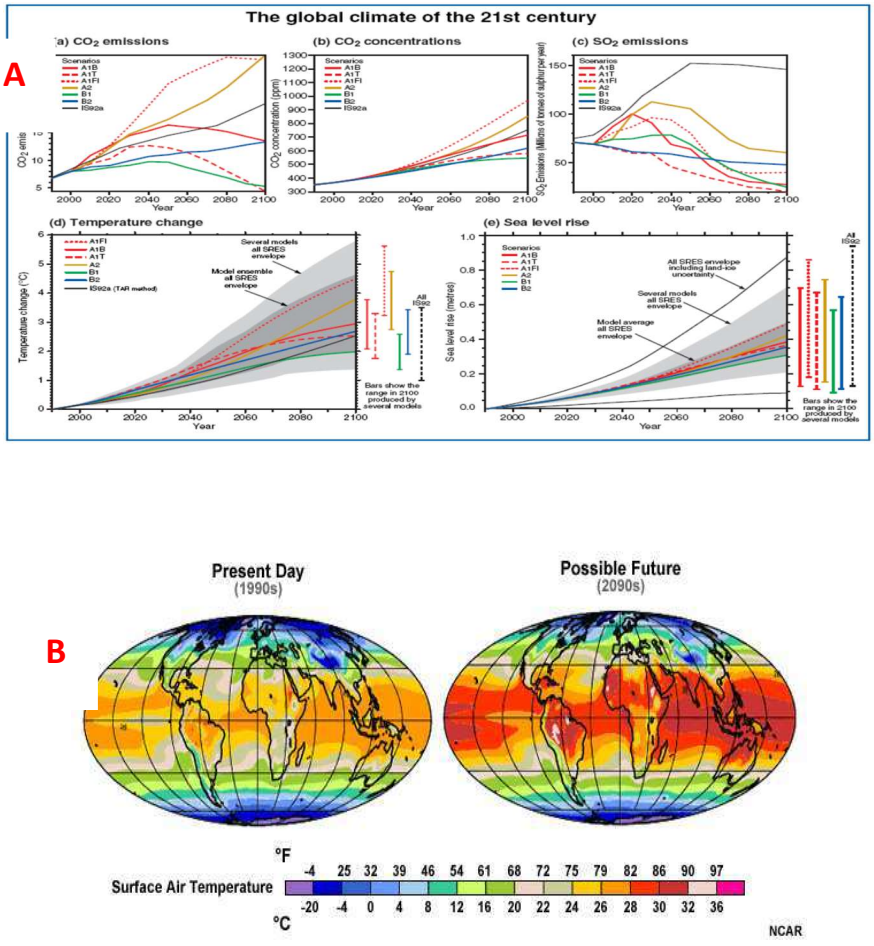


Figure 2. (a) Projected evolution of global climatic parameters according to different emission scenarios; and (b) Projection of Global Air Temperature Changes by 2090 (Source: IPCC, 2001)

It is important to note that the agglomeration of micro-level climate change metamorphoses into regional and global climate change impact. Therefore, addressing global climate change begins with re-organization of human activities at the micro-level to promote sustainability.

2. Research Methodology

2.1. Data: Type, Collection and Analysis

This paper adopts the qualitative research method by utilising the content analysis technique. The data for this study was obtained through secondary sources via archival data, reports of experts, policy documents and whitepapers, published research works, and official gazetted government publications on climate change financing, mitigation and adaptation in Nigeria.

The main limitation of the study is the absence of quantitative techniques and primary data collection and analysis.

2.2. Study Population

This study is directed at the role of public sector policymakers and administrators and staff of Ministries of Environment, Water Resources, and Agriculture (including relevant parastatals under them such as the Waste Management Agencies, Water Board, and Agriculture Development Projects), and the Legislative Arm of Governments at the Local, State and Federal levels. The intention of this work is to awaken these Agencies saddled with the responsibility of developing and driving plans and policies as well sourcing for and managing strategic financing for effective mitigation of and adaptation to the clearly inevitable effects of climate change across all parts of Nigeria.

3. Discussions

3.1. Vulnerability, Adaptation and Adaptive Capacity: Relevant Conceptual Issues in Climate Change Responses in Developing Countries

Vulnerability and adaptive capacity have been discussed in the theoretical climate change adaptation literature as key concepts for understanding how developing countries cope with and adapt to climate change and variability (Mertz et al., 2009; Adger 2006; Challinor et al., 2007; Eakin and Luers 2006; Mimura et al., 2007; Schro¨ter et al., 2005; Smit and Wandel 2006). Both terms are very useful for analyzing coupled human–environment interactions (Reenberg et al., 2008) and frameworks for vulnerability analysis have become a key component in sustainability science (Turner and others 2003). Vulnerability emerged as a concept in development debates in the 1990s (Bohle et al., 1994; Chambers 1995; Watts and Bohle 1993) and was largely a term borrowed from life sciences. There have been quite many attempts to define vulnerability, and in relation to climate change, vulnerability has been defined as the susceptibility of exposure to harmful stresses and the ability to respond to these stresses (Adger 2006; Adger et al., 2007; Bohle et al., 1994). It is important to recognize that vulnerability is highly contextual and must always be linked to specific hazards and the (likely) exposure to the impacts of these hazards (Brooks et al., 2005; Kelly and Adger 2000). Along this line, Luers (2005) suggested that vulnerability assessments should focus on the susceptibility of specific variables (such as food supply, income) that characterize the well-being of people to a specific damage (such as hunger and poverty). Adaptation is a broad term, and there have been many attempts to define the concept.

These are reviewed by Smit et al., (2000), and although the various definitions are rather similar, there are important nuances that might not answer completely the questions of ‘‘adapting to what?’’ ‘‘who and what adapts?’’ and ‘‘how does adaptation occur?’’ (Smit et al., 2000). Identifying the precise driver of any given strategy is highly complex and it is therefore often difficult to establish the cause of an adaptive strategy or even determine whether it is adaptation or perhaps a cyclic activity occurring with longer time intervals. The IPCC Third Assessment Working Group II Report, based on Smit and Pilifosova (2001), presented a broad definition of adaptation to climate change as being ‘‘adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts’’.

This definition is retained in the IPCC Fourth Assessment Report, where it is reiterated that adaptation comprises actions to reduce vulnerability or enhance resilience (Adger et al., 2007). However, the complexity of understanding adaptation—especially what exactly triggers different adaptive measures—is still frequently discussed in the literature. The linkages between vulnerability, adaptive capacity, and adaptation are often circular rather than linear in nature. The ability of people to control the variables that determine vulnerability might be translated into their capacity to adapt (Kelly and Adger 2000; Luers 2005; Smit and Wandel 2006). If people, for example, have a secure income and a diversified food supply, they are less likely to be poor and to experience hunger. This, in turn, will often enable them to respond to stresses by allocating resources differently or abandon/relocate farming areas—in other words, they have a better capacity to adapt to stress and the degree of vulnerability determines this capacity. It is thus prior damage that makes people vulnerable and hampers their capacity to adapt to potential future stress factors.

However, adapting to stress might also in itself exacerbate vulnerability; if, for example, the needed adaptive actions to drought will lead to dependence of credit schemes to purchase drought-resistant crops and crop varieties, then a complete crop loss will not only cause hunger but also leave people with debts they are unable to repay. Therefore, the true vulnerability of people can only be assessed after adaptation has taken place (Kelly and Adger 2000), and in some cases, it might be necessary to ‘‘adapt to the adaptation,’’ as some measures might solve one problem while creating another; credit schemes and new crops, for example, might have to be accompanied by ‘‘weather insurance,’’ as has been tried experimentally in some developing countries (Barnett and Mahul 2007). In economic terms, adaptive capacity has been defined as ‘‘a vector of resources and assets that represent the asset base from which adaptation action can be made’’ (Vincent 2007), and it has also been described by the coping range of climate variability upon which communities or individuals are used to react. When extreme events or more extreme variability go beyond the coping range, the adaptive capacity might be surpassed and the system threatened (Smit and Wandel 2006). At this point, the required adaptation is beyond the capacity of the people experiencing the threat and assistance is needed. A slightly different and more operational approach to the coping range concept suggests that adaptation of the system will occur only when thresholds of the coping range are exceeded, and the coping range thus signifies the resilience of a system (Yohe and Tol 2002). In other words, coping is the short-term response to variability, whereas adaptation is the more fundamental change of the system to allow for a new coping range to be established. Thus, the coping range can be described as the ‘‘head room’’ or ‘‘room for maneuver’’ of the system (Thomas and Twyman 2005), and the whole point of successful adaptation in poor communities is to ensure that an adequate coping range is established after adaptive actions have taken place. This will eventually reduce the vulnerability of people, and in an ideal world, a ‘‘good circle’’ of reduced vulnerability– increased adaptive capacity–appropriate adaptation can be closed.

Following these lines of thinking, policies on adaptation to climate change must be very carefully devised as they find themselves in a complex reality of societies that are poor and vulnerable for a

wide range of reasons. They must be an integral part of a development policy process that ensures mainstreaming of climate adaptation in all relevant sectors of society while not forgetting the other multiple drivers (social, economic, and environmental problems).

Concretely, the policies at the national level should be specific investments in physical and institutional assets that reduce climatic vulnerability and increase coping ranges without causing counterproductive effects. Examples of physical assets can be stronger infrastructure related to transport, energy, and water supply as well as new options for agricultural techniques, whereas institutional assets can be information systems, financial and risk-sharing systems, insurance, education, and warning systems that directly or indirectly address local, national, or regional vulnerability to climate change and variability.

It is also important to consider to what extent policies should be proactive (adapting in anticipation of a change) or reactive (adapting as a response to a change)—or as suggested by several studies, they should be both (Smit et al., 2000; Smit and Skinner 2002). The choice among these must be dependent on the confidence in local climate predictions, as investments in adaptation to anticipated change might be wasted or even counterproductive if predictions turn out to be wrong. This is especially crucial in developing countries, where the capacity for investment and later remedial actions to correct mistakes is limited. On the other hand, it can also be risky to base long-term adaptation strategies on observed climatic trends, as is sometimes done in National Adaptation Programs of Action (NAPA)—for example, in Sahelian countries, where the decrease in average annual precipitation since the 1960s is expected to continue or at least remain low (Gouvernement du Burkina Faso 2007; Re´publique du Mali 2007).

This need for a better understanding of the actual and potential adaptation needs in developing countries has spurred an increasing interest in adaptation and development policy (Halsnæs et al., 2008; Michaelowa and Michaelowa 2007; O'Brien and others 2008). Moreover, development of methodological frameworks for studying the links between vulnerability, poverty, and the complexity of adaptation to climate change, which is often not easily separated from adaptation to other factors that might stimulate change, has also attracted more interest (Tschakert 2007; Wheaton and Maciver 1999). It is, however, beyond the scope of this article to describe all of these approaches, but several important analytical and conceptual frameworks are presented in the recent literature (Eriksen and O'Brien 2007; Fussel 2007; Luers 2005; Tschakert 2007; Vincent 2007; Vogel et al., 2007).

3.2. Nigeria's Climate Financing Profile

A total of approximately $1.9 billion in climate funds have passed through Nigeria, making it the third-largest beneficiary of such funds in Africa, following only Egypt and Morocco. When compared to the magnitude of the national economy and the potential for low-carbon development, though, this sum is negligible. A total of USD 29.5 billion, or 7% of tracked climate money in Africa, and USD 7 billion, or 27% of flows in West Africa, came from Nigeria in 2019/2020. Regardless, there is still a projected yearly shortfall of USD 15.8 billion in climate investment in Nigeria as compared to what is needed to accomplish Nigeria's Nationally Determined Contribution (NDC) (Stout and Meattle, 2022: 7).

The private sector contributed 0.4 billion USD, or 23% of the total, while public players contributed 1.5 billion USD, or 77% of the total, towards climate funding in Nigeria. The bulk of Nigeria's public climate funding—55%—came from Multilateral Development Finance Institutions (DFIs), followed by Bilateral DFIs at 20% and the government at 19%—with the bulk of that funding going into debt.

Of the USD 147 million in private climate funding that was raised, 34% came from corporations, 12% from commercial financial institutions, 5% from homes and individuals, and 5% from institutional investors. Private investment in climate change mitigation in Nigeria is inadequate, although the country's contribution to global climate finance—23%—is more than in any other African country (CPI, 2022b).

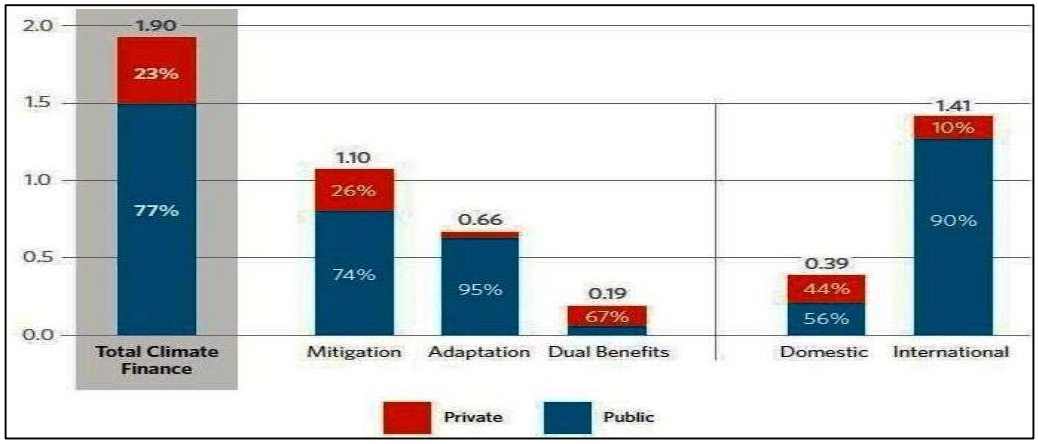


Figure 3: Domestic-Foreign Source Climate finance of Nigeria as at 2022

Source: Climate Policy Initiative (2022). *Landscape of Climate finance in Nigeria*, 10.

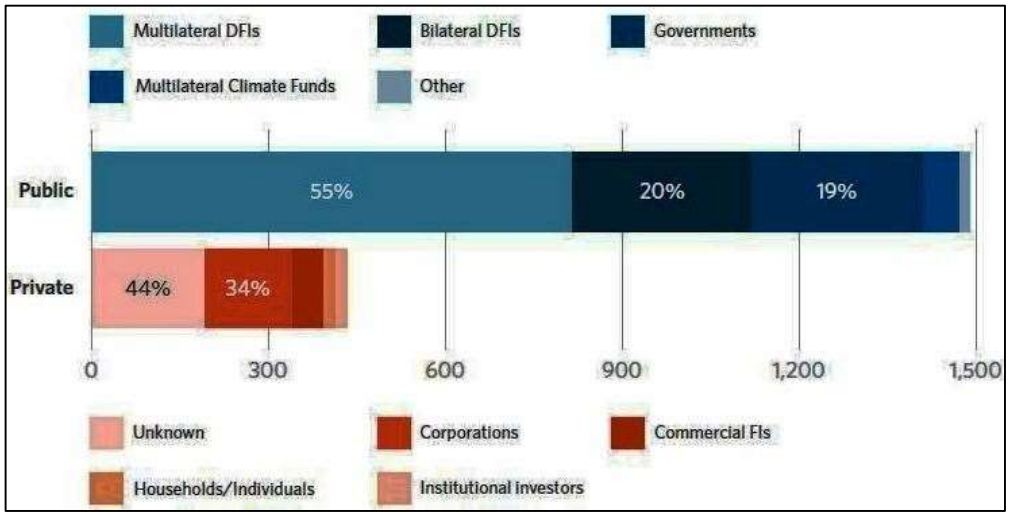


Figure 4: Public and Private Actors Climate Finance Breakdown as at 2022

Source: Climate Policy Initiative (2022). *Landscape of Climate finance in Nigeria*, 10.

3.3. Climate Change Stakeholder Mapping in Nigeria

In accordance with the national adaptation plan the list of stakeholders derived from brainstorming among the partners and from the literature review has been divided into major stakeholder groups in

Table 1. These are organisations that have a stake and could (or should) play a role in long-term resilience planning. In the implementation phase, this list should be used to generate target stakeholders within all States and LGAs of the Federation through further detailed document search and in partnership with civil society organisations. It is expected this stakeholder mapping is further subjected to further measures of validation at wider national workshops.

Table 1: List of stakeholders in climate adaptation

	Stakeholder	Key responsibility	[a]Prioritizing relevance
Federal Government	Ministry of Environment	To ensure environmental protection, natural resources conservation and sustainable development.	3
	Ministry of Health	To develop and implement policies that strengthen the national health system for effective, efficient, accessible and affordable delivery of health services in partnership with other stakeholders	2
	Ministry of Water Resources	Formulate National Water Resources policy and implement a Water Resources Master Plan	3
	The Nigerian Hydrological Services Agency (NIHSA)	Provide quality and reliable hydrological data needed for development of water resources	3
	National Water Resources Institute	Provide practical training of sector stakeholders to develop their capacities and equip them with skills for implementing integrated water resources management	2
	Nigeria Integrated Water Resources Management Commission (NIWRMC)	Charged with the responsibility for regulating and management of water resources all over the country, and other related matter	3
	Ministry of Power, Works and Housing	Charged with Federal highway planning, design, construction and rehabilitation. Monitoring and maintenance of Federal Roads and Bridges nationwide. Provision of engineering infrastructure. Surveying and mapping the nation's internal and international boundaries.	3
	National Emergency Management Agency (NEMA)	To coordinate resource towards efficient and effective disaster prevention, preparation, mitigation and response in Nigeria.	3
	Ecological Fund Office	Intervention facility established to address the multifarious ecological problems ravaging communities across the country	2
	River Basin Development Authority	To provide water for irrigation and domestic water supply, improvement of navigation, hydro-electric power generation, recreation facilities and fisheries projects.	3
	The National Environmental Standards and Regulations Enforcement Agency (NESREA)	Responsible for the effective enforcement of environmental laws, standards and regulations in the country.	3
State Gov	State Waste Management Authority	Management of solid waste, industrial-commercial waste collection and disposal,	3

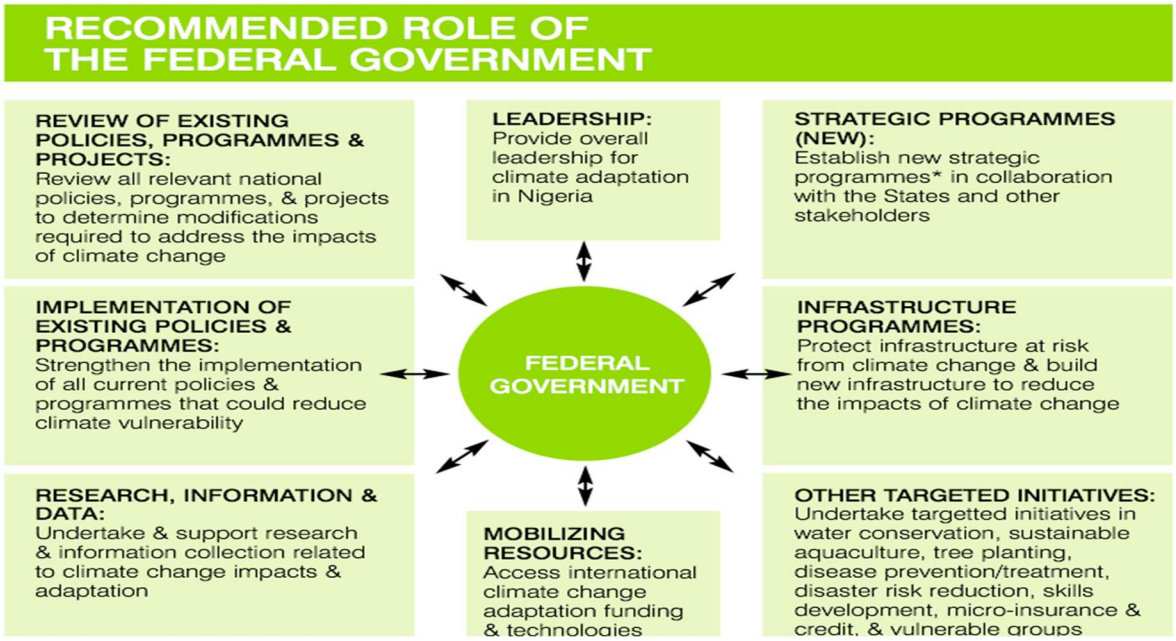
		drain clearing and disposal of derelict / scrapped vehicles.	
	State Planning & Environmental Monitoring Authority/ State Environmental Protection Agency	Safeguard environmental quality that is consistent with the social and economic needs of the State, so as to protect health, welfare, property and quality of life.	3
	Urban Renewal Board	Responsible for the supervision of town planning, physical planning and urban renewal.	3
	State Emergency Management Agency	*	3
	State Electrification Agencies	Generate, repair, maintain and extend power supply from the National Grid to all communities in the State. Embark on renewable/alternative energy project to ensure a better energy mix in the state.	3
	State Planning Commission	Harness, synergize and coordinate planning, monitoring, research and data management for sustainable development.	2
	State Ministry of Environment	*	3
	State Ministry of Lands and Housing	*	3
Local Government	Local Government Authority		
	Planning officers (Town planning authority)		
CBO/CSO/NGO and multilateral organizations			
	Nigerian Environmental Study/Action Team	Non-governmental organization, dedicated to improving the ways by which we interact with the environment.	2
	Nigerian Conservation Foundation	NCF pursues the conservation of nature and its resources with the aim of improving the quality of human life both the present and the future	2
	Red cross Society	Global voluntary network, responding to conflicts, natural disasters and individual emergencies.	2
	Green watch Initiative	Is a registered non-profit organization whose purpose is to promote environmental security and healthy living for the benefit of the poor and vulnerable people through capacity building, networking, advocacy, service/delivery, mentorship/coaching and policy change.	2
	Local Universities/Academics	Providing access to opportunities and facilities, resources and expertise.	2
	Land owners and community leaders		3
	Nigeria CAN		2

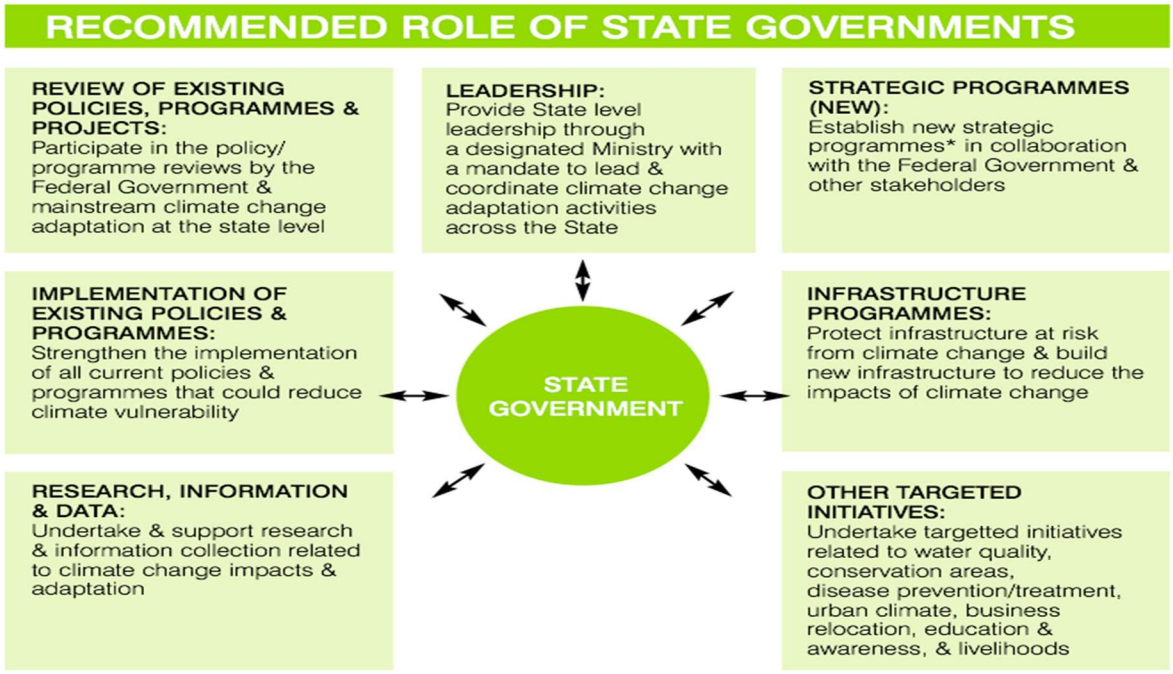
	Community associations	Champion infrastructural development and provision of services to the communities	3
	Other NGO - environmental and Gender based	Facilitate communication and advocacy for local population. Also develop infrastructural materials	3
	World Bank, UN agencies, AFDB, DFID	Provide funds for infrastructural development and promote applied research	3
Organised Private Sector	Media		2
	Infrastructure providers (e.g., Telecommunication companies and Electricity Distribution Companies (DISCOs))	Responsible for installation of equipment's (electricity transformers etc).	3
	Insurance companies		2
	Representatives of SMEs		3
	Major users of utilities		3

3= Extremely important; 2= Very important; 1= important. This ranking is subjective and is based on narratives drawn from authors' review of the literature.

3.4. The Role of Stakeholders in Adaptation to Climate Change Effects in Nigeria

Programmes to address the future challenges associated with changing climates have been undertaken at a Federal level resulting in a national adaptation strategy (Building Nigeria's Response to Climate Change, 2011a; Building Nigeria's Response to Climate Change, 2011b). The framework set out governance responsibilities as federal; state and local governments; civil society; and organised private sector and by sector. For example, in the energy sector, the Federal Government is tasked with setting infrastructure standards, identifying high risk infrastructure, building climate adaptation into the national energy masterplan and developing policies to encourage decentralisation of renewable energy. State governments should work in partnership with federal government to develop infrastructure standards and develop risk assessment and response plans in collaboration with federal agencies and private sector providers. Communities focus is on renewable and sustainable sources of local power generation and insurers are expected to assist with risk mapping and assessment of the facilities they insure. A summary of expected actions by the Federal, State and LGAs as well as Civil Society Organisations is shown in Figure 5. Individuals and households also have a role to play. They are expected to: learn how they can adapt to climate change; be willing to share information with other stakeholders on their experiences in climate change impacts and adaptation; prepare to make attitudinal changes in order to build capacity for adaptation; and, recognize that adaptation to climate change can be informed by, and build on, what they are already doing.


RECOMMENDED ROLE OF THE FEDERAL GOVERNMENT
REVIEW OF EXISTING POLICIES, PROGRAMMES & PROJECTS: Review all relevant national policies, programmes, & projects to determine modifications required to address the impacts of climate change
LEADERSHIP: Provide overall leadership for climate adaptation in Nigeria
STRATEGIC PROGRAMMES (NEW): Establish new strategic programmes* in collaboration with the States and other stakeholders
IMPLEMENTATION OF EXISTING POLICIES & PROGRAMMES: Strengthen the implementation of all current policies & programmes that could reduce climate vulnerability
FEDERAL GOVERNMENT
INFRASTRUCTURE PROGRAMMES: Protect infrastructure at risk from climate change & build new infrastructure to reduce the impacts of climate change
RESEARCH, INFORMATION & DATA: Undertake & support research & information collection related to climate change impacts & adaptation
MOBILIZING RESOURCES: Access international climate change adaptation funding & technologies
OTHER TARGETED INITIATIVES: Undertake targetted initiatives in water conservation, sustainable aquaculture, tree planting, disease prevention/treatment, disaster risk reduction, skills development, micro-insurance & credit, & vulnerable groups


RECOMMENDED ROLE OF STATE GOVERNMENTS
REVIEW OF EXISTING POLICIES, PROGRAMMES & PROJECTS: Participate in the policy/ programme reviews by the Federal Government & mainstream climate change adaptation at the state level
LEADERSHIP: Provide State level leadership through a designated Ministry with a mandate to lead & coordinate climate change adaptation activities across the State
STRATEGIC PROGRAMMES (NEW): Establish new strategic programmes* in collaboration with the Federal Government & other stakeholders
IMPLEMENTATION OF EXISTING POLICIES & PROGRAMMES: Strengthen the implementation of all current policies & programmes that could reduce climate vulnerability
STATE GOVERNMENT
INFRASTRUCTURE PROGRAMMES: Protect infrastructure at risk from climate change & build new infrastructure to reduce the impacts of climate change
RESEARCH, INFORMATION & DATA: Undertake & support research & information collection related to climate change impacts & adaptation
OTHER TARGETED INITIATIVES: Undertake targetted initiatives related to water quality, conservation areas, disease prevention/treatment, urban climate, business relocation, education & awareness, & livelihoods

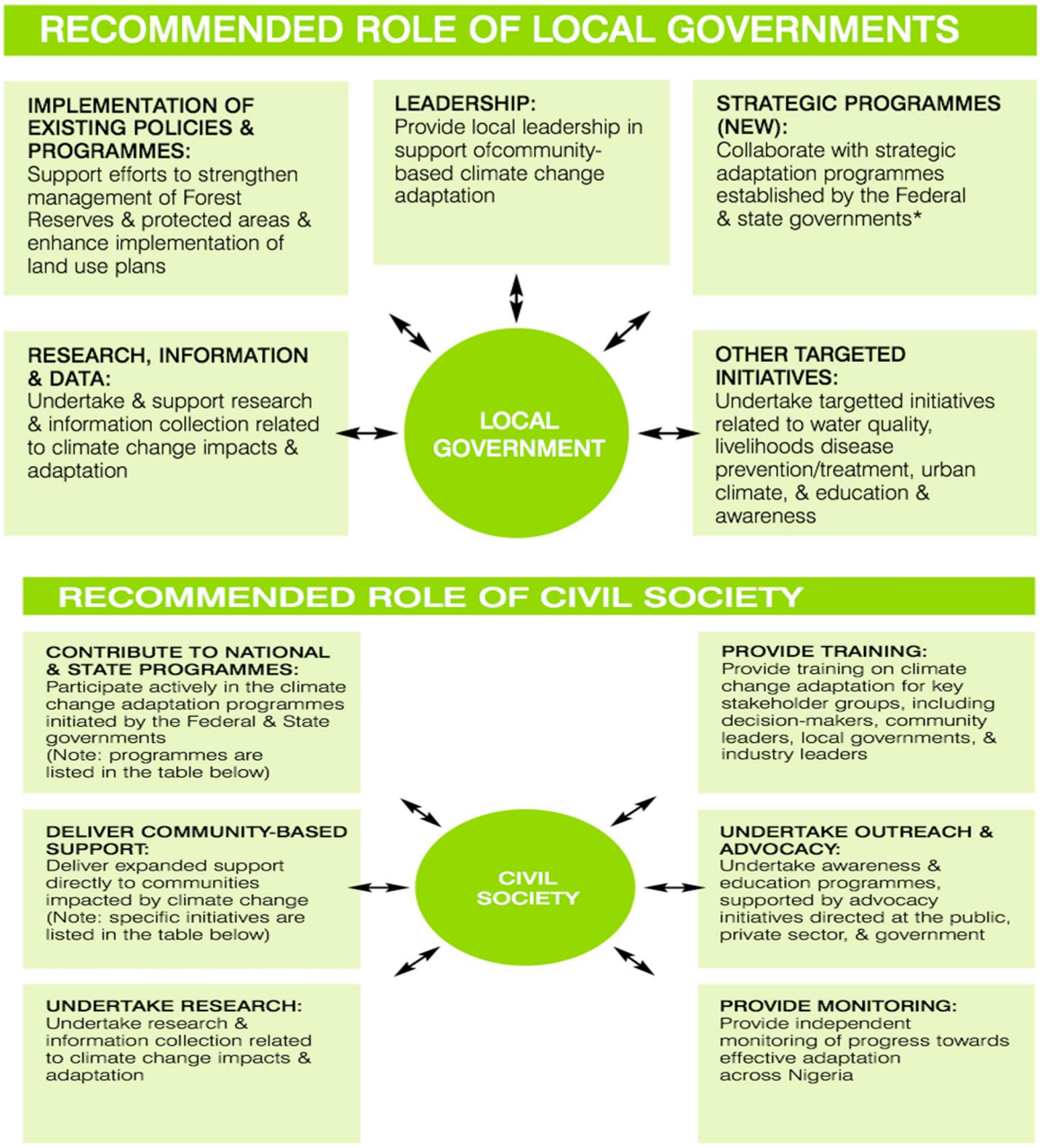


Figure 5: Recommended roles of all tiers of government and civil society in climate adaptation (Adapted from Building Nigeria's Response to Climate Change, 2011a).

Recent research studies have looked at policies for climate mitigation, disaster management and environmental responsibility (Soneye, 2012). With the notable exception of Lagos, non-structural measures and emergency planning are areas that have been neglected in the past. Research points to a lack of mandate or compulsion to organise mass evacuation by the relevant bodies (Ingwe, 2013, Chinedu, 2008). However internal migration has also been proposed as a solution for Nigeria's

coastal flooding issues (Chinedu, 2008) and is a natural consequence of desertification in the North East. In common with many developed and developing countries, much of the focus of previous flood mitigation strategies have involved hard engineered conveyance and drainage channels combined with upstream flow control devices (Ingwe, 2013). Water resource issues have been tackled using water treatment plants or long distance conveyance. Also a functioning and climate-resilient storm water drainage network and solid waste management system is seen as a pre-requisite to mitigate floods.

Suggestions for adoption of Blue-Green Infrastructure as a response to multiple climate stresses within cities have increasingly been made by commentators and researchers. Lagos is leading the field in adaptation programmes, the operation green Lagos programme (Ezema, 2013) is seen as a partial solution to a variety of social and environmental problems associated with densification and climate hazards. This has included the greening of derelict "loops" and verges. Other Lagos adaptation projects include the state-wide de-flooding programme that lined and upgraded drainage channels and the Ekocity project, protecting the vulnerable shoreline and the Eko solar project (AT, 2011). Other research has included assessments of the potential for rainwater harvesting (Imteaza et al., 2012), Green roofs and permeable paving for marshy roads (Ojuri, 2012).

The 2012 Post Disaster Needs Assessment Report recommended risk sensitive land use planning and investment in resilient buildings and infrastructure for 10 targeted urban areas with population up to one million (Federal Government of Nigeria, 2013). The Makoko floating school project is one example of an innovative approach to building design, however stilt built housing and other building level adaptations may be equally appropriate.

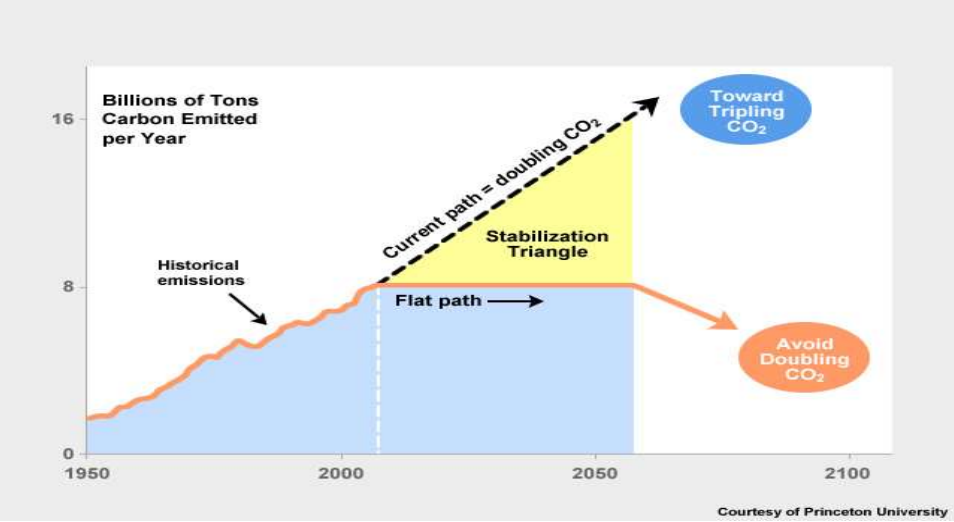


Figure 6: The Path to Avoid further climate change consequences.

Federal policies call for change in the management of climate risks and adaptation to future risks; however Federal government initiatives will be subject to interpretation and implementation by multiple, more local actors. For example, the law establishing NEMA and Nigeria's 1999 Constitution failed to specify disaster management responsibilities for states, Federal territory and

local councils (Chinedu, 2008). Issues with multi-levels of water resources governance include limited buy in and weakness of implementation of federal policies by state government (Soneye, 2012). Furthermore, there is a lack of an appreciation of the holistic approach necessary for catchment based management (Akiyode, 2011; Ajiboye, 2011). Therefore, examination of national strategies must be accompanied by consideration of local risks and adaptations.

3.5. Nigeria's Public Administration of Climate Change Mitigation and Adaptation

The public administration of climate change in Nigeria can be traced to the ontology of adaptation and mitigation frameworks within the policies of the country over years. For instance, the Bakolori Dam in Sokoto State was constructed between 1974 to 1978 in response to climate change (Hartenbach & Schuol, 2005). Similarly, the Chalawa Gorge Dam in Kano State, constructed from 1990 to 1992, was to diversify the reliance on fossil fuel for power generation in Nigeria (Salihi, 2009). Other similar public projects including the Dadin Kowa Dam in Gombe State, the Goronyo Dam in Sokoto State commissioned in 1992, the Jebba Dam in Niger State commissioned in 1985, the Tiga Dam in Kano State, et cetera (Farinloye, 2009; Omoniyi, 2009; International Hydropower Association, 2020); & Shariff, 2009).

In pursuance of specific public administration of climate change and mitigation activities, frameworks, programmes and projects, Amobi & Onyishi (2015) opine that Nigeria keyed into global and regional frameworks. According Nigeria has committed to international frameworks and ratified some instruments which include the following: the Kyoto Protocol; the Nairobi Declaration of 2009; the Convention of African Heads of States on Climatic Change (CAHOSCC) of 2009; the ECOWAS strategic guidelines on the Reduction of Vulnerability, and Adaptability to Climate Change in West Africa; and many other climate change mitigation and adaptation frameworks and instruments.
If we compare Nigeria's record with the worldwide climate financing adaptation-mitigation split, we see that it is more or less balanced. Total funding for adaptation to climate change, however, is insufficient. The ideal tracked total, making up 56% of the total, is the USD 1.1 billion in climate change mitigation funding that Nigeria has pledged. With 663 million USD, or 34% of the total, coming from public actors, and 186 million USD, or 10%, coming from dual benefits financing, Nigeria's climate change adaptation budget is well-funded. Given Nigeria's susceptibility to climate change, the country's efforts to reduce emissions should be accompanied by a substantial increase in adaptation funding (Stout and Meattle, 2022: 8).

Climate financing accounts for 46% of Nigeria's concessional debt. One quarter is attributed to the non-concessional debt. Less than 20% of climate finance comes from grant and equity-based sources. Due to the high proportion of debt financing for adaptation in Nigeria (around 90%), a wider variety of financial instruments were used to manage climate change mitigation funding. Only equity-based climate financing can be used to fund efforts to reduce global warming (Financier Worldwide, 2017). Considering the sustainability of Nigeria's debt profile in light of the rate at which climate shocks are rising, leaving insufficient space for recovery needs, it is worrying that the government relies on debt for climate adaptation (Stout and Meattle, 2022: 8-9).

Climate finance in Nigeria has been committedly allocated to projects which target climate change mitigation or adaptation objectives, and projects concurrently targeting both outcomes. A large portion of the funding goes toward energy infrastructure and cross-sectoral initiatives, such as disaster risk management. However, some sectors have gotten some climate finance allocations

which are synonymous with emissions sector climate finance. The figure below shows the sectoral Climate finance profile of Nigeria.

Within the sectoral allocations of Climate finance in Nigeria, the energy sector has gotten the major share of the total contribution with on-grid or off-grid solar receiving an estimated 66% of the sectoral investment. Accordingly, an estimate of 71% of the energy finance contributions has been committed to power and heat generation having an allocation of USD 564 million. However, only 20% of the committed energy finance went to transmission and distribution infrastructure.

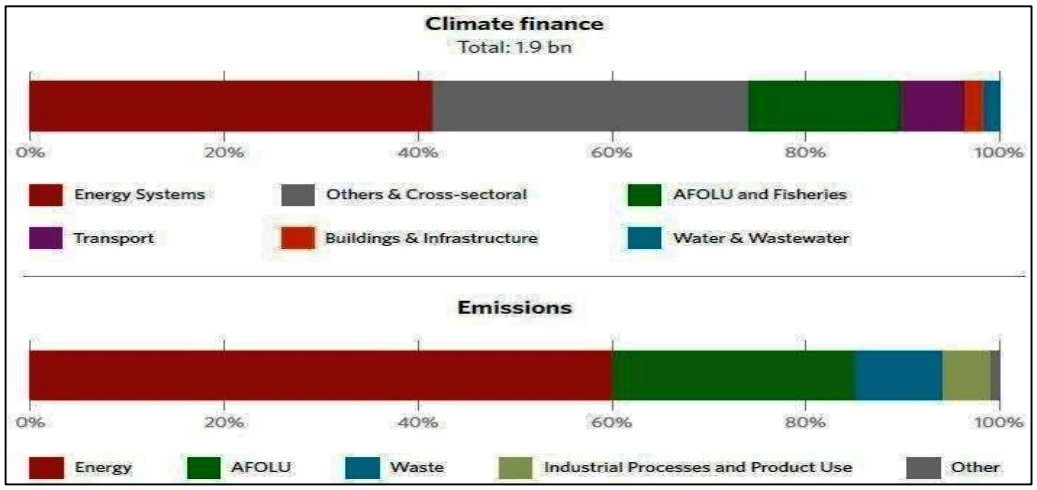


Figure 7: Climate Finance and Emissions by Sector
Source: Climate Policy Initiative (2022). *Landscape of Climate finance in Nigeria*, 14.

The agriculture and food supply sector also requires relevant consideration within the periscope of Nigeria's public administration of climate change mitigation and adaptation. Whereas the section has gotten the attention of public finance, the section has not gotten the desires level of attention which would be effective and efficient enough. For instance, in 2019/2020, the sector received barely 16% of total climate finance which was estimated at USD 130 million. A large portion of it amounting up to 80% was channelled to climate change adaptation objectives. Methods such as introducing crop varieties that are less susceptible to drought and improving and extending irrigation infrastructure are part of this expansion of storage capacity and facilities; provision of agro-allied insurance; and provision of alternative ways to traditional livestock farming (WBG, 2021). However, there was very little commitment of finance for forestry-related projects which stood at 1% of financial commitments for the agriculture sector in 2019 and 2020 (NDC, 2021).

Other sectors within the climate change mitigation and adaptation framework of Nigeria are Disaster-risk Management and Financial Services & Business. Disaster-risk management has an average allocation of 7.26% of Nigeria's Climate finance (Stout & Meattle, 2022). In this way, public sectors including the Ministry of Agriculture, Ministry of Tourism, National Emergency Management Agency, among others, are offered budgetary allocations for activities that seek to address concerns bothering climate change mitigation and adaptation through related activities. Specifically, Amobi and Onyishi (2015) observed that there is a climate change focal point in each Ministry in Nigeria. This implies that every ministry in Nigeria is required to make some efforts in the public

administration of climate change mitigation and adaptation frameworks of the country. As a result, as compared to the global profile of climate finance, Nigeria's adaptation and mitigation efforts are comparatively well-balanced.

Along with the National Climate Change Programme for Nigeria, which runs from 2021 to 2030, the Nigerian government ratified the updated National Climate Change Policy (NCCP) in 2021. The purpose of these frameworks is to offer direction for strategies and plans to adapt to and lessen the impact of climate change. Nigeria has incorporated climate change adaptation and mitigation initiatives into its Economic Sustainability Plan in an effort to lessen the impact of the COVID-19 pandemic on the nation (Ndukwe & Ogbonnaya, 2023).

3.6. Challenges of Public Administration of Climate Change Mitigation and Adaptation in Nigeria

In spite of the efforts made by the public sector in financing and administering climate change mitigation and adaptation in Nigeria, some challenges are encountered, thereby hindering the achievement of set goals and objectives in the efforts (Amobi & Onyishi, 2015; Stout & Meattle, 2022). Summarily, the challenges include the under-listed.

First, there is no comprehensive national climate change mitigation and adaptation strategy and a central institution for the administration of such a strategy in Nigeria. This is problematic as observed by Moram et al, thus:

> ***"One absolutely critical factor that needs to be emphasized here is the general inability of the national and regional agencies in-charge of the environment to enforce codes, regulations, and laws especially with respect to urban planning and infrastructure development, mineral prospecting, adherence to industrial standard and installation of facilities in ecologically sensitive zones (Moram, et al, 2011: 8)".***

Secondly, on their part, Amobi & Onyishi (2015) further extended the challenges to public administration of climate change mitigation and adaptation in Nigeria to include structural impediments. Notably, state actors hardly document the development of climate change mitigation and adaptation strategies. Public agencies suffer from insufficient resources and desired level of human capital. Research tends to neglect national gaps as they are sponsored by foreign donors and not Nigerian national actors (Moram: 2011). These among other challenges impede on the public administration of climate change mitigation and adaptation in Nigeria, despite of the financial commitment of the public sector in climate change mitigation and adaptation efforts in the country.

Furthermore, there are sectoral gaps in the public administration of climate change mitigation and adaptation in Nigeria. This is in spite of the allocated priorities to relevant related sectors in the National climate change mitigation and adaptation strategies. This is the situation with the Waste, Water and Industrial Processes, and Product Use aspects of the economy, where mobilising the required funds for effective administration of climate change mitigation and adaptation efforts related to the aspects is difficult. The difficulty arises from insufficient contributions from the private sector either directly or as part of expected corporate social responsibility (Stout & Meattle, 2022). Inherent in the sectoral gaps is the coordination weakness across actors. This weakness undermines the required holistic approach from public and private sectors as well as the general society (Itua & Esambe, 2021).

Finally, achieving the desired transparency in the administration of climate change mitigation and adaptation efforts has proved difficult. This has a negative effect on the administration of finance for climate action in Nigeria. Despite the efforts of the Central Bank of Nigeria and the Nigerian Stock Exchange, disclosure of funds is often problematic, leading to public distrust. This can partly account for the unwillingness of the private sector to provide the needed support (Stout & Meattle, 2022).

4. Proposing a Communications Framework for Public Administration of Climate Change Mitigation and Adaptation Plans and Policies

4.1. Principles of Climate Change Communication

According to the Center for Research on Environmental Decisions (2009), there are 8 major principles for communicating climate change policy, plan and activities. These are briefly discussed below and also presented in Figure 8.

i. Know your audience:
Discover what misconceptions the audience may have in their mental models about climate change. "Disconnect" the erroneous information and replace it with new facts.

ii. Get your audience's attention:
What appeals to and relates with them? Is it faith/religion, race, gender, occupation, etc. Select a frame that resonates with your audience. Selection of words that appeal to personal sentiments/goals is crucial. Draw the message closer home, leveraging local extreme weather events. Highlight current losses from such events, and potential for even greater losses in the future.

iii. Translate scientific data into concrete experience:
Use vivid imagery, personal accounts, real-world analogies, etc. to create, recall, and highlight relevant personal experience. Avoid using jargon, complicated scientific terms, and acronyms. Reduce volume of complex vocabulary.

iv. Beware the overuse of emotional appeal:
Avoid emotional numbing which occurs after repeated exposures to an emotionally draining situation. Register the point without over-flogging it. Lighten up the discussions with humour if possible.

v. Address and scientific uncertainties
Put uncertainty into context and help an audience understand what scientists know with a high degree of confidence and what they have a relatively poor understanding of. Make it interactive.

vi. Tap into social identities and affiliations:
Tap into the multiple identities represented by your audience; bolster audience members' sense of affiliation with each other, the environment, and the society that enjoys the benefits of its natural resources. If communicating as an "outsider," enlist the aid of someone locally known to introduce you.

vii. Encourage group participation:
Eliciting participation from various stakeholders is important when trying to broker environmental decisions. Stakeholders who feel like they were part of the decision-making process are more likely to support the outcome.

viii. Make behaviour change easier:

By making socially beneficial choices the default option, policy-makers can positively influence individual decisions concerning natural resources.

Giving people an immediate incentive, if possible, makes behavior change easier.

Figure 9: The 8 Principles of Climate Change Communication
(**Source:** Center for Research on Environmental Decisions, 2009)

4.2. Mental Model Risk Communication Framework

The subjective nature of risk communication and understanding in both experts and non-experts is now well established (Slovic et al., 2004), but it is easy for risk communicators to focus on improving access to information from the scientists' perspective, and overlook the impact of experience- and emotion-based preconceptions from the non-expert perspective (Leiserowitz, 2006). Commonplace preconceptions will strongly influence the way that a non-specialist will access and interpret climate change risk information provided to them (Leiserowitz, 2010), and so it is vital that public perceptions of climate change risks/hazards and impacts are taken into consideration by communicators. Traditional views of risk communication have conventionally been based on how best to align the knowledge of the recipient with that of the expert (or communicator).

Basically, mental models encompass a web of belief guiding learning and interpretation and through decision-making, define judgment and shape behaviour, preventing people from seeing alternate perspectives or options, and also define the boundaries of thought and action. In essence, mental models must be addressed through strategies and communications that build on where people are at today in their thinking, and are tailored precisely to the decisions they must make. According to Carey (1986), a mental model represents a person's thought process for how something works (i.e., a person's understanding of the surrounding world). Mental models, which are based on often-incomplete facts, past experiences, and even intuitive perceptions, help shape actions and behaviour, influence what people pay attention to in complicated situations, and define how people approach and solve problems. Perhaps most important to climate change communicators, mental models serve

as the framework into which people fit new information (Morgan et al., 2002). People usually have some relevant knowledge and beliefs that help them interpret new information in order to reach conclusions.

The mental models approach to risk (Morgan et al., 2002) is a mixed method procedure which integrates aspects of Johnson-Laird's Mental Models theory (1983) with risk communication practice (Morgan et al., 2002). It assumes that the heuristics and biases used by non-experts to interpret controversial, critical or unfamiliar issues do not form an entire model that directly reflects the world as the participant experiences it, but rather constitute a series of interconnecting ideas that may colour the perception of an issue (Morgan et al., 2002). This qualitative and quantitative process consists of three main stages:

First, qualitative semi-structured interviews are conducted with a broad sample of the target population, as well as with technical experts in the field under question. These semi-structured interviews provide the participant with an opportunity to speak freely about the issue, but also discuss related or perhaps peripheral topics that the participant feels are relevant (Maibach et al., 2008). Once this stage is completed, a series of models are constructed which reflect the key perceptions held by each group and considers how these perceptions compare across groups of different 'expertise'.

Second, quantitative questionnaires are constructed from the models produced after the interview stage. These questionnaires test the dominant perceptions that are highlighted by the model as representing the area of greatest concern or interest for the participants and researcher. The statements or questions are constructed using the language of the participants so as to minimise bias. The results of the questionnaire are then compared to the original models to test their validity in a larger sample.

Third, if the model provides a good reflection of the dominant perceptions of the target population, then a communication is designed that dovetails with the model content, in order to stimulate useful dialogue or provide information. This communication is tested for its ability to improve knowledge and understanding in the target population.
Figure 10 depicts these stages graphically.

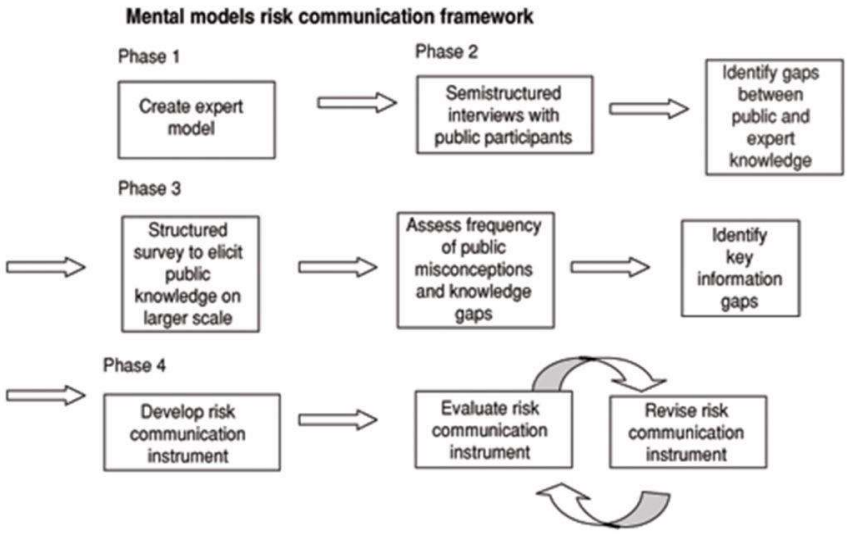


Figure 10: The Mental Model Risk Communication Framework proposed for Communication of Climate Change Impact, Plans and Policies

4.3. Proposing a Communication Process Model

According to a detailed study conducted by van dar Linden (2014), there are mainly 3 approaches for communication of climate change policy and plans to non-expert population. These are:

(1) Cognitive-analytical approach (consistent with the traditional knowledge-attitude behaviour model);
(2) Affective-experiential approach (congruent with the 'risk-as-feelings' framework and the use of negative emotional appeals such as fear and guilt messaging);
(3) Social-normative approach (consistent with the 'normative' paradigm - which seeks to leverage the persuasive potential of social and moral norms on behaviour).

These are independently distinct approaches that have been applied by various authorities in different parts of the world. Given the relatively low levels of climate change awareness especially among the vast population of developing nations, there is clearly a need to develop an alternative communication process model that would produce rapid and desirable outcomes.

van dar Linden (2014) presents a conceptual communications process framework to help guide the design of public climate change campaigns is presented in Figure 11 below. The central argument behind the framework is that persuasive communication is only persuasive (i.e. likely to elicit behavioural change) if it is based on an integrated understanding of the psychological processes that underlie and influence pro-environmental behaviour. In order to achieve this, three criteria need to be met; (1) interventions should design integrative communication messages that appeal to cognitive, experiential as well as normative dimensions of human behaviour, (2) the context and relevance of climate change needs to be made explicit and (3) specific behaviours should be targeted, paying close attention to the psychological determinants of the behaviours that need to be changed.

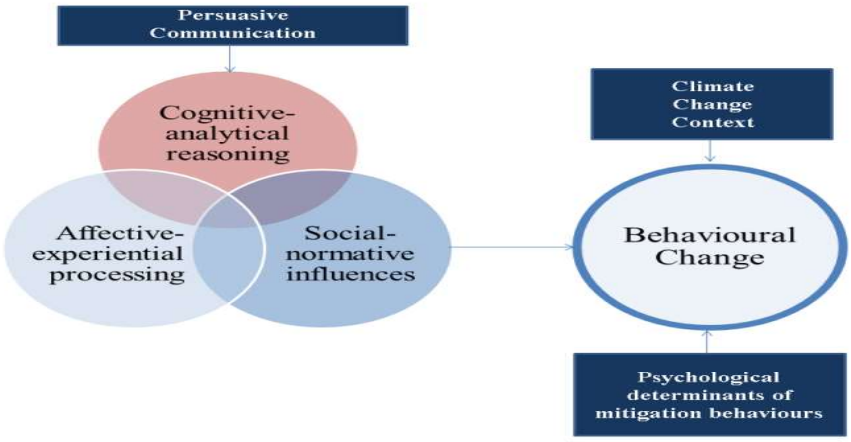


Figure 11: A proposed Integrative framework for climate change communication process in Nigeria (Adopted from van dar Linden, 2014)

Figure 11 illustrates that in order for communication to be persuasive, it should take into account the interrelation between cognitive, experiential and normative influences on behaviour. Recent experimental evidence supports this notion. For example, Dolan and Metcalfe (2012) comment that little is known (empirically) about the interaction between social norms and basic information

provisions. Based on a large-scale energy conservation study, the authors conclude that, compared to only using a social norm prime, providing information alongside social norm messages is key to the success of behavioural change interventions - as it doubled the rate of energy conservation (Dolan & Metcalfe, 2012). Similarly, a recent field study by De Groot, Abrahamse and Jones (2013) showed that the combination of different normative appeals reduced the use of plastic bags in supermarkets significantly more compared to when the messages were administered individually. It is no surprise that integrating these theoretical dimensions can help guide the practical design of public climate change interventions. To illustrate, consider that it is well documented that human attitudes encompass both cognitive and affective dimensions (Albarracín et al., 2005), especially in the context of climate change (Lorenzoni et al., 2006).

As a result, creating negative attitudes towards climate change draws on the interaction of both cognitive and affective processes. In addition, while knowledge about the potential consequences of climate change has been implicated in achieving behavioural change this effect is enhanced when knowledge about consequences interacts with a feeling of personal and moral responsibility for those consequences (Joireman et al., 2004; Wall, 2005; Bamberg & Möser, 2007). Furthermore, it is important that individuals believe that engaging in the target behaviour is the right thing to do (i.e. moral norm activation) but this feeling is more easily elicited when people are under the impression that the target behaviour is also being performed by important referent individuals (i.e. social norm activation).

Because individual beliefs are often a function of the social group to which the individual belongs, an informational message is expected to be more persuasive if the right in-group source and context is provided (Mackie et al., 1990; Van Knippenberg et al., 1994). In sum, recent research is increasingly validating the importance of exploring interactions between cognitive, experiential and normative influences on behaviour.

5. Synopsis

5.1. Summary of Study Outcome

It is critical to note that Nigeria has committed to the 2015 UNFCCC Paris Agreement through a set of Nationally Determined Contributions (NDCs), pledging to unconditionally reduce emissions by 20% below Business as Usual (BAU) scenario by 2030, and a 47% conditional commitment which is expected to be achieved with financial assistance, technology transfer and capacity building from the more advanced and more willing international partners (Federal Government of Nigeria, 2021). At the core of attaining this ambitious commitment is the entirety of Nigeria's population (government, private businesses, communities, societies, non-state organisations, and individuals). However, the governance and public administration of this process is been driven by the public sector. Transmitting government's intentions and expectations of all stakeholders is key and instrumental to achieving Nigeria's NDCs. Also, the administrators of Nigeria's climate change processes would determine whether or not Nigeria is able to access climate change financing form the Loss and Damage Fund activated at the COP28 held in Dubai, UAE, while also ensuring that government at all levels invest in the prerequisite infrastructure to support the Food and Agriculture Declaration and Climate, Relief, Recovery, and Peace Declaration endorsed at the COP28.

The aim of this study is therefore, to suggest a communication model (for public administrators) that is more likely to effectively encourage the behavioural shifts among stakeholders that climate change necessitates. It is concluded that in isolation, cognitive, experiential and normative approaches are unlikely to induce behavioural change. Instead, we argued that future interventions are more likely to reduce the gap between public communication and behavioural change when public campaigns:

(1) effectively integrate cognitive, experiential and normative aspects of human behaviour in their message design (2) make the climate change context explicit and (3) foster a strong link between the behaviours that need to be changed and their psychological determinants.

Overall, the level of public awareness on issues related to climate change in Nigeria is considered to be low. There is great need to improve public understanding of the potential impact of climate change.
Also, the impact of climate change is evident proven by various studies conducted in different parts of Nigeria. In summary, these impacts include:

- The vulnerable and socially marginalized groups – such as the poor, children, women, the elderly, and indigenous people – tend to bear the brunt of environmental change.
- Changes in climate factors have significant consequences for the agricultural sector. The adverse impacts of climate change are expected to lead to production losses in the sector.
- Climate change will affect the nature and characteristics of the freshwater resources of Nigeria. The impacts will vary between eco-zones, exacerbating existing problems of too much water (floods) too little water (droughts) and reduced water quality.
- Nigerian forests are already under great pressures arising from increasing populations and growing economic wealth leading to greater demand for forest resources. Climate change is expected to add to these pressures.
- Increased aridity, increased intensity and variability of rainfall, and sea level rise all have impacts on organisms, species, and habitats. Climate change can also lead to loss of livelihoods.
- Direct health impacts of climate change stem from extreme events such as heat waves, floods, droughts, windstorms, and wildfires. Indirect effects of climate change on health may arise from malnutrition due to reduced food production, from spread of infectious disease and food-and water-borne illness, and from increased air pollution.
- Climate change will have an economic impact on housing throughout the country due to the wide range and distribution of hazards including sea level rise, increased frequency and severity of storm surges, increased flooding associated with high rainfall events, and high winds.
- Climate change is also expected to negatively impact thermal the already limited electrical power supply through impacts on hydroelectric and thermal generation. Service interruption is also expected to result from damage to transmission lines and substation equipment impacted by sea level rise, flash floods, and other extreme weather events.
- Nigeria's transportation infrastructure includes road and highway networks, railways, canals and navigable waterways, seaport, airports, associated facilities, and vehicle fleets. Much of this infrastructure is inadequate for current needs, and vulnerable to the impacts of climate change.

5.2. Conclusion and Suggestions

The challenges of climate change are real and will continue to escalate. The efforts of government in mitigating the effects of climate change on the populace can only be meaningful when the people participate fully in the developed plans and policies to scale down the effects at all the relevant levels (from different communities to the LGA, State and National governments). The ultimate solutions to climate change are workable, cost-effective technologies which permit society to improve living standards while limiting and adapting to changes in the climate. Yet scientific, engineering, and

organizational solutions are not enough. Societies must be motivated and empowered to adopt the needed changes. For that, the public must be able to interpret and respond to often bewildering scientific, technological, and economic information. Social psychologists are aware, through their painstaking scientific research, of the difficulties that individuals and groups have in processing and responding effectively to the information surrounding long-term and complex societal challenges. This guide powerfully details many of the biases and barriers to scientific communication and information processing. It offers a tool—in combination with rigorous science, innovative engineering, and effective policy design—to help our societies take the pivotal actions needed to respond with urgency and accuracy to one of the greatest challenges ever faced by humanity: global-scale, human-induced environmental threats, of which the most complex and far reaching is climate change.

Based on the outcome of this study, the following suggestions are made. Firstly, government should drive communications bothering on legislation, policy, plans and actions with regards to adaptive measure such as:

- more fuel-efficient vehicles usage;
- reduced vehicular use;
- improved energy-efficient buildings;
- development of carbon capture and storage processes;
- increased off-grid/mini-grid renewable energy (solar, wind, etc.) usage;
- decreased deforestation activities; and,
- improved soil carbon management strategies.

Regarding individual/community actions, the following are suggested and/or recommended:

- Adopt energy-saving appliances and measures such as unplugging appliance when not in use;
- Use water saving appliances;
- Learn more about climate change, its causes and impacts, and steps to adapt and curtail its impacts;
- Building and energy-efficient houses;
- Cultivate the habit of planting trees annually; and,
- Use more of mass transportation services, biking and walking.

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