



**An evaluation of subnational climate change
response in Lagos state, Nigeria and Kwazulu
Natal province, South Africa**

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Dedication

This thesis is dedicated to the memory of my loving mother, **LATE MRS OMORINOLA OLAJIDE**. Mummy, you began this journey with me but death snatched you from my hands before I could complete it. I know you are proud of me and the man I have become. Thank you for the sacrifices you made for me to become what I am today.

Declaration

I declare that this study, *An Evaluation of Subnational Climate Change Response in Lagos State, Nigeria and Kwazulu Natal, South Africa*, is my original work. It has not been submitted for the award of any degree in any institution within and outside NWU and the Republic of South Africa. I have duly referenced and acknowledged any other materials and works used in this study as required by the University for the Award of the degree of Doctor of Philosophy. I declare that in the course of carrying out this study, there was compliance with the standard ethical principles of research and that the necessary training and certification were issued to me by NWU. I also declared that there is no conflict of interest in the conception and execution of this study.

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Certification

I certify that this work was carried out by BAMIDELE EMMANUEL OLAJIDE, Student Number 31869890, of the Department of Political Studies and International Relations, North West University, Mahikeng Campus, under my supervision.

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Abstract

The study examined the impact of climate change in Lagos State, Nigeria and Kwazulu Natal Province, South Africa. It evaluated the effectiveness of climate change policies and programmes of Lagos State and Kwazulu Natal Provincial governments in responding to climate change. The study determined challenges faced by intergovernmental relations, finance, and environmental institutions and the impact of these on climate change response of Lagos State and Kwazulu Natal Province and identified ways of improving existing climate change response programs and strategies of Lagos State and Kwazulu Natal Province. This was to advance knowledge on contributions of sub-national entities (Lagos state and Kwazulu-Natal) in Africa towards combating the climate change debacle. The study utilised a qualitative research design that was sourced through in-depth interviews (IDIs) and focus group discussions (FGDs) with purposively selected participants from Lagos and Kwazulu-natal respectively. A total of 22 participants were interviewed and 70 participants went through Focus Group Discussions in both Lagos and Kwazulu-natal. Data were analysed using thematic content analysis. Results showed that both Lagos State and Kwazulu-natal are vulnerable to climate change as they both suffer from sea level rise or heat waves, erosion, displacement, flooding, and other associated risks of extreme climate variability and that climate change policies and programmes of both Lagos and Kwazulu-natal are not effective. Results also showed that while the response to climate change in Lagos State, suffers from strained intergovernmental relations, poor funding, and weak environmental institutions, response to climate change in Kwazulu-Natal, is drastically affected by weak environmental institutions and that both Lagos State and Kwazulu Natal should devise creative climate finance, improved intergovernmental relations, and strengthen environmental institutions to be proactive to their climate change duties. The study concluded that subnational entities such as Lagos State and Kwazulu Natal climate change are important to the national climate ambitions of Nigeria and South Africa respectively. The study recommended among other things that Nigeria and South Africa should address intergovernmental relations issues that encumber the climate change response of Lagos and Kwazulu Natal respectively while both subnational governments should devise creative means of raising local climate finance and also engaging more in paradiplomatic networking to enhance their climate finance and technical expertise. They should also revamp existing institutions and build new ones to ensure that climate change response is effective in both mitigation adaptation.

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List of Abbreviations

100RC – 100 Resilient Cities

AFOLU – Agriculture, Forestry and Other Land Use

AU – African Union

BRT – Bus Rapid Transport

CAP – Climate Action Plan

CFCs – Chlorofluorocarbons

CNG – Compressed Natural Gas

COGTA – Department of Cooperative Governance and Traditional Affairs

COP – Conference of Parties

CSOs – Civil Society Organisations

DISCOs – Distribution Companies

ECOWAS – Economic Community of West African States

FGD – Focus Group Discussion

FGN – Federal Government of Nigeria

CF – Global Climate Fund

GEF – Global Environmental Fund

GHG – Greenhouse Gas

INDCs – Intended Nationally Determined Contributions

IPCC – Intergovernmental Panel on Climate Change

IPP – Independent Power Programme

KAI – Kick Against Indiscipline

KZN – Kwazulu Natal

KZN DARD – Kwazulu Natal Department of Agriculture and Rural Development

KZN EDTEA – Kwazulu Natal Department of Economic Development, Tourism and Environmental Affairs

LASEPA – Lagos State Environmental Protection Agency

LASG – Lagos State Government

LASPARK – Lagos State Parks and Gardens Agency

LASTMA – Lagos State Transport Management Authority

LASWA – Lagos State Waterways Authority

LAWMA- Lagos State Waste Management Authority

LCDA – Local Council Development Areas

LGAs – Local Government Areas

LTAS – Long Term Adaptation Scenarios

MCCP – Municipal Climate Protection Programme

MDGs – Millennium Development Goals

NCCRP – National Climate Change Response Policy

NCCRPW – National Climate Change Response White Paper

NDCs – Nationally Determined Contributions

NESREA – National Environmental Standards Regulatory and Enforcement Agency

NGOs – Non-Governmental Organisations

NIMET - Nigerian Metrological Agency

NIWA – Nigerian Inland Waterways Agency

NPA – Nigerian Ports Authority

NREEEP – National Rural Electrification and Energy Efficiency Programme

PPP – Public-Private Partnership

R&D – Research and Development

REDD – Reducing Emissions through Deforestation and Forest Degradation

SALGA – South African Local Government Association

SDGs – Sustainable Development Goals

SMEs – Small and Medium Scale Enterprises

UK – United Kingdom

UN – United Nations

UNDP – United Nations Development Programme

UNFCCC – United Nations Framework Convention on Climate Change

UNWTO – United Nations World Tourism Organisation

USAID – United States Agency for International Development

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Chapter One

Introduction

1.1 Background to the Study

Climate change is one of the biggest challenges of the present civilization. This is because the rise in carbon emissions and the concentration of greenhouse gases have caused an unprecedented rise in global temperature (Dunamoski, 2011; Klein, 2015; Scranton, 2015; Butler, 2018). The nature of the menace is that it is a global problem that requires the contributions of all stakeholders ranging from state to non-state actors around the world. Another feature of the climate challenge is the fact that its effects are already being felt disproportionately across climes of the world, with the African continent billed to be the worst hit (Africa Progress Panel, 2015; World Economic and Social Survey, 2016). This realisation requires a prompt and decisive response by African nations along with developments in Global Environment Governance as championed by the United Nations Framework Convention. One such development is the need to involve all levels of government in a multi-level governance architecture for climate change response.

The United Nations in the World Public Sector Report of 2001, titled ‘Globalisation and the State’ made a case for more devolution of power for subnational governments in a multi-level governance arrangement (United Nations, 2001). The same cannot be said of Nigeria and South Africa, Africa’s biggest economies and leaders. Nigeria and South Africa are leaders of the African Group in the United Nations Framework Convention for Climate Change (UNFCCC) (Olutola, 2019). Climate change is a global problem that is felt in disproportionate ways across the world as many developing countries lack the financial, technical, and infrastructure wherewithal to adapt to the reality of the rapidly changing climate and the issues that come with it. This situation is true of Africa, the world’s largest pool of the poor. This means Nigeria and South Africa must institute ways by which they can confront this menace decisively. One such way is ensuring that subnational governments take part in climate change response. This comes to the fore with the continent’s history of authoritarianism which affected intergovernmental relations of African countries vis à vis their subnational units. Nigeria and South Africa also had their fair share of authoritarianism in military rule and apartheid. This study examines the response to climate change by Lagos State and the Province of Kwazulu Natal as subnational units of government in Nigeria and South Africa.

Lagos State and Kwazulu Natal Province have similar geographical features in terms of their location along the Atlantic and Indian Oceans respectively. Their location and vulnerability as coastal political units make them important to the understanding of subnational climate change response in terms of adaptation policies and their impacts on the people. Lagos is a coastal state in Nigeria, it is the commercial nerve centre of the country. Lagos State has a total landmass of 3,577km², of which 787km² is made up of lagoons and creeks while 22% of Lagos State is covered by water (Elias and Omojola, 2015; New World Encyclopaedia, 2018). The State is a low-lying subnational unit with communities within 110 meters of the sea, which makes it very vulnerable to climate change and its effects such as coastal erosion and flooding (Ayodele, 2016). In terms of vulnerability, Lagos State is vulnerable to the effects of climate change such as a rise in the ocean level, which is consequently a trigger of erosion, especially in the coastal communities, some of which are densely populated slums (Adelekan, 2021). Some of the high-income areas of Lagos State are also coastal areas and vulnerable to ocean surges and similar threats (Mehrotra, Natenzon, Omojola, Gilbride & Rosenzweig, 2009). Kwazulu Natal, South Africa's second-most populous Province and one of the country's three coastal regions, on the other hand, has a coastline of 640km and 73 estuaries (South African Local Government Association, 2017). As a Province with a long coastline that is equally dotted with communities, it is vulnerable to climate change and its effects such as coastal erosion and flooding, water stress, food security, and loss of biodiversity, among others.

Lagos State has developed a few instruments to ensure environmental sustainability such as the Lagos State Environmental Protection Agency Law of 1996, the new Cleaner Lagos Initiative and a host of other policies such as the Lagos State Environmental Protection Law (EMPL) of 2017 and the Lagos Climate Action Plan 2020-2025. The state in its capacity is trying to respond to climate change and other environmental issues. The Kwazulu Natal Province has developed a few instruments and institutions to deal with its vulnerabilities. These include the establishment of the Kwazulu Natal Climate Change and Sustainable Development Council in 2012 (Coan, 2012), the Kwazulu Natal Climate Change Strategy and Action Plan in 2014, setting up diverse committees and structures to tackle the various avenues through which the environment might be endangered and the development of Response Toolkits across Municipalities within the Province. The

Province also played host to the United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (COP 17) in 2011.

The Intergovernmental Panel for Climate Change (IPCC) notes that climate change effects are uneven such that African countries would be more severely affected; response efforts were advised to mitigate but more importantly to adapt to changes brought about by the phenomenon (Niang, Ruppel, Abdrabo, Essel, Lennard, Padgham, & Urquhart, 2014). Lagos State and Kwazulu Natal Province being strategic coastal subnational units in Nigeria and South Africa are already being affected by climate change. Incidences of coastal erosions that have had serious effects on the lives and livelihoods of citizens living in Lagos and Kwazulu Natal have been reported in the two units over the last decade (Elias & Omojola, 2015; Smith, Guastella, Mather, Bundy & Haigh, 2012).

Parties to the global environmental crusade are meant to develop national environmental strategies based on local realities and problems (World Bank, 2005). The 2015 call for the Intended Nationally Determined Contribution (INDC) of Parties to the United Nations Framework Convention on Climate Change marks the boldest and latest attempts at ensuring that individual states contribute to the climate change struggle. This made COP 21 of Paris a watershed event in the global efforts against climate change as state parties to the UNFCCC agreed to limit emissions to below 2°C and eventually limit it to 1.5°C. This is due to the recognition of the potential contributions of subnational political entities and non-governmental groups to climate change dialogue through innovative policies and interventions. Christoplos, Aben, Bashaasha, Dhungana, Friis-Hansen, Funder ... & Sen. (2016, p.5) affirm that subnational entities are “often responsible for implementing national climate change policies and interventions in practice, while at the same time being accountable to the local population. Their decisions about how to interpret and implement climate policies in practice have direct and often substantial impacts on livelihoods and the risks faced by climate-vulnerable people”.

As it stands, climate change adaptation programmes and policies of Lagos State and Kwazulu Natal are fraught with issues and challenges of adequacy in addressing vulnerability and implementation. As a result, the climate change policy responses of Lagos and Kwazulu Natal are not commensurate with their levels of vulnerability. The climate change response of Lagos State is haphazard as the climate change policies and programmes are fraught with problems such as inadequate finance and weak institutional outlook, among others. The situation in Kwazulu Natal

is not too different from that of Lagos as it has some of the most at-risk communities in South Africa. Despite this, the policies and programmes are not achieving maximum results due to similar reasons as that of Lagos State (Elias and Omojola, 2015; Mather & Theron, n.d). Therefore, extreme weather events affect people adversely (Adelekan, 2016; Sithole, 2016; Drysdale, Moshabela & Bob, 2019). The policies and programmes are not effective in ensuring that residents of the two subnationalities can cope with changing climate realities.

Poorly managed and uncoordinated intergovernmental relations and weak institutions have been the bane of viable climate change response in Lagos State and Kwazulu Natal (source). These have affected their ability to come up with policies and programmes that are well-financed and implemented for the benefit of residents. Intergovernmental relations has the potential to affect subnational climate change finance (Olajide & Ojatorotu, 2019). The financial outlay for climate change response is low in Lagos State and Kwazulu Natal due to the complexities of the politics of international and local climate finance. While Nigeria finds it difficult to leverage international climate finance from which Lagos State can benefit, climate finance in Kwazulu Natal remains inadequate despite the flow of international climate finance to South Africa with the Province standing to benefit from it (Olajide & Ojatorotu, 2019; Montmasson-Clair, 2013). In the same vein, weak environmental institutions have not allowed for a sound climate change policy process, especially at the implementation level. These institutions are either weak or do not have the requisite autonomy to allow them to function at an optimal level. As Third World political units, the bane of unviable institutions, in effect, weakens climate change response in these locations (Agrawal, McSweeney & Perrin, 2008). The twin issues of intergovernmental relations and lack of viable institutions have ensured that the Lagos State and Kwazulu Natal are not able to respond to climate change optimally.

Inadequate response by both Lagos State and Kwazulu Natal Province predisposes their citizens to serious challenges such as flooding, drought, heat waves, air pollution, and biodiversity loss, among others, leading to loss of lives and disruption of livelihood. It, therefore, becomes necessary to conduct a systematic study on the issues as a means for evolving workable climate change response that would ensure that their citizens are in the best stead to adapt to climate change and evolve medium and long-term strategies to mitigate the problem.

1.2 Statement of the Problem

Citizens in Lagos State and the Province of Kwazulu Natal, like others, are supposed to be free from problems of erosion, rise in sea level, flooding, and the harsh atmospheric temperature that impoverish their means of livelihood. An effective response to, or against these ugly climatic conditions could have been more rewarding in terms of improving the healthy living of citizens, their businesses, and their environment. However, the reality in Lagos and Kwazulu Natal, shows that citizens and their businesses suffer from harsh climate conditions. The case of the rising sea level and flooding, which has continued to drive people away from their homes or washed away crops for food production is rampant in both locations in Nigeria and South Africa (Elias & Fasona, 2015; Averchenkova, Gannon & Curran, 2019).

There is evidence of climate change response measures in Lagos State and Kwazulu Natal. The problem, however, is that these measures are not effective. Some of the measures include in Lagos include the Lagos State Environmental Protection Agency Law of 1996, Lagos State Climate Change Adaptation Strategy (LAS-CCAS) of 2012, Lagos State Climate Change Policy (2012-2014), Lagos Resilience Strategy (2020) and the Lagos State Climate Action Plan (2020-2025), Cleaner Lagos Initiative and Lagos State Environmental Protection Law (EMPL) of 2017, while those of Kwazulu Natal include The Climate Change and Sustainable Development Council in 2012, Draft KwaZulu-Natal Green Economy Strategy, Kwazulu Natal Environmental Management Strategic Plan 2014-2019, 2030 Provincial Growth and Development Plan, National Kwazulu Natal Conservation Management Act of 1996, Kwazulu Natal Tourism Master Plan and the Oceans Economy Strategy. As laudable as the measures are, they have not been able to prevent the worsening climate events in both locations.

While the role(s) of subnational governments in climate change response is recognised across the world, political dynamics such as intergovernmental relations, institutional viability and finance continue to pose a considerable challenge to the effectiveness of their offerings (Agrawal, McSweeney & Perrin, 2008; Smoke & Cook, 2022). In Lagos State, for instance, the conflict-ridden intergovernmental relations of Nigeria are a veritable problem in its efforts mitigation and adaptation efforts. While the intergovernmental relations of South Africa not conflict-ridden as that of Nigeria constitute a considerable drag in the ability of Kwazulu Natal in climate change response because of the subservient status of provincial governments to the national government

(Hendricks, 2016). Both subnational units are enmeshed in an institutional and financial conundrum, such that both of them find it tenuous to develop and implement effective climate change response policies and strategies. The import of the political weakness of Lagos State and Kwazulu Natal many of the time-bound climate change response policies elapse without tangible results. This leaves the citizens at the mercy of inclement climate conditions that have implications for the social, economic, environmental and other aspects of their lives.

Given the foregoing, this research is a way of finding sustainable solutions to climate change issues in both regions. It could also provide information on how to design result-oriented policies against climate change problems for both sub-national governments in Lagos and Kwazulu. Although, studies have been conducted to examine action or response against climate change in Nigeria and South Africa the majority of the studies were provoked by SDG 13, which advocates for collaborative actions against climate change. Although this goal has made many scholars examine collaborative responses against climate change at the national or international level, evidence is significantly low in the number of studies that have empirically interrogated the response of sub-national entities. Even the few ones that examined country-level response to climate change, have concentrated too much on the central government; not much is known about how to respond to climate change from the perspective of intergovernmental relations between the central government and its subnational entities in Africa. This study bridges this gap by examining the contributions of sub-national entities in Lagos State and Kwazulu-Natal, Nigeria and South Africa in combating the climate change debacle.

1.3 The Aim of the Study

This study aims to investigate the contributions of sub-national entities in Africa towards combating the climate change debacle with emphasis on Lagos State, Nigeria, and Kwazulu Natal Province of South Africa.

1.4 Objectives of the Study

- i. To determine the evidence and impacts of climate change in Lagos State, Nigeria, and Kwazulu Natal Province, South Africa;
- ii. To evaluate the effectiveness of climate change policies and programmes of Lagos State and Kwazulu Natal Provincial governments in responding to climate change;

- iii. To determine the challenges posed by intergovernmental relations, finance, and environmental institutions, and the impact of these on climate change response of Lagos State and Kwazulu Natal Province;
- iv. To interrogate and map ways of improving existing climate change response programs and strategies of Lagos State and Kwazulu Natal Province.

1.5 Research Questions

- i. What are the evidences and impacts of climate change in Lagos State and Kwazulu Natal?
- ii. How effective are climate change policies and programmes of Lagos State and Kwazulu Natal Provincial governments in responding to climate change?
- iii. What challenges do intergovernmental relations, finance, and environmental institutions of Lagos State and Kwazulu Natal Province face in their responses to climate change?
- iv. In what ways are Lagos State and Kwazulu Natal Province similar and different in their climate change responses?

1.6 Significance of the Study

Climate change and climate change response have become critical issues in development discourse (Frankhauser & Stern, 2016). Therefore, studies on climate change response in any part of the world become an opportunity to contribute to the quest for global sustainability. In line with this reasoning, this research is significant in several ways. This study attempts to provide empirical and evidence-based political and public policy analysis of the impact of climate change in Lagos State and Kwazulu Natal. It is original research on the process of making climate change policy and programmes as well as providing insight on the political dynamics of climate change response in the study areas. Hence, the research is a meeting point for climate change policymakers and the citizens who are the beneficiaries of climate change policies.

The study is also relevant for its comparative outlook. Given the development of peer review culture in governance (Gruzd, 2014), this offers an ample opportunity to see what Lagos State and Kwazulu Natal are doing in their respective climate change response and isolate lessons that can be learned from one another to improve their response to the menace. It, therefore, becomes

necessary to conduct a comparative study on the two regions' climate change responses. This can produce policy suggestions that would enable citizens of Lagos State and the Province of Kwazulu Natal to adapt to climate change and evolve medium as well as long-term strategies to mitigate the problem.

This study recognises the rise in importance of subnational governments in global policy circles with climate change regimes as some of the important in the world at present (Christoplos, Bashaasha, Dhungana, Friis-Hansen, Funder, Hunong, Khatri, Lindegaard, Mweemba, Ngoan, Nyambe, Ojha, Okiro & Thi-Hoa-Sen, 2016). In the light of this, this research presents an ample opportunity to consider how, beyond the national level, sub-national political governments in Africa are adapting to climate change. The study contributes to the general body of knowledge in environmental politics, comparative study, international relations, and responsive governance in Africa, with a specific focus on Lagos State, Nigeria and Kwazulu-Natal Province, South Africa. This is because subnational governments are now seen as critical stakeholders in the implementation of climate change action plans. The choice of subnational units in Nigeria and South Africa presents an opportunity to see how the two African leading economies are responding to climate change by carrying Lagos State and Kwazulu Natal along and the political problems the subnational units encounter in this process.

The study of climate change response of Lagos State and the Province of Kwazulu Natal represents cross-cultural studies not just between Nigeria and South Africa but between West Africa on the one hand and Southern Africa on the other hand. Therefore, the study is important in its consideration of the politics of subnational climate change response in the West African and Southern African sub-regions of Africa. It expands the frontier of knowledge in the possibility of understanding the relationship between intergovernmental relations, finance, and environmental institutions as enablers of or barriers to subnational climate change response in the two sub-regions of the African continent.

This study would be of policy relevance in Lagos State, the Province of Kwazulu Natal in climate governance. This means that other subnational governments in Nigeria and South Africa respectively can benefit from the findings and recommendations of this study. The same also applies to subnational units across the African continent and other developing nations. As a study

that evaluates subnational climate change response in Nigeria and South Africa respectively, this study would benefit the national climate change policymakers in both countries in terms of understanding political barriers that could hamper effective subnational climate change response within them respectively. With this, the study encourages the review of existing and future political contradictions and problems encountered in intergovernmental relations, climate finance, and institutions to enable their subnational governments to contribute meaningfully and effectively to reducing emissions and anticipatively and creatively adapt to climate change.

The study would inform civil society organisations, donors, international partners, and global subnational climate organisations about the political problems of subnational climate change response of Lagos State and Kwazulu Natal in Nigeria and South Africa respectively. This is because the understanding of these political enablers and or barriers will enhance their position in interacting with the subnational and national governments respectively. In this respect, this study can help these bodies to mitigate problems that might arise from intergovernmental relations, climate finance, and institutions in Lagos State and Kwazulu Natal and to creatively conduct their relations with them to achieve the aims of their relations. This would ensure political problems do not substantially affect their contributions to subnational climate change response in Lagos State, Kwazulu Natal, other subnational units within their respective countries, and other developing countries around the world.

1.7 Scope and Delimitation of Study

Understanding and setting a proper scope and delimitation for a study is important in the planning of research. This entails setting the parameters and boundaries for the study (Diego, 2020). Mapping the scope of study makes the study manageable as there is always the temptation for researchers to want to ensure that their studies are broad enough to enable them to make findings that are far-reaching in problem-solving. This is, however, not the case as a study that lacks a good scope and delimitation may not be able to fulfil these aims. Given this, Akanle, Ademuson & Shittu (2020) contend that the “scope of social research is to make research manageable, handy, researchable, optimal and SMART” (p. 105). For research to be SMART, it means it must be simple, measurable, achievable, researchable and time-bound.

It is consequent upon this that a study can achieve the desired results a researcher set out to achieve because, through the scope of the study, the necessary parameters and boundaries have been set. The scope provides a platform for assessing the researcher. In this wise, Akanle, Ademuson & Shittu (2020) assert further that “researchers need to determine the scope very early enough in the research cycle. Aside from the fact that it makes research processes seamless and focused, it also makes research financing and accounting transparent, easy and accountable. Good research scope establishes a researcher’s competence, expertise and integrity” (p.105). Therefore, to ensure that this study is SMART, the scope and delimitation are done in terms of periodisation and the necessary variables/themes chosen in terms of climate change response.

This study covers the twenty years between 2000 and 2020 in which climate change and its issues became an agenda of unprecedented status. Since the turn of the millennium in the year 2000, the quest for development in Africa gathered unprecedented momentum, especially through the adoption of the Millennium Development Goals which lasted till 2015. Upon the expiration of the window of the MDGs, world leaders expanded their development objectives of the paradigm into a 17-goal Millennium Development Goals (SDGs). The African continent and the rest of the developing world are expected to have shored up their development deficits between 2015 and 2030. Also within the African continent, the period 2000 to 2020 have seen the rise of regional development agenda and paradigms. A prime example of this is Agenda 2063 which was adopted in 2015. The relevance of this study within the global and regional development paradigms is the quest for multi-level and multi-stakeholder involvement in the governance of African countries. It is also instructive to note that climate change response as an element of sustainability features in these paradigms and that subnational governments have important roles to play in their achievement and implementation (Africa Union, Economic Commission for Africa, African Development Bank & United Nations Development Programme, 2016). Therefore, the period 2000 - 2020 is critical in the climate change response of Lagos State and Province of Kwazulu Natal in Nigeria and South Africa respectively.

Another reason why the period 2000 – 2020 is relevant to this study is that, since the turn of the century, subnational governments have acquired increased importance in governance within their countries. A first clarion call during this period was made in the United Nations Public Sector Report of 2001 which interrogated the role of the state within an emergent globalised system. The

United Nations advised nations to devolve more powers to subnational governments as the old practice of concentration of powers in the hands of the state weakens governance and development (United Nations, 2001). Therefore, almost every development agenda and policy advice within international space advocates for improved decentralisation and devolution of powers to the subnational government.

An example of this is in the year 2015, which marks a watershed in climate change negotiations as the Conference of Parties of the UNFCCC in which a rare breakthrough in negotiations was made. The Paris Agreement made a case for greater involvement of non-state actors in climate change response. With this, the status and responsibilities of subnational political units as vehicles for the implementation of national climate strategies was re-affirmed and enhanced to make climate change response more inclusive through vertical and horizontal interactions among stakeholders and all levels of government (Hale, 2016; Petrie, Wolpe, Reddy, Adriázola, Gerhard, Landesman... & Marie, 2018). This is because Sub-national governments have featured prominently in decreasing greenhouse emissions in the last two decades, according to studies. Many areas with strong mitigation potential, including housing, transportation, land use, urban planning, infrastructure development, and waste management, are frequently under the jurisdiction of subnational government units (Petrie, Wolpe, Reddy, Adriázola, Gerhard, Landesman... & Marie, 2018). Based on the foregoing, this study examines the political dynamics of the climate change response of Lagos State of Nigeria and Kwazulu Natal Province of South Africa during this period. The objectives and research questions of the study revolve around the political challenges of climate change response in Lagos State and Kwazulu Natal as exemplified in intergovernmental relations, climate finance, and institutions.

Thematically, the study dwells on mitigation and adaptation as climate change response in Lagos State and Kwazulu Natal. While the two subnational governments are located in historically low-carbon-emitting African continent (though South Africa's emissions are high compared to other African countries) (Amusan & Olutola, 2017), the need to embrace mitigation to reduce emissions is important. As an anthropogenic phenomenon, highly populated regions and cities around the world are usually the highest emitters within their respective nations (Moran, Kanemoto, Jiborn, Wood, Tobben & Seto, 2018). With this in mind, Lagos and Kwazulu Natal need to embrace climate change mitigation because of their relative populations in Nigeria and South Africa

respectively. The relatively large populations and the structure of the economies are the drivers of emissions such that Lagos is the leading emitter among Nigerian states while Kwazulu Natal as South Africa's second-largest population means it has a high carbon footprint relative to other provinces in the country (Lagos State Government, 2021; Jagarnath & Thambiran, 2018). This means as fractions of humanity, Lagos State and Kwazulu Natal need to contribute their quota to the global question for reduction of greenhouse gases and the stabilisation of the already emitted gases in the atmosphere.

On the other hand, climate change adaptation is a focus because Lagos State and Kwazulu Natal as African subnational entities are already experiencing the impacts of climate change. The two subnational spaces are vulnerable to climate change because of their geographies which are largely low-lying and at the risk of being submerged because of sea-level rise (Uwaegbulam, 2019; Bega, 2020). In the same vein, their large populations are coastal community-based, which means that the majority of the populations of Lagos and Kwazulu Natal are daily being affected by impacts such as floods and erosion, a situation exacerbated by the absence of infrastructure for the people to cope with their realities as African subnational units (Elias & Omojola, 2015; Hunter, North, Roberts & Slowtow, 2020). The importance of adaptation as a regional and local climate action means that the necessary investments are made in Lagos and Kwazulu Natal so that they can leverage the development opportunities inherent in climate change response. This is because “adaptation to climate change has the potential to substantially reduce many of the adverse impacts of climate change and enhance beneficial impacts—though neither without cost nor without leaving residual damage” (Smit & Pilifosova, 2003:897). This is why the bulk of the bandwagoning objectives of Nigeria and South Africa as well as other African states are based on climate change adaptation (Olajide 2022). This study, therefore, sees the need to study the adaptation plank of climate change response in Lagos State and Kwazulu Natal as two sides of a coin.

The study cannot afford to study mitigation and adaptation in isolation of each other. This is because the two planks are interrelated and nations and their subnational entities run the risk of unwholesome climate change response by addressing one in isolation of the other (Smit & Pilifosova, 2003). While adaptation has been the main focus of African countries in climate change negotiations since its inception at the Earth Conference of 1992 in Rio de Janeiro, Brazil, based on

the principle of Common But Differentiated Responsibilities (CBRD), that is to ensure that each region of the world responds to climate change more in the area in which they have historical complicity, it is still necessary to reduce emissions (Tsega, 2016, Bogott & Van Wyk, n.d.). The interrelation of mitigation and adaptation can be analysed along four planks according to Klein, Denton, Huq, Downing, Richels, Robinson & Toth (2007:750). These are

- Adaptation actions that have consequences for mitigation
- Mitigation actions that have consequences for adaptation
- Decisions that include trade-offs or synergies between adaptation and mitigation
- Processes that have consequences for both adaptation and mitigation.

Therefore, the study of climate change response must be in isolation of one another. This is because their respective offerings in climate change response are interwoven. This interwovenness is presented in Figure 1.1 below;

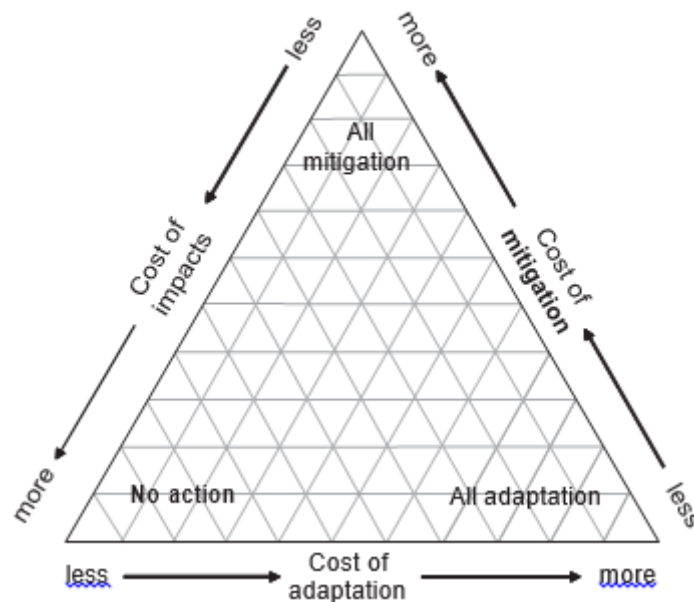


Figure 1.1 A Diagrammatic Representation of the Interrelationship between climate change mitigation and adaptation

Source: Klein, Denton, Huq, Downing, Richels, Robinson & Toth (2007:748)

The foregoing figure shows a cost-benefit analysis of the interrelationship between mitigation and adaptation. This shows that the adequate planning and implementation of each of them as climate

change response reduces the other and in the final analysis reduces the impacts of climate change on its cost on the people and their livelihoods.

1.8 Operational Definition of Concepts

Adaptation: Climate change adaptation involves programmes and measures put in place to ensure that the effects of climate change do not cause unbearable disruptions to the lives and livelihood of the people. Adaptive strategies can be made by individuals, families, communities, and governments. For this research, adaptation means government programmes and strategies to enhance the ability of the people to be minimally affected by climate change and its effects.

Adaptive Capacity: Adaptive capacity is the ability of an individual or a group of persons to adapt to the social, economic, and environmental dynamics produced by climate change.

Central Government: A Central Government is the main Government of a state. Within a state, depending on the political structure adopted, a Central Government is the coordinating governmental structure of the state. It issues guides for lower levels of government within the state and is the sole authority within the state to enter into binding international agreements.

Climate Change Policy: Climate change policy is a plan of action of the government on climate change. This is usually to ensure that the causes and effects of climate change are effectively managed within the state and in consonance with developments in international climate politics.

Climate Change Programme: The climate change programme is a fallout of climate change policy. A programme is a strategy designed by the state and its institutions to ensure that climate change is controlled either in its causes (mitigation) or its effects (Adaptation). Climate change programmes provide veritable platforms for the evaluation of the climate change policies and serve as a good source of feedback within the policy cycle.

Climate Change: This comprises observable changes in the environmental parameters of a place due to a rise in the temperature of the place. The temperature rise is otherwise known as global warming and it is the accumulated effect of resource use by man.

Climate finance: Climate finance is the mechanism for providing funding for countries to tackle climate change through mitigation and adaptation. Sources of climate finance can be international

(UNFCCC, bilateral and other multilateral agreements) and local (Special funds, National Climate Finance Mechanism, private donations, etc.)

Climate change response: The climate change response includes the policies and programmes of government that are meant to help citizens to reduce global warming, the main cause of climate change and ensure that they can adapt to changes caused by climate change.

De Facto Federal Systems: Defacto federal systems are unitary systems that find utility in the federal principles and apply these principles in governing relations between their central and subnational government.

Environmental Institutions: Environmental institutions are government organisations that are responsible for implementing environmental policies and programmes of the state, including climate change.

Federalism: Federalism is a system of governance in which power is distributed between a central government and its constituent units. In a federal system, the powers of the constituent units are guaranteed by a rigid constitution, such that such powers cannot be withdrawn by the central government. Each level of government is the final authority on the allocated responsibilities by the constitution.

Federal Government: A federal government is a central government of a federal system. It is the coordinating level of government in a federation.

Global Warming: The rise in the temperature of the earth is caused by the accumulation of greenhouse gases in the atmosphere. It is responsible for the melting of the polar and arctic ice leading to the rise in sea level, variability in weather conditions and other environmental instabilities.

Intergovernmental Relations: Intergovernmental relations means ongoing and dynamic relations between levels of government in a state. It is meant to regulate and coordinate these relations such that areas of conflict can be recognised and addressed for the smooth running of the system. The term is more popular with a federal system but is now increasingly being used in unitary systems too.

Mitigation: Climate change mitigation is the aspect of climate change response that is meant to reduce carbon emission into the atmosphere. Carbon emission is the most significant contributor to global warming due to the saturation of greenhouse gases in the atmosphere. Hence, it is necessary to evolve mechanisms, technological and otherwise, to reduce carbon emission, which will also reduce the temperature of the world and prevent climate events capable of endangering the lives of the people.

Multilevel Governance: Multi-level governance is a form of governance in which powers and responsibilities are divided among levels of government so that each level can contribute its quota to the solving of problems. A multi-level governance structure can be from the international arena through to the local government. It is the recommended governance structure for climate change response.

Provincial Government: A Provincial government is a type of subnational government. Usually, a mid-level government in both federal and unitary systems.

Public Policy: Public policy is the intended action of the government in addressing social, economic and political issues in society. It is generally seen as the direction by which the government intends to get problems solved. In terms of climate change, public policy is the intended action of the government towards mitigating and adapting to climate change.

Subnational Government: A subnational government is any government below a central government within a system of government. Both federal and unitary systems have subnational governments but with varying degrees of power based on the constitutional guarantee or otherwise.

Unitarism: Unitarism is the system of governance in which power is concentrated in the central government. The central government allocate powers to subnational units mostly through delegation and such powers do not have constitutional guarantees, thus, may be withdrawn from the central government.

Vulnerability: Vulnerability is the degree of susceptibility or openness of a place to disaster. In terms of climate change, it is the degree of susceptibility of a place to the effects of climate change such as coastal inundation, erosion, cyclones, drought, etc.

1.9 Structure of the Thesis

This thesis is divided into eight chapters. Each of the chapters is analysed below as follows;

Chapter One: The Introduction of the thesis detailing the background of the research. Other aspects of the chapter include a statement of the problem, aim and objectives of the research, research question, significance of the study, scope and delimitation of the study, operational definition of concepts and the structure of the thesis.

Chapter Two: The chapter covers Literature Review and Theoretical Framework for the research. The literature for the research is broken into themes. Hence, the state-of-the-art in the search is interrogated in the form of books, journals, reports, working papers and other related texts. The chapter also serves as a vital source of secondary data for the research.

Chapter Three: Deals with the Research Methodology of the thesis. The chapter includes sections such as research design, the population of the study, sample size, sampling technique, data collection, study location, data analysis, limitation of the study and ethical consideration.

Chapter Four: The chapter offers an analysis of the research finding Climate Change and Climate Change Response in Lagos State, Nigeria. Issues such as intergovernmental relations between the Federal Government of Nigeria, environmental institutions, and climate finance are discussed vis à vis the effects on coastal communities in the state that are highly vulnerable to the effects of climate change.

Chapter Five: The chapter offers an analysis of the research finding Climate Change and Climate Change Response in Kwazulu Natal Province, South Africa, Nigeria. Issues such as intergovernmental relations between the Federal Government of Nigeria, environmental institutions, and climate finance are discussed vis à vis the effects on coastal communities in the state that are highly vulnerable to the effects of climate change.

Chapter Six: This chapter deals with the Comparative Analysis and the synopsis of Climate Change Response in Lagos State, Nigeria and Kwazulu Natal Province, South Africa. This was done to know the similarities and differences in climate change responses of both study locations and what accounts for such. The chapter also offers the opportunity to evaluate subnational climate

change response in the two units, leading to the determination of whether Nigeria and South Africa offer platforms for their subnational units to contribute significantly to climate change response.

Chapter Seven: This last chapter combines the Summary, Conclusion and Recommendation of the study. It serves to make deductions and inferences from the previous chapters on the problematique of the research and give a final justification to the research by highlighting the contribution of the study to knowledge on climate change and subnational climate change response in particular.

1.10 Summary of the Chapter

The chapter is the introductory part of the study. It explores the background of the study by establishing climate change as a threat to the development of Lagos State and Kwazulu Natal. It also explores the problematique that spurred the researcher's interest to undertake the study. The chapter lists the aim and objectives and research questions of the study. It also covers other areas such as the significance of the study, scope and delimitation of the study, operational definition of key concepts in the study and the structure of the thesis.

Chapter Two

Literature Review and Theoretical Framework

2.1 Introduction

This chapter contains an important aspect of this research. This is because literature review serves to showcase the extent of work already done in the area of research. It also provides a basis for the integration of a study to the body of knowledge in the relevant study area in theoretical, conceptual and empirical terms (Kumar, 2018). Based on the foregoing, the chapter is divided as follows: first, it offers a review of the relevant literature on subnational climate change response in Lagos Nigeria and the Province of KwaZulu-Natal, South Africa. This is done by dividing the research into themes to unearth the state of the earth in climate change, especially as regards subnational climate change response in the two study locations. To achieve this, the literature review section is divided into two sub-sections. The first sub-section covers the review of the major concepts in the study. These are climate change and climate change response respectively. The second sub-section covers the empirical review of literature on the nexus between climate change and international relations, climate change and intergovernmental relations and climate change and environmental relations in Nigeria and South Africa as they could affect Lagos State and Kwazulu Natal respectively. It also covers reviews of climate change and climate change response in Nigeria, South Africa, Lagos State and Kwazulu Natal respectively. This is to identify the gaps in the literature to further justify and bring into perspective the novelty of the research. Second, the chapter explains the theoretical pillars on which the analysis of findings will rest. This is to have theory-guided research in which results can be valid and reliable.

2.2 Conceptual Review

2.2.1 Climate Change: Meaning, Cause, Evidence and Contestations

Climate change is arguably the world's most pressing challenge of the twenty-first century (Feulner, 2017). This is because of its destructive impacts, which have now been confirmed to be not just environmental but also social, economic, and even political (Feulner, 2017). Since the tail end of the twentieth century, climate change has risen to the top of the policy concerns of policymakers across the world such that it has drawn global attention. Following the release of the Report of the United Nations Commission on Environment and Development (UNCED) title 'Our

Common Future' in 1987, climate change and its narratives have been on the ascent on the global policy scale as urgent action was called for the world to avert an environmental crisis with dangerous development consequences (Brundtland, 1987; Solomon, Manning, Marquis & Qin; IPCC 2021). While there have been contestations, rebuttals, and controversies on the existence of climate change, its impacts and their implications for global development continue to attract policy attention.

Given the importance of climate change as a pressing policy item of this century, it is pertinent to understand its meaning, assert the evidence of its existence and the response that has been mustered to address it as a global menace. As a starting point, to understand what climate change is about, it is necessary to interrogate the concept of climate. It is with the understanding of the concept of climate and its dynamics that the understanding of climate change as a phenomenon can be intelligible. In this wise, Riedy (2016) notes that climate “is the average of the weather conditions at a particular point of the Earth. Typically, the climate is expressed in terms of expected temperature, rainfall and wind conditions based on historical observations” (p.1). The Britannica Encyclopaedia (2008) defines climate as “the average state of the meteorological conditions of a location considered over a long period. The climate of a location is determined by climatological factors: latitude, longitude, altitude, topography, and continentality” (p. 92). In the same vein, Mélières & Maréchal (2015) notes that “at any one place, the climate is defined essentially by the prevailing temperature and by the rainfall (p. 7).

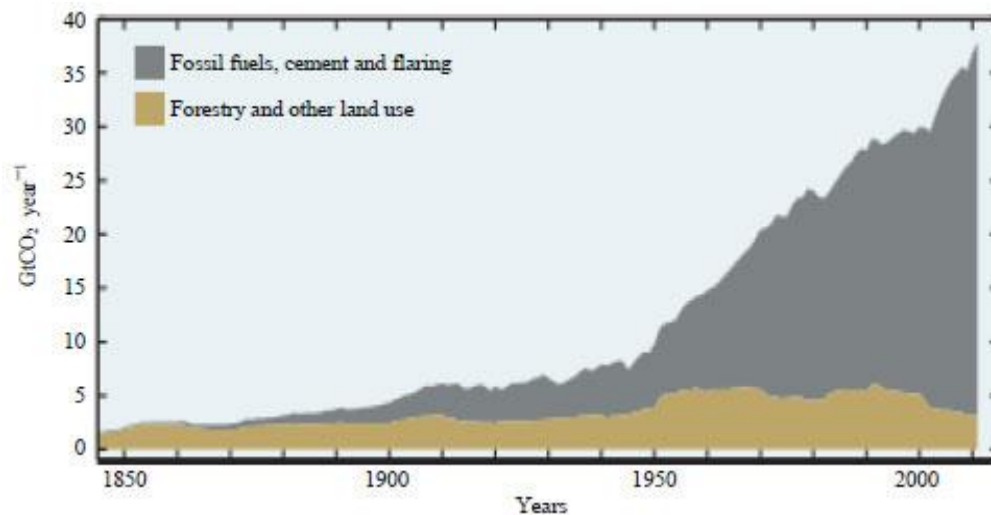
The centrality of climate to the understanding of climate change lies in the fluctuations of these climate parameters over time. Over time, the climate of places has always changed as patterns of the climate system change. The climate system is defined as a function of the mean and variability of temperature, precipitation and wind for about 30 years (Le, Somerville, Cubasch, Mauritzen, Moskit, Peterson & Prather, 2007). The climate system can change through internal and external factors. Internal factors are those that are internal dynamics within the climate of each location at a given time while external factors are natural phenomena such as volcanic eruptions, solar variations, and human activities (Le Treut, Somerville, Cubasch, Mauritzen, Moskit, Peterson & Prather, 2007). It is within external factors influencing the change in the climate system that climate change finds expression.

Climate change consists of the observed changes in the parameters of the climate system. This is much noted in the definition of the Intergovernmental Panel on Climate Change (IPCC) which refers to it as “...change in the state of the climate that can be identified (e.g. 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. It refers to any change in climate over time, whether due to natural variability or as a result of human activity” (UNFCCC, 2011:1). In the same vein, UNFCCC), defines climate change as “change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable periods” (UNFCCC, 2011:2). Tyokumbour (2010) observes that climate change has brought about alterations in the weather and ecological conditions because of human activities.

While the climate system has always experienced changes and fluctuations throughout history, the climate change experience from the turn of the Industrial Revolution in 1850 is unprecedented (Mgbemene, Nnaji & Nwozor, 2016). This leads to the interrogation of the cause(s) of the climate change phenomenon. The most notable environmental outcome of the Industrial Revolution is global warming (National Academy of Sciences & The Royal Society, 2020). Global warming results from the trapping of greenhouse gases into the atmosphere, which is the resultant effect of the greenhouse effect in the atmosphere. The greenhouse effect is the balancing of heat radiating from the sun by allowing 30% of the sunlight back into space while the rest is absorbed into the ocean, air and land. This facilitates life on earth but with the greenhouse gases such as carbon dioxide, methane and others, too much radiation is absorbed into the atmosphere. This makes the earth warmer than necessary for life (Shahzad, 2015). The bastardisation of the greenhouse effect by carbon dioxide and other greenhouse gases have drastically warmed the earth at a rate that had never been hitherto experienced in the historical recordings of changes in the climate system of the earth (National Academy of Sciences & The Royal Society, 2020). This has led to approximately 1°C of global warming above the pre-industrial mark and could even rise to 1.5°C or higher before the turn of this century (Allen, Babiker, Chen, Coninck, Connors, Diemen, Dube, Ebi, Engelbrecht, Ferrat, Ford, Forster, Fuss, Guillén, Harold, Hoegh-Guldberg, Hourcade, Huppmann, Jacob, ... Zickfeld, (2018).

The industrial revolution coincided with the rapid concentration of greenhouse gases into the atmosphere. National Academy of Sciences & the Royal Society (2020) note that the temperature of the earth that is causing the current climate change is unprecedented in terms of its pace and severity. This is because the rate of carbon emissions has grown to over 40% in the last 200 years. Much of this rise in carbon concentration has also occurred from the 1970s to the present time. Figure 2.1 below shows the rate of concentration of carbon into the atmosphere since the 1880s;

Figure 2.1: Rate of Concentration of Carbon into the atmosphere since 1850.



Source: UNFCCC (2020).

Climate change and global warming have been blamed on human activities. These anthropogenic activities according to Figure 2.1 have ensured that excess heat is retained on earth. The scientific exactitude on global warming shows that the future of the earth is at risk in the hands of humans (IPCC, 2007; Allen, Babiker, Chen, Coninck, Connors, Diemen, Dube, Ebi, Engelbrecht, Ferrat, Ford, Forster, Fuss, Guillén, Harold, Hoegh-Guldberg, Hourcade, Huppmann, Jacob, ... Zickfeld, (2018); IPCC 2021). Some of the human activities that induce global warming include fossil fuel combustion, wood burning, rice cultivation in their paddies, livestock farming, manufacture and use of chlorofluorocarbons (CFCs) as aerosol propellants, fire hydrants, foaming agents, and heat transfer media in refrigerators and air conditioning system (Tyokumbour, 2010). The fact is that in the quest for survival and self-actualization, man has fundamentally tampered with the ecosystem in fundamental and complex ways. This has brought with it a contradiction of man destroying his very own habitat in the name of development and survival.

There is evidence that climate change is causing fundamental changes and disruptions in the human environment with serious social and economic outcomes. According to the IPCC (2018), the evidence of climate change transcends the warming of the atmosphere because of the extreme concentration of greenhouse gases in the atmosphere. Therefore, beyond global warming, the evidence of climate change includes extreme weather events, sea-level rise, and acidification of the oceans, melting of the glaciers and ice caps in the Arctic region of the world and general uncertainty of weather patterns across the world. In the same vein, Schulze (2007) cited in Sithole (2016:4) notes that climate changes bring about environmental/weather changes in the society as follows;

“flooding and erosion of coastal areas – glacier ice melts raise the sea level and affect low lying coastal areas; • drought, desertification, shortage of drinking water – dry areas receive less rain, making them even drier; • more difficulty growing crops due to little or too much rain; • coral bleaching – coral whitens and can become destroyed by an increase in sea temperature, storms and flooding or sedimentation thus causing a decrease in fish habitat; • loss of biodiversity, plant and animal migration because the climate no longer supports them; spread of disease – for example, malaria and other insect-borne diseases from insects because insects can survive in new environments created by weather changes; • damage to homes, land and infrastructure from more severe storms or flooding”.

Despite the foregoing pieces of evidence of climate change as induced by global warming, there exist contestations about the trend, causes and impacts of climate change. Since the 1990s when climate active change denial broke out, the phenomenon has acquired a political life with a well-grounded ideology (Collomb, 2014; Hakkinen & Akrami, 2014). The crux of climate change denial is to attack the credibility of the consensus on the anthropogenic nature of climate change. Climate deniers do essentially not deny the existence of climate change, rather, they attempt to cast doubt on the science of climate change and attack its credibility (Dunlap & McCright, 2011). Thus, there exists a vast climate change denial industry with a large number of actors such as contractarian scientists, fossil fuel corporations, conservative think tanks, conservative media and politicians, among other groups, essentially with the overarching aim of derailing regulatory efforts at restricting carbon emissions (Dunlap & McCright, 2011).

There are different types of climate deniers. Their methods of climate denial are decipherable by the methods they employ in engaging in denying climate change. (Rahmstorf, 2004) identifies three types of climate denial and the methods employed by their respective deniers. These are trend sceptics, attribution sceptics and impact sceptics. For trend sceptics, there is nothing like climate change. In their view, the environmental measures pointed to by scientists were wrong. They anchor their position on urbanisation as the measures were due to urbanisation around the stations where the measures were taken. Attribution sceptics doubt the anthropogenic causation of climate change. Some of them see climate change as a natural occurrence rather than being caused by human activities. Lastly, impact sceptics baselessly argue that climate change might have positive impacts after all. This is because agriculture can be extended to places with higher latitudes (Rahmstorf, 2004).

Similarly, Maslin (2019) opines that climate denial has five pillars, all of which he deemed corrupt. These are science denial, economic denial, humanitarian denial, political denial and crisis denial. Science deniers contend that the science of climate change is still debatable because CO₂ cannot be responsible for global warming. After all, it is rather a small portion of the atmosphere. Economic denial is anchored on the cost of addressing climate change (Maslin, 2019). Economists, however, punctured the argument as just 1% of global GDP would be needed to address the menace but could rise to 20% by 2050 if not addressed (Maslin, 2019). For those holding on to humanitarian denial, climate change could serve some good as some of the cold places in the world would be warmer, thereby making agriculture more viable. Evidence, however, suggests that there is a rising incidence of the heatwave in these cold regions (Maslin, 2019). Political denial of climate change trades on a blame game as some countries need to act more than some because of their historical contribution to global warming. The argument is weak as all countries need to act on climate change to ensure a better ambience for the world (Maslin, 2019).

Finally, crisis deniers argue against the need for urgent action on climate change. They contend that the situation is not as bad as painted by climate scientists (Maslin, 2019). Climate change contestations have made climate action more tenuous, however, climate change is scientifically incontrovertible. It is instructive to note that 97% of climate scientists and research affirm that anthropogenic activities are causing massive damage to the sustainability of the earth through global warming (Shahzad, 2015). In the last two centuries, human economic activities have

tethered towards serious damage to nature as the earth is fast losing its biodiversity and the ambience that makes it the most liveable among the planets in the universe. Scientific evidence attests to the existence of climate change as extreme events since the 1970s that have been the greatest in incidence and magnitude in human history (Encyclopaedia Britannica, 2008). Extreme events in recent years have been very destructive. This includes wildfires, floods and erosions, cyclones and typhoons, etc. For instance, Cyclone Idai in Mozambique, Malawi and Zimbabwe in 2019 was deemed the first instance of the near-total destruction of a city by climate change as the extreme event destroyed about 95% of the city of Beira in Mozambique, leaving thousands dead and millions of people displaced from their homes (Olajide, Tshidzumba & Ojajorotu, 2019).

2.2.2 Climate Change Response

Climate change has not only been affirmed to be scientifically real, but it is also destructive not just of the earth's sustainability but also portends gory social and economic outcomes on humans across the world. To this end, efforts to respond to climate change have become a top agenda of the scientific community and policymakers across the world. Climate change response involves policy efforts to reduce the causes of climate change and prepare for the consequences of climate change (The Royal Society, 2005). In the same vein, the National Aeronautics and Space Administration (NASA) (2021) note that climate change response involves the two-pronged approach of reducing emissions and stabilizing global warming and adapting to the change already wrought by the phenomenon of climate change.

That climate change exists is now incontrovertible (IPCC, 2021). It is therefore necessary to mount serious efforts in response to the menace. This response takes the forms of mitigation and adaptation. According to the IPCC (2001), climate change mitigation is “an anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases” (Klein, Denton, Huq, Downing, Richels, Robinson & Toth, 2007:750). IPCC Working Group III (2020) asserts that “climate change mitigation is achieved by limiting or preventing greenhouse gas emissions and by enhancing activities that remove these gases from the atmosphere”. The foregoing understanding of climate change mitigation resonates with the fact that anthropogenic activities leading to the concentration of greenhouse gases emissions have ensured that there is a mismatch of the energy needs of the earth's climate system and the actual energy production through the greenhouse effect.

Essentially, the quest to ensure that the earth returns to normalcy entails critical and urgent policy and technological interventions to reduce the concentration of the dangerous gases and then ensure that the excess energy trapped in the atmosphere is balanced.

Mitigation is the main driver of climate change response. This is seen through the development of response regimes since the middle of the twentieth century, specifically with the United Nations Conference on Human Environment held in Stockholm in 1972 (Paglia, 2021). The necessity and urgency of climate change mitigation were eventually established upon the conclusion of the World Commission on Environment and Development with the release of the now popular Brundtland Commission Report, *Our Common Future: Report of the World Commission on Environment and Development*. Article 70 of the Report impresses the need for climate change response and principally, mitigation upon the world by stating that “there is thus a need for new techniques and technologies - as well as legal and institutional mechanisms - for safety design and control, accident prevention, contingency planning, damage mitigation, and provision of relief”. In the view of the Commission, mitigation is a strategic means of ensuring the sustainability and development of the world.

The imprints of global warming and the need to upend its causes have occupied policy efforts at all levels. The development of international climate regimes such as the IPCC and the UNFCCC to anchor climate change response on the global stage has as a larger mandate the reduction of emissions. The IPCC reports in 2021 that;

“Observed increases in well-mixed greenhouse gas (GHG) concentrations since around 1750 are unequivocally caused by human activities. Since 2011 (measurements reported in AR5), concentrations have continued to increase in the atmosphere, reaching annual averages of 410 ppm for carbon dioxide (CO₂), 1866 ppb for methane (CH₄), and 332 ppb for nitrous oxide (N₂O) in 2019. Land and ocean have taken up a near-constant proportion (globally about 56% per year) of CO₂ emissions from human activities over the past six decades, with regional differences” (p. SPM-5).

It reports further that;

“Each of the last four decades has been successively warmer than any decade that preceded it since 1850. Global surface temperature⁸ in the first two decades of the 21st century (2001-2020) was 0.99 [0.84- 1.10] °C higher than 1850-1900. Global surface temperature was 1.09 [0.95 to 1.20] °C higher in 2011– 2020 than 1850–1900, with larger increases over land (1.59 [1.34 to 1.83] °C) than over

the ocean (0.88 [0.68 to 1.01] °C). The estimated increase in global surface temperature since AR5 is principally due to further warming since 2003–2012 (+0.19 [0.16 to 0.22] °C). Additionally, methodological advances and new datasets contributed approximately 0.1°C to the updated estimate of warming in AR6” (p. SPM-5).

The foregoing establishment of the worsening emissions of greenhouse gases shows that climate change mitigation is crucial and needs not just to be urgently done but must be jointly and severally done across the world (Bosselo, Carraro & De Cian, 2012). As a foremost response to climate change, mitigation and the politics that revolve around continues to shape Global Environmental Politics (Bosselo, Carraro & De Cian, 2012). The definition and initial controversy surrounding the politics of sustainable development can be summed up as the politics of climate change mitigation. Despite the initial delays and hesitancy, climate change mitigation policy response has taken shape and negotiations on achieving emissions reductions have recorded some successes. Examples of this include the Kyoto Protocol of 1997 and the Paris Agreement of 2015. This speaks to the fact that the motivation for climate change mitigation is international in outlook and no single nation can unilaterally develop a framework for reducing emissions (Klein, Denton, Huq, Downing, Richels, Robinson & Toth, 2007). This is why international climate forums continue to negotiate among parties to the UNFCCC and other forums on reducing emissions.

The second plank of climate change response is adaptation. With global warming and other indices of climate change on the rise, the world has never remained the same. This is because the menace is producing gory and dangerous outcomes that continue to put the lives and livelihoods of people around the world at risk (IPCC, 2018). Therefore, there is a need to cushion the effects of climate change on the people. Climate change adaptation is also a strategic plank of climate change response. The IPCC defines adaptation as an “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities” Klein, Denton, Huq, Downing, Richels, Robinson & Toth, 2007:750). Smit & Pilifosova (2003) refers to climate change adaptation as follows;

“Adaptation is adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. This term refers to changes in processes, practices, or structures to moderate or offset potential damages or to take advantage of opportunities associated with changes in climate. It involves adjustments to reduce the vulnerability of communities, regions, or activities to climatic change and variability” (p. 881).

Adaptation, like its mitigation counterpart, became a climate change response suggestion in the Brundtland Commission Report that suggests in Article 70 of the Report that “there is thus a need for new techniques and technologies - as well as legal and institutional mechanisms - for **safety design and control, accident prevention, contingency planning**, damage mitigation, and **provision of relief**” (Emphasis by the researcher). It is apposite to note that there were references to elements of climate change adaptation in the climate change response suggestions by the Commission than mitigation. This is because safety design and control, accident prevention, contingency planning and provision of relief all fall within the purview of adaptation. This speaks to the necessity of planned adaptation rather than spontaneous or impact-based adaptation which are elements of planning and worst-case scenarios prevention. This is because “planned anticipatory adaptation has the potential to reduce vulnerability and realize opportunities associated with climate change, regardless of autonomous adaptation” (Smit & Piliposofa, 2003:879). The development of international instruments and agreements have always recognised the place and role of adaptation as a veritable climate change response. For example, the UNFCCC treaty, Kyoto Protocol and the Paris Agreement all saw the need for adaptation as a counterpart response to mitigation (Smit & Piliposofa, 2003; Streck, Keenlyside & von Unger, 2016).

In terms of the importance as a response to climate change, adaptation stands side by side with mitigation (Klein, Denton, Huq, Downing, Richels, Robinson & Toth, 2007). While there are some differences in the processes and outcomes of mitigation and adaptation, neither can exist nor be successfully implemented in the absence of the other. Lensikowski, Ford, Biesbroek, Berrang-Ford, Maillet, Arao & Austin (2016) celebrates the Paris Agreement in this regard for making climate change adaptation of equal priority with mitigation, thereby making a strong motivation for adaptation planning, implementation, and financing. The utility of adaptation in contrast to mitigation is that while the latter’s impacts are long-term and scope is global, adaptation’s impacts are rather short-term because it reduces vulnerability. The benefits of adaptation are also palpable

in economic, social, and political terms within the context in which they are implemented (Smit & Piliposofa, 2003; Bosselo, Carraro & De Cian, 2012). The severity and urgency of climate change response are demonstrated in the different global, regional, and local climate forums. This accounts for why governments and stakeholders across the world must ensure that both mitigation and adaptation are granted equal attention in terms of financing and enabling regimes.

2.3 Empirical Review

2.3.1 Climate Change in International Relations

Climate change has changed the face of global politics. International fraternisation through diplomatic conferences has proliferated to counter the global warming menace facing the world. Climate change diplomacy and negotiations have rather been topsy-turvy due to the high-level politics involved in the limiting and eventual lowering of carbon emissions around the world. Studies have shown that global environmental governance is replete with controversies and contestations (Death, 2012; Parramon-Gurney & Gilder, 2012; Amusan & Olutola, 2016; Nhamo & Nhamo, 2016; Savaresi, 2016; Amusan & Olutola, 2017). While these are commendable intellectual interventions on climate change and global environmental governance, they are however silent on subnational climate change challenges and environmental governance.

Parramon-Gurney and Gilder (2012) consider the challenges and opportunities open to South Africa when the country played host to COP 17 in Durban. South Africa had a dual position as a leading negotiator and host. The stakes for the country were high and involved successful negotiations and consensus among parties. The Conference was such an opportunity for South Africa to produce post-COP 17 environmental policies. Parramon-Gurney and Gilder (2012) give insight into the nature of climate change negotiations but is silent on the need to develop subnational climate change policies necessary for post-COP 17 development in South Africa.

Nhamo and Nhamo (2016) reserve commendations for the rare achievement of the COP 21 which gave birth to the Paris Agreement and they also have serious knocks for what the agreement did not cover. Analysing the good, the bad, and the ugly of the Paris Agreement, it is not a fully binding instrument on parties and leaves a huge gap for the poorer nations as it was weak on Loss and Damage (L&D), adaptation, and finance. The uniqueness of the Paris Agreement borders on the wide array of actors and parties that had the political will to agree on limiting carbon emissions

and other decisions on climate change. In terms of finance, despite successive promises of financing L&D as well as adaptation, Africa and other poor nations continue to be expectant for the promises to be met. The authors have given an excellent contribution to the literature on global environmental governance but did not look at the Paris Agreement from the prism of subnational climate change response, except by some allusions to the bottom-up approach of the agreement.

2.3.2 Climate Change and Intergovernmental Relations

The nature of intergovernmental relations not only suggests the relationship between levels of government in a country, but it is also a reflection of the strength of climate change finance of the country (Wehner, 2000; Tapscott, 2000; Ile, 2010; Murray & Simeon, 2011; Bird, Beloe, Corfee-Morlot & Zou, 2013; Calitz and Essop 2013; Technical Assistant Unit and Western Cape Government, 2013; International Institute for Environment and Development, 2014; Ibbih & Idiagi, 2015; Odigwe & Aibieyi, 2015; Veiga, Kurian and Ardakanian, 2015; Hendriks, 2016; Sacher, 2017). Existing literature establish the relationship between intergovernmental relations and robust climate change finance. There is no study tailored for the understanding of climate change and intergovernmental relations in Lagos State generally and Kwazulu Natal at the provincial level.

Odigwe and Aibieyi (2015) blame military rule for the undue over-centralisation of Nigeria's fiscal federalism that does not consider production and revenue generation. This in effect turns the states to agencies of the Federal Government in an outright violation of federal practice. Given the military culture base of unity of command, states lost their agency on policymaking and had to get permission from successive military governments to get things done. Since military rule connotes the suspension of the constitution, states could not assert their coordinate authority relative to the Federal Government on any matter of governance. This is more critical given that the states were led during these periods by military officers. Civilians who found themselves in military government could not defend the constitution, hence had to imbibe the military's unity of command culture to the detriment of vibrant intergovernmental relations in the country. Odigwe and Aibieyi (2015) hold that the Nigerian fiscal framework lacks equity and that does not place it in the necessary stead for sustainable development. The emasculation of state and local governments led to a lack of generally acceptable compromise on the revenue sharing formula. Hence, low internally generated revenue, youth restiveness and a mono-cultural economy

contribute to the lack of sustainable development in Nigeria. (Odigwe & Aibieyi, 2015) did not in any way link their work to climate change finance or the environmental problems across the states of the federation nor the need to ensure a direly vulnerable state like Lagos receive commensurate funds to build the state's adaptive capacity through infrastructure revamp and provision.

Hendriks (2016) argues that South African Provincial governments play a subservient role to the Central government. This is because the country's intergovernmental fiscal regime does not give Provincial governments the room to raise enough independent revenue. In research on Northern Cape Province, Hendriks (2016) posits that subnational governments in the country are not financially self-sufficient because their revenue-raising capacity is not commensurate with the ever-growing developmental tasks ahead of them. This brings about dependency on the central government. This dependence also grows with a proportional rise in provincial responsibilities. This work provides an important exposé on intergovernmental relations in South Africa but is silent on the environmental risks such a regime could bring.

Subnational climate change finance in the continent is fraught with difficulties. The Technical Assistant Unit and Western Cape Government (2013, p.6) argue that accessing climate change finance is at once complicated and complex. According to the report, "the global climate finance architecture is complex and in the process of continuous reform; which includes several multilateral, bilateral, domestic, public and private climates as well as financing mechanisms that have been developed. Thus, accessing international climate finance requires a high level of capacity and expertise to prepare and package the projects according to rigorous, stringent and unfamiliar requirements" (Technical Assistant Unit & Western Cape Government 2013, p.6). What this portends is that Africa as a continent still relies on foreign aid from global donors to combat climate change with very little financial contribution from within. This has led to a situation in which subnational governments are not able to plan and implement climate change response projects. The International Institute for Environment and Development (2014) avers that Kenya's ambitious attempts to raise the bar in climate change response by 2030 has been made problematic by her inability to raise the requisite finance to make that workable. Hence in the continent, climate change finance at both national and subnational levels does not support the huge task at hand. Climate change finance is incapacitated by Africa's economic situation. Therefore,

Africa needs to revamp its climate change finance strategies so that multi-level governance of the environment that the continent needs can be well funded.

2.3.3 Subnational Governments in Climate Change Response

Climate change response has been a rising phenomenon since the time the focus of the world shifted to the imminence of several threats that global warming poses to humanity. It started however on a supranational scale with the institution of the United Nations Framework Convention on Climate Change in 1992. The Conference of Parties to the Framework Convention thus became an annual event to design the pattern of response to climate change. The 21st Conference that was held in Paris (COP 21) in 2015 was however far-reaching in terms of its ambition. This entails that individual states are to come up with the Intended Nationally Determined Contributions (INDCs) to climate change response. The import of this is that the global climate change framework places unprecedented emphasis on multi-level governance that will see non-state actors and state actors take prominent roles in the global climate agenda. (Anton, Cambray, Dupar, Westerlind-Wigstroem & Gogoi, 2014; Yale Centre for Environmental Law and Policy, 2015; Barbi & Fereira, 2016; Christoplos, Aben, Bashaasha, Dhungana, Friis-Hansen, Funder and Sen, 2016; Roe and Awosemusi, 2016; & Setzer, 2017). The existing works, despite their robust views and analysis of the importance of subnational government in climate change response and governance, did not cover subnational climate change response in Lagos State and Kwazulu Natal.

The Yale Centre for Environmental Law and Policy (2015) argues that COP 21 stresses the importance of subnational action in climate dialogue and action. The Conference considers subnational climate efforts as critical to enabling its outcome to come to fruition. Subnational climate change response has assumed great importance globally. Around the world, subnational political entities have demonstrated leadership and capacity to respond to climate change through local innovations. Anton, Cambray, Dupar, Westerlind-Wigstroem & Gogoi, (2014) argue that the success of climate compatible development depends on how well subnational actors can implement national climate policies. Given the appropriate legal and policy conditions, climate compatible development is a huge possibility. Within any given political system, a lot depends on the functioning of subnational actors. Barbi & Fereira (2016) insist that subnational governments play important role in climate change policy strategies and instruments in Brazil. They are the hub

around which mitigation and adaptation actions revolve. Furthermore, they have also been involved in transnational cooperation networks related to climate change.

In their discussion of subnational climate change response in Nepal, Uganda, Vietnam and Zambia; Christoplos, Aben, Bashaasha, Dhungana, Friis-Hansen, Funder and Sen. (2016) see climate change as an arena of struggles over authority and meaning in the cases studied. They aver that climate change adaptation has the imprints of the processes of state formation and resource politics and the general political dynamics of individual states. There is therefore the need to situate and trace how ‘climate agency’ and climate politics are connected within broader processes of how states produce and reproduce legitimacy, authority, and territorial control. Subnational climate change is affected by the environment of politics within which it takes place. How well subnational governments can manage climate change adaptation is a function of the allowance provided by the political process and structure of the nation-state.

While there have been several initiatives to combat environmental problems, subnational climate change in Nigeria remains uncoordinated. Moran (2011) in their analysis of climate change dynamics in Nigeria show that subnational vulnerability to climate change in the country is very high. Ironically, the emphasis of climate change response in the country is overly national and at best regional. Nigeria’s climate change adaptation efforts have therefore not been commensurate with the level of threat faced all over the country. Roe and Awosemusi (2016) opine that there are several challenges that Nigeria faces in the implementation efforts of her Intended Nationally Determined Contribution (INDC) to the global efforts against climate change. These include demonstrated problems of coordination of the relevant institutions, actors and issues surrounding achieving the necessary cohesion to bring the vision of a climate-resilient Nigeria into fruition. Furthermore, institutional problems, conflict, national insecurity, petty politics, and economic uncertainty are great threats to Nigeria’s robust contribution to climate change response globally from within.

2.3.4 Climate Change and Climate Change Response in Nigeria

Nigeria as an African country is billed to be among the most adversely affected countries by climate change. Despite being an Annex II country, that is, one of the countries not responsible for historical emissions of greenhouse gases into the atmosphere, the country is affected seriously by

the menace. As a result of this, the literature on climate change and climate change response in Nigeria is rich and burgeoning. This can be divided into themes, which include evidence of climate change in Nigeria, climate change, climate change and environmental politics in Nigeria, human security and conflict in Nigeria, climate change and food security in Nigeria, climate change mitigation and adaptation in Nigeria, and climate change awareness creation in Nigeria.

Given the geography of the country as mostly arid North and Coastal South, climate change is affecting Nigeria and Nigerians. Several works exist on the evidence of climate change in Nigeria (Agumagu & Todd, 2015; Komolafe, Adegboyega & Akinluyi, 2015; Sylvester & Abdulkadir, 2015; Ogbonna, Albrecht & Schönfelder, 2017; Olajide, Quadri & Ojakorotu, 2018; Heider, 2019; Olaniyi, Olutimehin & Funmilayo, 2019; Umar, Ramli, Aris, Jamil & Aderemi, 2019). The vulnerability of Nigeria and Nigerians to climate change and its vagaries is predicated on the fast-changing environmental dynamics of the country. Studies have shown that the environmental dynamics of the country have been changing over the decades in terms of rainfall, mean temperature, and occurrence of hail. The onset and cessation of rainfall were observed by the Nigerian Metrological Agency (NIMET) to have changed between 1971 and 2000 (Olajide, Quadri & Ojakorotu, 2018). During this period, late-onset and early cessation of rainfall were observed. Nigeria's mean temperature was also observed to have been on the rise since the mid-twentieth century (Olajide, Quadri & Ojakorotu, 2018). In many places in Nigeria mean temperature was observed to have increased between 0.9°C to 1.9°C since the mid-twentieth century (Olajide, Quadri & Ojakorotu, 2018). The occurrence of hail during the rainy season has been infrequent and reducing (Olajide, Quadri & Ojakorotu, 2018).

In Bauchi for example, the evidence of climate change is established through the study of the rainfall variability and an increase in mean temperature of the state. It was observed from there that between 1978 and 2008, both rainfall and temperature increased over time. The people, however, opine that well water which is the main source of water dries up in recent years faster than before (Sylvester & Abdulkadir, 2015). The contradiction suggests that climate change is real in Bauchi State. Increased temperature is incompatible with the production of maize, the most prominent staple food and the economic crop of the people (Sylvester & Abdulkadir, 2015). The observed annual increase of 0.0299°C would shoot the temperature beyond the requisite 21°C and 30°C for maize production. Increased rainfall would also lead to flooding, and ecosystem alteration

may be dangerous to the lives and livelihoods of the people. Umar, Ramli, Aris, Jamil & Aderemi (2019) also note that there is climate variability in the Northern part of the country. In a 36-year (1980-2015) analysis of rainfall and temperature data in the Hadejia River Basin, it was found that there is a spatial and temporal variation in rainfall and temperature of the area. The foregoing show that climate change is being experienced in the Northern part of Nigeria as climate variability and its effects are evident through observation.

Climate change is also observable in the Southern part of the country. In the Niger Delta, which has a history of environmental pollution arising from oil and gas exploration, climatic observations confirm the evidence of climate change. The study of rainfall and temperature in the region affirms that there is variability in these environmental indices. Ogbonna, Albrecht & Schönfelder (2017) in a study to confirm the evidence of climate change in the Niger Delta using three cities Warri, Owerri, and Port Harcourt in Delta, Imo and, Rivers States respectively found that in the period from 1980 to 2010, the average monthly temperature increased in the three cities by 0.14°C, 0.21°C and 0.042°C per decade. The study of the three cities on rainfall posits that in the period of study, a high level of rainfall variability was observed. Heider (2019) in the same vein notes that the Niger Delta region is the most vulnerable to climate change in the Southern part of Nigeria. Oil and gas production certainly contributed to climate variability in the Niger Delta. Gas flaring is noted to have contributed to the rise in temperature in the region (Agumagu & Todd, 2015).

The evidence of climate change in Nigeria is denoted by the effects the phenomenon has wrought in the country. These are further environmental indices that show how climate change is creating difficulties and aggravating existing ones for Nigeria. NIMET notes in Olajide, Quadri & Ojakorotu (2018:184) that "...climate change has shown considerable temporal and spatial shifts in its variability and change. Extreme climate and weather events (drought, floods, heatwaves, ocean surges, etc.) have become regular. The impacts of extreme weather and climate may be gradual, but they are destructive to lives and properties and they negatively impact on the economy". From the Northern to the Southern parts of Nigeria, these impacts are common. Flooding is now more regular across the country in recent years. Olaniyi, Olutimehin & Funmilayo (2019) note that flood hazards have become more common in the country and this raises the need for flood risk analysis in the country. In 2012, the Great Floods affected almost every section of the country leading to the loss of lives and property. In the Benue Valley, Niger Delta, and Lagos,

floodings and inundations have wreaked serious havoc on the people and their livelihoods (Agada & Nirupama, 2015; Komolafe, Adegboyega & Akinluyi, 2015). In the South East of Nigeria, erosions and flooding triggered by climate change are worsening the incidence and magnitude of gully erosions in the region. In Anambra State and many parts of the South East gully erosion has displaced many Nigerians from their homes and farms (Olajide, Quadri & Ojakorotu, 2018; Olaniyi, Olutimehin & Funmilayo, 2019).

Literature notes that climate change is producing human insecurity and conflict in Nigeria. The relationship between climate change and resource conflict in the frame of the farmer-herdsmen conflict is established in literature (Obi, 1997; Onuoha & Ezirim, 2010; Okpara, Stringer & Doughill, 2015; Akinyemi, 2016; Akinyemi & Olaniyan, 2017; Kolade & Ibrahim, 2017; Okoli & Ogayi, 2018; Oli, Ibekwe & Nwankwo, 2018; Adigun, 2019; Nnaji & Samuel, 2019; Ajala, 2020; Onah & Olajide, 2020; Owonikoko & Momodu, 2020). The foundation for understanding the human security and conflict in Nigeria outlook is to consider it by analyzing the environment-security nexus. Levy (1995) cited in Obi (1997) argues it exists in three forms, existential, physical, and political. When juxtaposed with the Nigerian situation, all three forms exist in Nigeria. Climate change as an environmental crisis produces the three outcomes in the country. It is a 'stressor factor' and 'threat multiplier of instability' in Nigeria as environmental dynamics such as desert encroachment/flooding, soil erosion/flooding, coastal erosion/flooding, and depletion of biodiversity produced by climate change have dire security outcomes for the country (Onuoha & Ezirim, 2010).

It has been argued extensively that climate change is a major underlying factor fuelling the farmers-herdsmen conflict in Nigeria. Many scholars opine that while there is a relationship between climate change and resource scarcity and contestations, they become violent as they are impacted by intervening social, economic, and political factors (Akinyemi, 2016; Adigun, 2019; Dewan, 2019; Onah & Olajide, 2020).

Dwelling on the eco-violence and resource scarcity by Homer Dixon (1991; 1999), the enlarged geography of the farmers-herdsmen conflict shows that climate change is a serious problem in Nigeria. Akinyemi (2016) using Efon Alaaye, Iseyin/Shaki, Udeni-Gida and Oke Ero in Ekiti, Oyo, Nassarawa and Kwara States respectively found that there is a relationship between climate

change and resource contestations in the context of resource scarcity, human migration, and farmer-herders conflict. With migration as a form of adaptation to the effects of climate change such as desertification, land degradation and water scarcity, farmers and herders come into conflict, leading to loss of lives and livelihoods in these locations and many more across the country. In a related research, Onah & Olajide (2020) note that climate change impacted the environment, making the need for southward herders migration a necessity. While this in itself should not be a problem, the coinciding divides – mostly ethnic and religious – have made the situation conflictual and deadlier in recent years.

Okoli & Ogayi (2018) note the agency of climate change in the farmers-herdsmen conflict in Nigeria. In what they describe as herdsmen militancy, it is apparent that environmental factors including climate change are worsening existing ethnic and religious relations in the country. This exerts more stress on the human and national security situation of the country with a sickening number of deaths from the conflicts. That there were a total of 259 deaths in 2015 and 752 death between January and April 2016 shows how fast the crisis degenerated and the negative human and national security outcomes the phenomenon is producing. As much as Adigun (2019) tries to extricate climate change as a factor in the farmers-herdsmen conflict, he could not achieve much success in his analysis without factoring in the environmental dynamics introduced by the former. The fact that “vested interests” are escalating the crisis shows that climate change produces multiplier effects in existing problems and fault lines in a polity.

The farmers-herdsmen conflict is explained as neo-pastoralism (Ajala, 2020). This is believed to be one of the new drivers of the conflict. This is defined as;

“new form of cattle ownership characterised by large cattle holdings owned by non-pastoralists, kept by salaried herdsmen, often involving the use of sophisticated arms and ammunitions, arising from the need to hide stolen wealth, proceeds of trafficking or income derived from terrorism with the underlying aim of deriving profit for investors” (p. 3).

Neo-pastoralism is linked with many of the existing ills facing the nation in terms of corruption and other forms of illegality. The introduction of capitalism and its market processes means that migratory adaptation to climate change leads to resource contestations and eventually violent clashes as neo-pastoralists go about with sophisticated weapons ‘defend’ their stocks (Akinyemi & Olaniyan, 2017; Ajala, 2020). It has been alleged that neo-pastoralists are backed by their

employers who are mostly members of the political class and many of them operate in a militia-like manner (Ajala, 2020). This speaks to the menace of small arms and light weapons in the country, which has dire national and human security outcomes. Neo-pastoralism is not just a Northern affair. In recent years, the farmers-herdsmen conflict has also been witnessed in the South. Nnaji & Samuel (2019) in a study of herders' aggression on farmers in the South East alludes to climate change as a major driver of migratory adaptation in the region. Like in many places in the country, the human security outcomes of this mean that farmers are not able to go to their farms any longer as herders go about with AK 47 rifles. This has produced serious political outcomes as existing ethnic suspicions and other divisions have been brought into the open (Onah & Olajide, 2020).

In the Lake Chad region of the country, the shrinking of the Lake is the main source of water for different agricultural engagements in the region. This also produces security outcomes in the region as drought and water scarcity cause disruptions to the livelihoods of people who engage in water-sensitive agriculture (Okpara, Stringer & Doughill, 2015). This seems to have a long history through a slow and steady reduction in the volume of water produced in the region vis a vis what is needed to maintain a secure and harmonious living. The first case of farmers-herdsmen conflict was recorded in the North East in 1965, a period in which there was a global awareness of the reality of environmental problems such as global warming (Onah & Olajide, 2020). Owonikoko & Momodu (2020) in their study found that climate change-induced environmental degradation is one of the drivers of criminality and easy recruitment for terrorist groups in the Lake Chad Region. The shrinking of the Lake is contributing to socio-economic hardship disrupting the livelihood of the majority of the people. The production of absolute poverty in the region feeds well into the Boko Haram terrorism with the Lake Chad region as the epicentre.

2.3.5 Climate Change and Climate Change Response in South Africa

South Africa, like the rest of the world, is affected by climate change. As a transboundary menace, every part of the country is affected by it (Ziervogel, New, van Garderen, Midgley, Taylor, Hamman..., Warburton, 2014). The geography of South Africa predisposes it to the impacts of climate change. It is a very large country with a landmass of 1,219,602km² containing several rivers and lakes, many heritage sites and diverse vegetational zones. It has a long coastline of 3000km spanning two oceans – the Atlantic and Indian Oceans. (South African Government,

2021). The geographical complex of South Africa implies that every part of the country is vulnerable to the impacts of climate change. The impacts of climate change in South Africa cut across many sectors and facets of human life. These sectors include agriculture, water, health, security, built environment (Ziervogel, New, van Garderen, Midgley, Taylor, Hamman..., Warburton, 2014). Hence, climate change impacts are an everyday reality in the country.

Agriculture is one of the sectors that are most impacted by climate change. This is because it is one of the largest employers of labour, both at the formal and informal levels, notwithstanding the racial employment imbalances in the sector (Greyling, Vink & Mabaya, 2015). While the focus of Greyling, Vink & Mabaya, (2015) did not directly address the link between agricultural employment and climate change, they, however, note that there was a dwindling trend in the contribution of the sector to the economy within the 20 years of 1994 and 2013. This can hardly be divorced from the impacts of climate change as policies have improved and even marginally been inclusive within the period. Hence, climate change has a direct economic impact on the people of South Africa.

Land degradation is arguably the main cause of poor agricultural output in South Africa (Mani, Osborne & Cleaver, 2021). Land degradation in the country stifles agricultural production in the country as it has faced more severe droughts in recent history. These droughts are noted causes of poor agricultural production that threatens food security in the country. This is also caused by desert encroachment into the Western part of the country and has accounted for the biggest drop in agricultural production (Botai, Botai, De Wit, Ncongwane & Adeola, 2017; Mahlalela, Blamey, Hart & Reason, 2020). Land degradation causes the soil to lose its nutrients and its ability to support the thriving of plants on the farm. As climate change and other factors impact the land over the medium-term to the long-term, the land loses its ability to support adequate production of agricultural products (Barman, Mandal, Bhattacharjee & Ray, 2013).

Rainfall variability, which is causing droughts across the country is leading to land degradation. In many of the provinces in South Africa, irregular rainfall patterns are causing water shortages. This leads to loss of biodiversity and forest cover, to the extent that commercial and subsistence farmers' productions are affected. Botai, Botai, De Wit, Ncongwane & Adeola, 2017; Mahlalela, Blamey, Hart & Reason (2020) note that the Western Cape Province has been experiencing

recurrent drought such that the 2015/2016 drought was an outgrowth of the past droughts. This is such that in the past few weeks, the drought in Eastern Cape, Northern Cape and Western Cape Provinces have been declared a national drought emergency. The culpability of climate change in what has been described as the worst drought in the last 100 years is put in perspective by Agri SA's Natural Resource Centre of Excellence that, "The frequency and magnitude of drought conditions have increased over years. Climate change brings extreme weather events, and by the intensity of the drought in the agricultural sector, experts might argue it's due to climate change" (Sgqolana, 2021).

Generally, drought is a major climate change manifestation in South Africa. Almost every province in the country has experienced drought in the recent past. This affects a broader spectrum of economic activities outside agriculture, including manufacturing and tourism. The frequency and the rising severity of the phenomenon combined with extreme weather events such as the El Niño events, which is characterised by warming ocean current, the socio-economic impacts of droughts in the country are quite serious (Baudoin, Vogel, Nortje & Naik, 2017; Nhemachena, Nhamo, Matchaya, Nhemachena, Muchara, Karuaihe & Mpandeli, 2020). Hence, climate change-induced droughts in South Africa has wide-ranging effects across many sectors of the economy and has a negative influence of stifling the development drive of the country. This reality is brought to the fore by the South African Department of Forestry, Fisheries and Environment (2017), which submits that the negative effect on water is the most biting impact of climate change in South Africa. The impact is felt through "increases in climate variability and climatic extremes are impacting both water quality and availability through changes in rainfall patterns, with more intense storms, floods and droughts; changes in soil moisture and runoff; and the effects of increasing evaporation and changing temperatures on aquatic systems. South Africa has been experiencing a serious drought since 2015, with associated crop losses, water restrictions, and impacts on food and water security".

Climate change also produces healthcare crisis outcomes in South Africa. It is responsible for change in the prevalence and severity of diseases across the regions of the world. According to America's Centres for Disease Control, climate change as a threat multiplier of existing problems would worsen existing diseases and create vectors for new ones across the world. Diseases related to changes in weather patterns would lead to premature deaths, worsening health outcomes of

disruption in food growing patterns and quality, water-borne and infectious diseases (Centres for Disease Control, 2021). McMichael (2009) cited in Myers & Rother (2012) contends that while climate change may not necessarily bring about new diseases, it would aggravate existing ones and push the burden from existing diseases to such an extent that threatens the health system of nations. In South Africa, the health outcomes of climate change are a product of “extreme climatic events, changes in the patterns of infectious diseases, increased food insecurity, displacement of populations, lack of fresh water and conflict over resources” (Mash 2009; 404).

These factors have raised the mortality and morbidity rates within the various demographic groups in the country. Heft-Neal, Burney, Bendavid & Burke (2018) establish the relationship between air quality, which has deteriorated due to climate change, and infant mortality in Africa of which South Africa features prominently. Cairncross, Dalvie, Empiridou, Irlam & Naidoo (2017) note the relationship between climate change, air pollution and health in South Africa. The deteriorating climate condition is responsible for the rising cases of chronic respiratory, cardiovascular and other health concerns in the country. There is a relationship between daily maximum temperature and mortality in South Africa. This is stronger among the infant/elderly than any other group in the country (Chersich, Wright, Venter, Rees, Scorgie & Erasmus, 2018; Scovronick, Sera, Acquanitta, Garzena, Fratianni, Wright & Gasparrini, 2018). The failure of temperature to reach the maximum level brings about cold, which is responsible for 3.4% of deaths through cardiovascular and respiratory diseases. In terms of maternal mortality, heat exposure endangers pregnant women and also affects the foetus, thereby raising the risks of infant and maternal mortality in South Africa.

On the economic side, the tourism industry in South Africa is at the receiving end of climate change. This comes to the fore because the tourism industry is one of the most productive sectors of the economy of many provinces in the country (Donkor & Mearns, 2020). According to the United Nations World Tourism Organisation (UNWTO), the country is the highest recipient of tourists in Sub-Saharan Africa with 10.5 million tourist arrivals in 2017 (UNWTO, 2018). The tourism sector contributes about R100 million to the GDP of South Africa, hence, climate change portends serious economic danger to South Africa through the sector (Fitchett & Hoogendoorn, 2016). Rogerson (2016) notes that climate change will affect the economic wellbeing and performance of small towns and peripheral areas of South Africa because their economies mainly depend on tourism. This corresponds with the finding of Fitchett & Hoogendoorn (2016) about

climate change scenarios that “the worst effects will be experienced by 2050. The models suggest that 23 guesthouses which immediately border the coastline and one town’s canal will be flooded by this time”.

The economic impact of climate change would be felt in the sector by the government in terms of revenue and South Africans who are employed in the sector. This means that the menace would impact South Africa’s ability to combat poverty (Pandy & Rogerson, 2020). Climate change could affect tourism in the country through climate seasonality that has been predicted to be inconsistent. In the same vein, climate change is going to have an impact on the distribution and availability of wildlife. This means that climate change, in effect, would bastardise the ecosystem and biodiversity of South Africa if a effective response is not given to it (Amusan & Olutola, 2017; Odonkor & Mearns, 2020).

(Amusan & Olutola (2017) speak to the contradiction of the situation of South Africa regarding climate change and tourism. This is because while South Africa is one of the heaviest polluters of the atmosphere, it is also one of the most affected nations of the world by impacts of climate change. This brings the tourism sector to the fore because it is one of the most active sectors in South Africa. Hence, the country is both an instigator of the problem and a victim of the problem in terms of tourism. This unique status of South Africa and the confusion it brings is affirmed by (Pandy & Rogerson, 2021). This is because South Africa’s strenuous diplomatic efforts on climate change have not translated to a sound policy nexus between the menace and tourism in the country. While Freidrich, Stahl, Hoogendoorn & Fitchett, (2020) contend that climate change can make the mean climate of South Africa more endearing to tourists, a position which means that climate change is not all-negative to the country, they acknowledge the possibility of indirect and induced effects of the menace. They, however, suggest that South Africa’s climate change response can be deemed inadequate or affected by the problem of scope as the tourism sector is deemed not well covered by existing policies.

Given the multi-sectoral impacts of climate change on South Africa, policymakers’ efforts are being made to ensure it has a socio-economic resilience to the menace. Generally, climate change response can be seen along two response planks, which are mitigation and adaptation. Climate change policies of the government and other stakeholders have revolved around these efforts along

with issues of finance, without which policies cannot be implemented. The main climate change response effort of South Africa is embodied in the National Climate Change Response Plan White Paper (NCCRPW). Garland (2014) notes that the document contains the various ways in which South Africa intends to address the climate challenge towards a climate-resilient and low-carbon economy. Pandey & Rogerson (2021:451) note that the climate change response of South Africa is based on the following nine principles as enunciated in the NCCRPW;

“1) Ensure that all international, national, provincial and local measures which focus on the issues associated with climate change are aligned in order to ensure effective mitigation and adaptation actions are undertaken. 2) Oversee the fair allocation of resources needed to adapt to the impacts and implications associated with climate change, as well as ensuring that the requisite costs of climate change are not disproportionate. 3) Consider those most vulnerable to the impacts and implications of climate change and seek to put in place measures to ensure that key groups such as women, children, the aged, sick, and physically challenged are accounted for. 4) Seek to continue to uplift and empower the poor and vulnerable within society while also ensuring that actions are sustainable socially, economically and environmentally. 5) Ensure that all actions and measures undertaken are sustainable in the long-term in order to ensure that key resources are still available for future generations. 6) Take a risk-averse approach to confronting climate change, and specifically apply a precautionary principle in the decision making process. 7) Enforce the polluter pays principle, which seeks to ensure that those who do undertake actions that emit carbon into the atmosphere pay the costs used to support or remedy the damage which takes place as a result. 8) Place increasing emphasis on public awareness surrounding the climate change issue in order to ensure informed participation to ensure support for mitigation and adaptation based undertakings. 9) Recognise the importance of a healthy environment and ecosystems which are invaluable in the manner in which they underpin a sustainable economy needed for socio-economic upliftment and stability”.

Every other climate change response policies and programmes in South Africa are outgrowths of the NCCRPW. While the climate change response of South Africa remains commendable (Chikulo, 2014), scholars hold that there is a lot to be done to have a response that is commensurate with the level of vulnerability and risks faced across the country. Averchenkova, Gannon & Gurran (2019) contend that South Africa does have important cross-cutting climate change responses on the ground but they are fraught with misalignment and implementation issues. The import of this is that as commendable and beautiful as climate change response policies and programmes in South Africa may be, their ability to achieve desired results is limited.

The critical issues in the ineffectiveness or problematique of climate change policy response are political and institutional. This view is shared by many analysts and observers of the South Africa climate change response process. For example, Ziervogel, New, van Garderen, Midgley, Taylor, Hamman..., Warburton (2014) note that climate change response is fraught with institutional weakness. This position is addressed as follows;

“Institutional barriers for addressing climate change have been identified across a range of South African studies that include: a lack of capacity (both in terms of numbers of people and expertise), high turnover of staff within government departments; limited understanding of and expertise in tackling climate-related issues; the positioning of climate change as an environmental issue rather than as a development issue; conservative financial management practices; and poor communication and coordination between departments and between different levels of government (especially national to local and provincial to local)”

In line with this thought-flow, Trolip & Boule (2017) posit that the problems stifling climate change response policy in South Africa are largely political. These problems stem from weak intra-governmental cooperation on environmental and climate issues, the inability to garner political support across the board on these issues and information asymmetry, arising from possible conflicting group interests. There is also the overly political malaise of over-bloated ambition in climate change targets, which the state has demonstrably shown a weak capacity to achieve.

South Africa’s climate change response is deemed to be strong on both mitigation and adaptation fronts. In line with the brilliant work of Duguma, Wambugu, Minang & Van Noordwijk (2014) on the conditions for the synergistic planning and implementation of climate change response, South Africa is a shining light. Based on the four necessary conditions for integrating mitigation with adaptation, which is, policies and strategies, programmes and projects, institutional arrangement and financial mechanisms, the country’s climate change response is deemed viable in comparison to other developing countries. While there may be problems with the implementation and scope of the response, South Africa has demonstrated capability and will to explore the planks of climate change response extensively and in an integrated manner.

Further on the problem of implementation of climate change response including the NCCRP is poor awareness and sensitisation of stakeholders, principally, farmers in the country. Climate change awareness is essential for effective adaptation to the environmental realities wrought by the menace, such that farmers can leverage opportunities embedded in climate change response. In this wise, Popoola, Yusuf & Monde (2020) contend that the chief reason for the poor

implementation of the NCCRP is that there is low awareness of its provision among the people, especially farmers. In their study of the Amathole District Municipality of the Eastern Cape Province, they found that poor and/or low sensitisation campaign and capacity of extension officials. This situation is a reflection of the general understanding and awareness of climate change policies and action plans in the country. Low awareness is also blamed for the poor inclination of government officials and politicians to develop and implement climate action plans. Nkhruma (2021) looks towards the youths, who are ‘free borns’ to take to climate activism to ensure effective implementation of actions. This, however, becomes problematic because of poor awareness among them. Hence, raising awareness of climate change among the ‘free borns’ of South Africa is a strategic way to ensure that the right policies and action plans are developed and implemented in the country.

Another albatross of climate change policy in South Africa is finance. Given the complex nature of the political dynamics that shape climate finance at the international and local levels, South Africa’s climate change is hampered significantly by the huge financial outlay for mitigation and adaptation. This is because South Africa lacks “a comprehensive climate finance strategy to define the allocation of resources to support climate change work and to attract international funding and investment” (Averchenkova, Gannon & Gurran, 2019: 4). This problem becomes clearer with the submission of Cassim, Radmore, Dinham & McCallum (2021) that South Africa requires an annual climate investment of R596 billion totalling R8.9 trillion to achieve its NDC over the thirty years of 2015-2030. To this extent, the implementation of climate policy in South Africa is problematic. Senyolo, Long, Blok & Omta & van der Velde, 2018) note the dearth of policies to ensure the adequate financing of climate-smart innovations in South Africa. From their studies, innovations to foster conservation agriculture, rainwater harvesting and growing drought-tolerant and early-maturing seeds are hampered by inadequate climate finance. Hence, in the agricultural sector, it is palpable that inadequate climate finance hampers climate adaptation.

2.3.6 Climate Change and Climate Change Response in Lagos State

Lagos State is affected by climate change. Existing literature on climate change and climate change response in Lagos State can be divided into four themes. These themes are climate change vulnerability and environmental problems in Lagos, development issues arising from climate change in Lagos State, climate change mitigation in Lagos State, and climate change adaptation in Lagos State. Several works exist on climate change vulnerability and environmental problems in Lagos (Oteri & Ayeni, 2016; Sojobi, Balogun & Salami, 2016; Abiodun, Adegoke, Abatan, Ibe, Egbebiyi, Engelbrecht & Pinto, 2017; Adeyeri, Ishola & Okogbue, 2017; Danladi, Gül & Ateş, 2017; Fasona, Muiyolu, Soneye, Ogundipe, Otusanya, Adekanmbi,... & Onuminya, 2019; Heider, 2019; Olaniyi, Olutimehin & Funmilayo, 2019; Danladi, Kore & Gül, 2020; Uwadiogwu & Chigozie, 2020).

Lagos State by its geography is vulnerable to climate change and its effects. As a low-lying, coastal political unit, the vulnerability of Lagos State to climate change is established in the literature on climate change in Lagos State as well as its coverage on environmental problems this situation has caused and portends. The literature on the vulnerability of Lagos State to climate change focuses on it from the perspective of sea-level rise and coastal flooding. As one of the lowest-lying locations along the long coastline of Nigeria, the state is prone to flooding. With climate change predicted to lead to the thawing of the glaciers and arctic ice thereby leading to sea-level rise, Lagos is prone to coastal erosion and flooding. Oteri & Ayeni (2016) note that climate change in the form of sea-level rise and increased rainfall makes the state prone to environmental crises. The situation resonates because of the huge population of residents of the State living in coastal communities. For them, sea-level rise is potentially the most serious impact of climate change in Lagos in the long term.

The susceptibility of Lagos to coastal erosion has a slow-onset pattern. In studies of coastal zones of Nigeria and Lagos, more crucially, coastline changes were observed to occur over the years. Danladi, Gül & Ateş (2017) in a 43-year study of the Nigerian coastline using Google Earth aver that there are remarkable changes in coastline changes in Lagos. They maintained that despite the breakwaters constructed Goshen Estate, Lekki and Lekki Phase I in 2012 to stop coastal change, it was observed that 49113m² were lost between 2013 and 2014. Danladi, Kore & Gül (2020) in a 34-year study of coastline in Southwestern Nigeria between 1973 and 2017, using Landsat

Imagery, found that there were instances of coastal erosion and accumulation in both the eastern and western sides of the coastline with a net loss of 1.228 ha. This is eminently linked to climate change in the form of storms and tidal conditions. The findings of Uwadiogwu & Chigozie (2020) agrees with the foregoing. They found that between 1975 and 2015, the Lagos coastline has been impacted by erosion and a bit of the shoreline has been lost. A relationship was found between climate change-induced rainfall and coastline changes, in the form of increased rainfall, flooding and coastal erosion.

Away from coastal erosion and flooding, rainfall variability also registers as one of the areas of vulnerability of Lagos to climate change. This is because highly monthly variability is already being experienced in the city. In the view of Sojobi, Balogun & Salami (2016), Lagos has been experiencing high monthly rainfall variability. It is averred that rainfall variability is noticed in 10 months out of the twelve months that make a year. The authors also observe that variable pattern shows that there have been a decrease in summer rainfall and a rise in autumn rainfall in Lagos since 1986. Aligning with this, Abiodun, Adegoke, Abatan, Ibe, Egbebiyi, Engelbrecht & Pinto (2017) in a study of extreme precipitation in four African cities, note that Lagos as well as the three cities, Cape Town, Maputo and Port Said are already experiencing extreme precipitation. As coastal cities with the necessary pull factors that are trigger rural-urban migration, the citizens would experience loss of lives and economic damages as environmental indices become direr due to climate change. In Lagos, extreme precipitation is expected to increase. Local features such as population rise would aid the rise in precipitation in the city. Fasona, Muiyolu, Soneye, Ogundipe, Otusanya, Adekanmbi... & Onuminya (2019) also note that the mean temperature of Lagos has increased by 0.012°C between 1944 and 2015 with the possibility of 3°C increase in temperature in 100 years from the present period. Hence, beyond rainfall variability, Lagos State will be vulnerable to climate change through temperature change.

The demonstration of the vulnerability of Lagos State to climate change is found not just in the environmental problems associated with it. Climate change is now seen as an environmental problem in line with global advice. This is because it is the major way of leading. With the many threats climate change portends for the world, the quest for adaptation to foster resilience cannot be divorced from the development (Zhenmin & Espinoza, 2019; Mikulewicz & Taylor, 2020). Climate change in Lagos also manifests as a developmental problem. Existing developmental

issues in the state are now being exacerbated while new dimensions to them are springing up (Lawanson, Orelaja & Simire, 2015; Oladokun, 2016; Broto, 2017; Ojaborotu & Olajide, 2018; Olukoju, 2018; Salvaire, 2019; Shiru, Shahid & Shiru, 2019; Ilevbare, 2020 and Adama, 2020). The development and social implications of climate change in Lagos are many and complex. Climate change produces unfavourable outcomes across different sectors in the State. These areas include urban development and its political economy, agriculture, health and healthcare, security, poverty, and waste management among others.

The rapid population growth of Lagos means that it is one of the most rapidly developing urban areas in Africa. As a conurbation of around 20 million residents, Lagos is an apt description of what Allen, Lampis & Swilling (2016) in the edited work regard as ‘untamed urbanisms’. With urban development, demands of the rising population in housing, infrastructure and transport has been on the rise, given the uncontrolled population growth in the city. Urban governance in Lagos is affected by climate change. Both the highbrow and low-income coastal communities of the metropolis are vulnerable to the impacts of climate change. The situation of the low-income coastal communities resonates because they are some of most populated communities in the State. Therefore, urbanization in Lagos is largely unplanned and this has given rise to the proliferation of urban coastal slums, housing millions of people (Lawanson, Orelaja & Simire, 2015; Lawanson, 2016).

One area of climate change response in Lagos is slum upgrading. This is however problematic because of the many contradictions surrounding the noble cause. As homes to the large poor urban masses in the city, urban policy implementation is detached from the welfare of the people. Lawanson (2016) notes that in many communities where they are vulnerable to climate change, government policies and actions predispose people to social exclusion and rights denial. There have been instances of gentrification exercises in coastal communities in which the poor lose their homes and means of livelihood with little or no capacity to cope with the resultant social crisis. While Adama (2020) views slum upgrading in Lagos positively as a response to global trends in urban development and renewal, there is a mismatch of urban renewal policy and the interests of people dwelling in coastal communities in Lagos. This has led to protests against eviction attempts by the state government. There is also a lack of a bottom-up approach to urban renewal and development in Lagos as infrastructure development is devoid of the participation of the people,

showing that global best practices might be difficult to implement if the local context is disregarded.

Closely related to the urban development issue in Lagos is waste management. The huge population of the city entails that robust waste management governance is put in place. There is a relationship between waste management and the risk of flooding and pollution among other outcomes. Lagos generates 12,000 metric tonnes of waste daily (Olukanni & Oresanya, 2018; Omole, Isiorho & Ndambuki, 2016). Waste management is problematic in Lagos and many factors are responsible. The politicization of waste management in Lagos does not take the threat of climate change into cognizance. The absoluteness of the state in waste collection portends that residents are not satisfied with services rendered by waste collection vendors in the state, which were awarded contracts on political grounds (Salvaire, 2019). Ike, Ezeibe, Anijiofor, Daud & Nik, (2018) notes the politicization and monopolization of waste management by sub-national governments, including Lagos, in the face of obvious lack of capacity. While Lagos bases its waste management on public-private partnerships, there is a need to open up more on waste management to private participants in the sector. There is also the need to adopt global best-practices in waste management such as recycling, community involvement in waste management, awareness creation on the wealth-generation potential of waste management in Lagos, use of appropriate and state-of-the-art technology in waste management, among others, to ensure that the risks of climate change associated with waste generation are dealt with (Olukoju, 2018).

Climate change produces a complex of outcomes in Lagos. The untamed urban expansion of Lagos due to the rising population is producing adverse outcomes. Rapid urbanization in Lagos is producing food insecurity outcomes due to competitive land-use challenges. The need for urban extension which has largely been unregulated is affecting the possibility of turning Lagos into an agricultural state. A study of Igbe in Ikorodu, Lagos, Lawanson, Orelaja & Simire (2015) found that agricultural communities are vulnerable to climate change in Lagos. Urban extension reduces access to land for agricultural purposes, thereby contributing to Nigeria's food security pressures. Ojakorotu & Olajide (2018) looks at climate change as producing poor outcomes for women in coastal communities in Lagos. With coastal erosion and flooding, there have been instances of lack of access to people's homes and means of livelihood, which has biting effects on households headed by women. This has huge human rights effects on women and their children.

Due to an observed decrease in rainfall and a corresponding increase in temperature, there is reduced availability of water supply, which makes the people depend on groundwater. Shiru, Shahid, Shiru & Chung (2019), due to climate change, the quality of groundwater in Lagos is salinity, subsidence, and high presence of heavy metals in wells around landfills. Ilevbare (2020) notes that climate change is associated with health challenges for aged people in Lagos. This is due to climate variability, directly and indirectly, responsible for health issues such as high blood pressure, fever, respiratory diseases and cholera. Social and development challenges of climate change are complex in Lagos due to population rise, unregulated urbanization, poor policy conception and implementation, lack of consultation, leading to protests and people not buying into potential climate change policies and programmes, mass poverty, healthcare challenges and waste management issues, among others. This agrees with the view of Serdeczny, Adams, Baarsch, Coumou, Robinson, Hare ... & Reinhardt (2016) which avers that climate change will have sectoral impacts, especially in Africa, which is tantamount to its social repercussions. The state is grappling with these challenges in varying degrees, which signal the need for climate change mitigation and adaptation to ensure that its triggers are dealt with or, at least, controlled so that that the effects do not cause unbearable harm to the people.

Climate change mitigation in Lagos has received some attention in literature. In Nigeria, as in the rest of the African continent, there is greater attention on adaptation than mitigation due to lower levels of industrialization and consequently lower emissions, compared to the developed economies. Despite this, the understanding of mitigation and knowledge of the state-of-the-art in literature is important for a subnational political unit like Lagos due to its sheer huge population and the outcomes which this produces. Lagos is an important piece of Nigeria's climate change mitigation puzzle due to not just its population but its status as the economic nerve centre of the country. Several works exist on climate change mitigation in Lagos State (Ugonna, Malcolm & Brian, 2015; Elum, Modise & Nhamo, 2016; Otene, Murray & Enongene, 2016; Ezema, Opoko & Oluwatayo, 2016; Udomiaye & Chukwuali, 2018; Olurode, Isola & Adebisi, 2018; Akinwale & Adepoju, 2019; Enongene, Abanda, Otene, Obi & Okafor, 2019; Odogun & Georgakis, 2019; Akinola, Opoko, Ibem, Okagbue & Afolabi, 2020; Alao, Ayodele, Ogunjuyigbe & Popoola, 2020).

One major problem with the climate change response of Lagos state is that its mitigation and strategies are still very weak. This might not be unconnected with the low premium on mitigation

due to the status of Nigeria as an Annex II country in Global Environmental Governance. However, mitigation and adaptation have to go hand in hand in climate change response policy and planning. Ugonna, Malcolm & Brian (2015) note this by harping on the relationship between the understanding of vulnerability and adaptation priorities as having potential mitigation utility. By seeing vulnerability from a social perspective and having a robust assessment of it, Lagos state can mitigate some of its climate change-induced problems such as flood risk. In their view, poor attention to vulnerability assessment has weakened the state's ability to mitigate this problem. This means that the relationship between adaptation which is the main focus of climate change response in Lagos and Nigeria at large has failed to capture the mitigative tendencies in successful adaptation policies and strategies.

The close relationship between adaptation and mitigation is seen in the housing sector in Lagos State. In a study of the built environment in Lagos, Akinola, Opoko, Ibem, Okagbue & Afolabi, (2020) note that professionals in that sector are aware of the relationship between adaptation and mitigation as their suggested mitigation and adaptation strategies could not be divorced from one another. The strategies include "greening/tree planting, enforcement of building guidelines and the use of energy-efficient technologies" (p. 1273). This suggests that in the built environment sector, adaptation is a mitigation strategy and vice versa. In all of this, respondents also state that climate change awareness in the built environment is the link between adaptation and mitigation. Awareness informs mitigation and adaptation strategies woven into one another to ensure building sustainability. Infrastructure building is another mitigation strategy that has been mooted in Lagos. Dipeolu & Ibem (2020) notes that Green Infrastructure (GI) is key to ensuring mitigating Environmental Sustainability Challenges (ESCs) and this is poor in Lagos. To mitigate the ESCs such as greenhouse gas emission, waste management and water quality which were reputed by respondents as the most serious ESCs in Lagos, there is a need to improve the GI to give the people improved environmental ambience that can aid health and well-being. This means that better parks, recreational facilities, tree planting and related activities need to be encouraged in the State.

Another aspect of climate change mitigation is renewable energy. There is the need to shore up energy provision in the metropolis and also ensure that this energy drive is clean and renewable. The energy deficit profile of the state shows that despite efforts of the state government to increase electric power supply through the establishment of Independent Power Projects and renewable

energy, there is still a lot that need to be done. Olurode, Isola & Adebisi (2018) put the electricity supply gap of Lagos State at an average of 790MW between 2015 and 2019. It is for this reason that the quest for adequate and clean energy in Lagos comes to the fore as the state is the industrial and commercial hub of the nation. In this wise, Akinwale & Adepoju (2019), in their study of renewable energy adoption by Medium and Small Scale Entreprises (MSEs) in Lagos State, note that they are an important source of greenhouse gas emissions in the state. They found that the motivation to transit to renewable energy is contingent on many factors, including, “creating awareness and knowledge about renewable energy, adequate government policies, trust, peer-effect, development of renewable energy markets and technology acceptance factors (if it makes life easier, simple to use and improve the quality of work) are all positive and statistically significant in influencing the willingness to adopt renewable energy technologies among the MSEs” (p. 79). As a large MSEs hub in Nigeria, it behoves the authorities in Lagos to make the conditions for the fruition and implementation of the factors available.

Relatedly, Enongene, Abanda, Otene, Obi & Okafor (2019) in their study focus on the adoption of renewable energy through solar photovoltaic (PV) systems in residential homes in Lagos. The solar PV system is one important way of reducing greenhouse gas emissions into the atmosphere to the tune of 31.24 kgCO₂eq to 7456.44 kgCO₂eq annually. It is a veritable tool for achieving the targets of Nigeria’s Nationally Determined Contributions (NDCs) and the Sustainable Development Goals (SDGs). The generation of energy from waste is also one of the ways of shoring energy deficit in the state. The most common process of waste management is the incinerator system which aid pollution and emission of greenhouse gases. In the view of Alao, Ayodele, Ogunjuyigbe & Popoola (2020), this is discouraged as a method of waste-energy conversion in the state. Dwelling on the Technique for Order of Preference by Similarity to an Ideal Solution (TOPSIS) and Entropy Weighted method, the hybrid of anaerobic digestion, landfill gas recovery and pyrolysis portends the best means of converting waste to energy due to its environmental friendliness. There is therefore the need to develop the technology for mitigating pollution and greenhouse gas emissions through waste conversion in the state.

Climate change adaptation is the premium form of climate change response in Nigeria and by implication in Lagos. The location of the city and its highly-at-risk status with arguably one of

Africa's largest conglomeration of urban poor means that adaptation cannot be taken for granted by stakeholders in the state. The need for adaptation is seen in the now regular incidence and destructive magnitude of flooding across the state. Several works have been done on nature, incidence, magnitude and need for adaption in the state (Adetokunbo & Emeka, 2015; Ojomo, Elliot, Amjad & Bartram, 2015; Adekomaya & Ojo, 2016; Georgeson, Maslin, Poessinouw & Howard, 2016; Mjimba & Elum, 2016; Njoku, Rumide, Akinola & Adesuyi & Jolaoso, 2016; Ajibade, Pelling & Agboola & Garschagen, 2017; Akerele, 2017; Meerow & Mitchell, 2017; Sridhar & Hammed, 2017; Adegboyega, Oloukoi, Olajuyigbe & Ajibade, 2018; Butt, Shanahan, Shumway, Bekessy, Fuller, Watson, ... & Hole, 2018; Leal Filho, Balogun, Ayal, Bethurem, Murambadoro, Mambo, ... & Mugabe, 2018; Anabaraonye, Chukwuma & Eriobu, 2019; Resurrección, Bee, Dankelman, Park, Haldar, McMullen, 2019; Healy, Upton, Capstick, Bristow, Tijani, MacDonald, ... & Danert, 2020).

Climate change portends a grave reality for the residents of Lagos. Its effects are felt not just in terms of environmental problems but also in social and economic terms. One of the ways in adaption to climate change is an urgent need is that also manifests in gendered terms and this can affect adaptation strategies and programmes both in conception and implementation. Resurrección, Bee, Dankelman, Park, Haldar, McMullen (2019) notes that not addressing gender differences in vulnerability to climate change can cause maladaptation. Economic, social and power inequalities do not allow female-folk to adapt to climate change adequately. This reality is real in Lagos as Ojokorotu & Olajide (2018) argue that climate change is causing the human rights crisis in gendered terms in coastal communities in Lagos. The Lagos State government and other stakeholders are engaged in climate change adaption but this is characterized by inadequacies. A foremost aspect and means of achieving adaption to climate change is preparedness. Ojomo, Elliot, Amjad & Bartram (2015) found that in Southern Nigeria, of which Lagos is the foremost city, climate change preparedness based on the understanding of the dynamics is weak. It is quite paradoxical that despite the volume of climate information available to government officials, preparedness is low or poor. This is responsible for the unimpressive adaptation outlook across the region of study and Lagos in particular. Adaptation inadequacy in Lagos state is also noted in the disjuncture between science, policy, and practice in water supplies management. Healy, Upton, Capstick, Bristow, Tijani, MacDonald ... & Danert (2020) note that the underground water

management system in Lagos is uncoordinated, demonstrating a science-policy-practice disjuncture in the state. Groundwater abstraction by households and drilling contractors in the state are based on scientifically informed water policy largely uncoordinated. The import of this is that adaptation to climate change-induced water shortage may be difficult to achieve in the state as the depletion of groundwater resources could come up in the state. Despite that water management is receiving adaptive attention in the state (Butt, Shanahan, Shumway, Bekessy, Fuller, Watson... & Hole, 2018), lack of coordination and science-practice disjuncture, among other issues, are poised to derail such efforts. Further to the adaptation inadequacy in Lagos is the unsustainable environmental practices that reverse adaptation gains that have been made. One of such borders on land use and land cover change in the state. According to Adegboyega, Oloukoi, Olajuyigbe & Ajibade (2018) land reclamation and other land-use practices in Lagos that is largely uncoordinated nor in tandem with best practices cause social and environmental issues for the people. There is no serious ecosystem accounting that can be a guide and foundation for such actions in Lagos. There is also a lack of adherence to Environmental Impact Assessment in land reclamation exercises. The result of this is the loss of forest cover and ecosystem depletion in Lagos, giving rise to an adaptation-unsustainability vicious cycle in the state.

A critical way of addressing the adaptation need of a city is through knowledge sharing, copying, and domestication of successful adaptation politics and strategies and the adoption of global best practices in adaptation management. Adetokunbo & Emeka (2015) suggest this through the sharing of Asian lessons on urbanization, housing, and homelessness and how to ensure the impact of climate change is cushioned on issues arising from them. According to them, Lagos can benefit from Asian efforts through “conscious policy-linkage of urban demographic expansion and economic growth; synergy between formal and informal sectors; urban densification through compact, mixed-land use development; broad-based urbanization; metropolitan expansion; pursuit of slum-free cities; the prominence of housing in national policies; pro-poor financial frameworks” (p. 15). All of these, however, need to be done in a location-specific manner. Put together, these are elements of adaptation to climate change that must address the peculiarities of Lagos as a location distinct from Asian cities.

Climate change adaptation is a dynamic set of actions implemented to achieve some level of cushioning to the effects of climate change. This may be seen in form of economic opportunities and can be seen in future-looking concerns. Adaptation means economic opportunities for the people. Georgeson, Maslin, Poessinouw & Howard (2016) in line with this reasoning note that because of the need to invest in adaptative programmes and infrastructure, there is a need to interrogate what they called ‘adaptation economy’ in megacities. The adaptation spending of Lagos is the second-lowest of the ten megacities in the study, which include New York, London, Paris, Beijing, Mexico City, Sao Paulo, Mumbai, Jakarta and Addis Ababa. Despite having a population growth rate that is higher than most of the cities, it is apparent that the adaptive capacity of Lagos in terms of its adaptation spend as a percentage of its GDP is low. This means that compared to most of the cities studied by the authors, the adaptation economy of Lagos cannot support its climate change response quest.

Literature on climate change and climate change response in Lagos State is rich. The literature demonstrates that the city is vulnerable to climate change. This is based on the city’s burgeoning population, its location as a coastal city. In summary, the climate change response of Lagos State is not impressive due to the many issues and challenges that are rising in the state. The city demonstrates the globally acclaimed position that the effects of climate change go beyond the environment. Like in many megacities around the world, climate change produces social, economic, human rights, and even political outcomes. Going through the themes into which literature on climate change and climate change response in Lagos State are divided, extant works touched on issues such as the environmental vulnerability of Lagos, the development implications of climate change, that is the complex outcomes of the menace which are often in the negative for the people, mitigation and adaptation dynamics surrounding climate change.

The literature on climate change and climate change response in Lagos - despite being rich and burgeoning - has neglected the governance aspect of the mitigation and adaption. Science is the core tool for determining the incidence and magnitude of climate change; however, governance allows such knowledge to become an agenda and ensures the resources to mitigate and control the problems arising from it are available. For climate change response in Lagos, literature is scarce on governance and dynamics, which include intergovernmental relations, climate finance and the role and viability of environmental institutions in mitigation and adaptation. With this tripod of

governance, the measurement of climate change response becomes easier and more focused. Climate change can be integrated into the development agenda of society, with the political, financial and institutional means of achieving its aims and objectives.

2.3.7 Climate Change and Climate Change Response in Kwazulu Natal

Kwazulu Natal, as an integral part of South Africa and the world, is affected by climate change. This is made palpable by the location of the Province and its status as the country's second-most populous province. In the first place, the location of the province along a 580km coastline makes the vast majority of its citizens vulnerable to coastal erosion and inundation, among other impacts of climate change (Riddlle, 2015; Shangalall, Feretinou, Karymbalis & Smith, 2019). Secondly, in the midland areas of the Province, the vast areas of dry vegetation zones make climate change impacts such as loss of biodiversity, land degradation, and drought quite biting to citizens of Kwazulu Natal (Eeley, Lawes & Piper, 1999; Ndlovu, Clulow, Savage, Nhamo, Magidi & Mabhuadhi, 2021). Thus, climate change is already a lived reality across the Kwazulu Natal and the impacts are affecting the socio-economic dynamics of the Province.

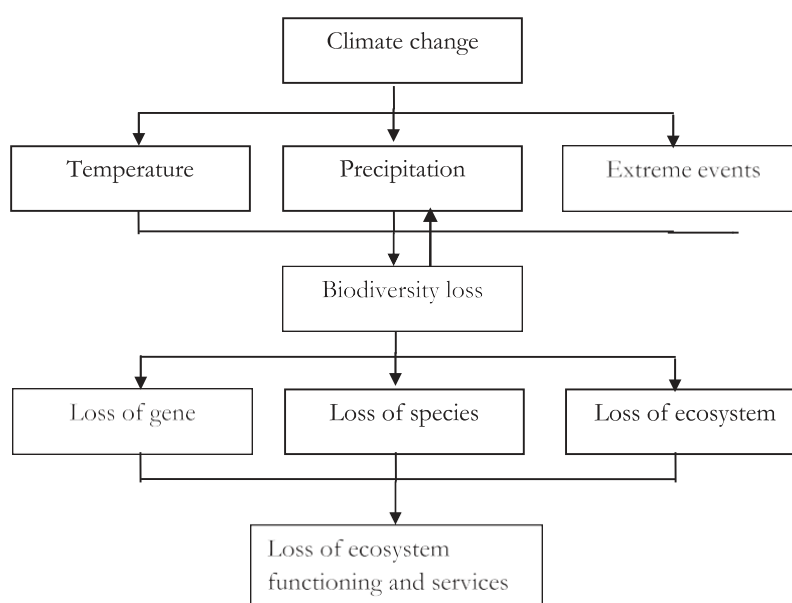
The impacts of climate change can be broadly divided into biophysical and social impacts and vulnerability. The interstices of these broad categorisations can be seen in the daily lived experience of the people of Kwazulu Natal in terms of sectoral problems in biodiversity, agriculture, water, cities, built environment, and health (Ziervogel, New, van Garderen, Midgley, Taylor, Hamman..., Warburton, 2014). These are the primary impacts of climate change in the province. They go on to produce further multi-sectoral impacts on the lives and livelihoods of the people. The combination of these impacts and vulnerability makes Kwazulu Natal be one of the South African provinces that are affected by climate change (Ndlovu, Clulow, Savage, Nhamo, Magidi & Mabhuadhi, 2021).

Climate change is producing gory biodiversity outcomes in Kwazulu Natal (Eely, Lawes & Piper, 1999; Boon, Cockburn, Govender, Ground, Slowtow, McClean, ..., Roberts, 2016). As defined by the United Nations Convention of Biological Diversity (UNCBD), biodiversity is "the variability among organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species, and of ecosystems" (Watson, Gitay, Suarez, Dokken & Leemans,

2006:3). The import of this is that climate change is threatening and destroying the support system of life across the world and in Kwazulu Natal. The disruption of the biological system and its processes are noted in the Province. As the hub around which the socio-economic dynamics of human society revolves, the impacts of biodiversity on the people and their livelihood cannot be overemphasised.

The connection between climate change and biodiversity loss in Kwazulu Natal is as elsewhere in the world. It is linked with the rise in surface temperature of the earth, reduced precipitation, and the rise in the occurrence of extreme events. This leads to a loss of biodiversity loss which entails disruption of the functioning of the ecosystem (Sintayehu, 2018). The linkage between climate change and biodiversity loss is represented in Figure 2.1 below;

Figure 2.2: Relationship between climate change and biodiversity loss



Source: Sintayehu (2018)

Kwazulu Natal is rich in biodiversity but this is being threatened by climate change, resulting in rapid loss of biodiversity. In alignment with the relationship between climate change and biodiversity as described by Sintayehu (2018), the South African Long Term Adaptation Scenarios (LTAS) posit that climate change affects the biodiversity sector of the country, including Kwazulu Natal as follows;

1. Loss of High Priority Biomes and areas of biodiversity importance.
2. Increased impacts and loss of threatened ecosystems due to changes in climate.
3. Degradation of natural habitat and loss of biodiversity due to significant land use change will impact on the ability of natural ecosystems to respond to climate change.
4. Changes in rainfall patterns and temperature are likely to have an impact on wetlands and the ecosystem services they provide. (South African Local Government Association, 2017).

The main drivers of biodiversity loss in Kwazulu Natal are population growth and land use (Jewitt, 2017). While the rising population of the province means that there would be more pressure on land use, which means the biodiversity profile of the province would be under threat and this can lead to poor agricultural production, among other social problems. This usually comes with rapid urbanisation in the province which would lead to depletion of natural habitats and, in effect, loss of species and the ability of the ecosystem to carry out its full functions. When climate change is added to the biodiversity profile of the province, it portends massive loss of the latter because of the nature of the threat multiplier status of the former. Jewitt (2017) posits that while land-use change, leading to habitat loss is the globally recognised main driver of biodiversity loss, climate change is going to hasten and worsen biodiversity loss in Kwazulu Natal going forward.

The effects of climate change on biodiversity in Kwazulu Natal are many. Strydom & Savage (2017) note that the rise in temperature in the midlands areas of the Kwazulu Natal predisposes it to rise in incidences of wildfires. This would lead to loss of the ecosystem, thereby making it impossible to offer its traditional services. It would also lead to loss of species. Loss of biodiversity as impacted by climate change also directly affects the livelihood of rural people in the province (Nkoana, 2014). In the rural areas of Kwazulu Natal, biodiversity richness that manifests in the abundance of forest natural resources is directly related to the livelihood of the people. Hence, as climate change continues to affect biodiversity, leading to its depletion and loss, the wellbeing of the people is being threatened.

Climate change affects agriculture in Kwazulu Natal. These impacts can be gleaned from the earlier analysis of the impacts of climate change on biodiversity (Jewitt, Goodman, Erasmus, O'Connor & Witkowski, 2015; Sintayehu, 2018). It is also related to the impacts of climate change

on water (Ndlovu, Clulow, Savage, Nhamo, Magidi & Mabhuadhi, 2021; Patrick, 2021). In line with the global rise in temperature, the temperature in Kwazulu Natal has risen in recent decades. For example, the temperature of the Mzinyathi District increased by 1.5°C between 1993 and 2010 (Shishanya & Mafongoya, 2017) and this is the situation around the Province. In the same, rainfall and precipitation have dropped significantly in Kwazulu Natal. The KZN EDTEA (2020:57) notes that;

“for the near term (2016–2035), all climate models predict a warming of 0.5°C to 1.0°C, with the coastal areas being closer to 0.5°C. For the long term (2080–2100), predicted temperature increases range from 2°C to 5°C, depending on emission scenarios. This will consequently result in an increase of heat waves and very hot days. Such heat waves and high temperatures will most likely have severe impacts on agriculture, water security, biodiversity and human health”.

On the other hand, climate change is producing poor water availability outcomes in Kwazulu Natal. This puts agriculture and farmers, especially rural farmers in harm's way in terms of wellbeing and food security. While there is variation in the rainfall patterns of the coastal and other areas of the Province, it has a well-documented history of water stress (Eeley, Lawes & Piper, 1999; Ndlovu & Demlie, 2020). Vetter, Goodhall & Alcock (2019) posit that annual mean rainfall in Kwazulu Natal reduced by 5.8% between 1997 and 2006 compared to the period 1970-1999. In terms of dryness which speaks to rainfall variability, the period 1992 to 2014/15 is the driest in the history of Kwazulu Natal (Ndlovu & Demlie, 2020). The import of this is that both increases in temperature and rainfall variability are affecting agriculture in the province. This situation breeds socio-economic stress for the people.

The combined effects of temperature and rainfall variability are such that the agricultural sector, which is dominated by the smallholding farmers, the majority of whom are rural dwellers, are hampered in productive terms. Shishanya & Mafongoya (2017) posits that climate change causes anxiety among rural farmers on account of poor weather patterns arising from increased surface temperature and erratic rainfall. The prevalence of drought in the Province is affecting water sources, thereby making agriculture of all types more tenuous than ever. One of the most affected water sources is the Lake Sibayi in Northern Kwazulu Natal, which has shrunk by 20% since 1992 because of the combination of temperature and rainfall variability (Nsuguba, Mearns & Adeola, 2019).

This means that agricultural concerns close to the lake are water-stressed, thereby putting productivity in peril. The 2015/2016 drought in Kwazulu Natal caused a massive economic loss in the pastoral agriculture sub-sector. Vetter, Goodhall & Alcock (2019) note that in the Msinga area of the Province, cattle farmers who lost 43% of their herds to the drought are finding it difficult to recover from the loss. This portends economic and nutrition challenge to the people as the pastoral sub-sector is a supplier of protein in the Province. There is also food insecurity in households in the same District following the 2015/2016 drought which put the prices of food items beyond the reach of poor households through inflation (Drysdale, Bob & Moshabela, 2020).

Arguably, the main outcome of the impact of climate change on agriculture in Kwazulu Natal is food security (Drysdale, Moshabela & Bob, 2019; Shishanya & Mafongoya, 2017). There is delayed and prolonged effects of drought in the province even in its aftermath. In the iLembe District of the Province, though rainfall was generally erratic in the months after the 2015/2016 drought, there was increase in rainfall between July and November 2017. This means that the effects of droughts cannot be immediately undone even when there is rainfall as the ground did not absorb water from rainfall leading to floods in the District (Drysdale, Moshabela & Bob, 2019). Climate change fosters a situation in which smallholding farmers cannot meet up the demands of adaptation. This is because they lack the wherewithal, financial, information and other extension interventions to help them moderate the new social, economic, and environmental dynamics introduced by climate change.

Another angle to the discourse on the vulnerability to and impact of climate change on agriculture and food security in the Province of Kwazulu Natal is its gendered dynamics. Climate change, like other social dynamics, affects men and women differently and this follows the established patriarchal patterns in society. Alluding to this in respect to the Covid-19 pandemic, Ojorotu & Olajide (2020) argue that women have a weakened response to these developments because of the social, religious and cultural encumbrances on their ability to mount a serious response to them. In the province, the trajectory of the nexus between climate change and agriculture and food security remains palpably traumatic for women (Ndimande, 2001; Babugura, 2010; Masinga, Maharaj & Nzima, 2021). This shows that the gendered manifestation of climate change in

agriculture and food security terms remains a critical problem in Kwazulu Natal. Women typically wallow in climate change-induced poverty and social menaces because of the poor adaptive capacity and this subjects them to food insecurity. They are performing badly in the metrics of food security, which include availability, physical and economic access, utilisation, and stability as enunciated by Haug (2018).

Women in Kwazulu Natal are at the wrong end of the impacts of climate change. This manifests in their rural-dwelling and endemic poverty reality across the Province as in the rest of South Africa (Tibesigwa, Visser, Hunter, Collinson & Twine, 2015). Further to this, Nzimela & Ahmed (2018) submit that women in Kwazulu Natal as seen in Ndwedwe and Cibane are vulnerable to food, energy and water (FEW) constraints. As climate variability continues to bite harder, the situation of women in terms of food security becomes more precarious. This also affects the ability of women to earn economically from agricultural efforts. In the semi-arid areas of the province that are being threatened by severe droughts, female-headed families fare worse than male-headed families to earn financially from the sales of goats (Tsvuura, 2020). In addition to this, the herds are smaller as they have lower financial and other resources to maintain large herds.

Climate change impacts cities and makes the built environment in Kwazulu Natal vulnerable (Ziervogel, New, van Garderen, Midgley, Taylor, Hamman..., Warburton, 2014; Bai, Dawson, Üрге-Vorsatz, Delgado, Barau, Dhakal, Dodman... Schultz, 2018). Cities generally are affected by climate change as temperature, rainfall and precipitation become more erratic. To this end, cities and built environments experience floods, heatwaves, storms and other extreme weather events that put the ambience and the entire political economy of cities in jeopardy (United Nations Environmental Programme, 2021). This situation of coastal cities around the world resonates with the fact they are the most rapidly urbanising spaces and this comes with rapid population growth. This is true of coastal cities in developing countries that are dominated by urban slums and informal settlements that predispose people to extreme climate events.

Hlahla & Hill (2018) alludes to the rapid rising of informal settlements in South Africa with Kwazulu Natal as one of the leading provinces on that count because of its large and rising population. One of the main markers of informal settlements is poverty as dwellers lack the necessary adaptive capacity to ensure that the impact of climate change on their shabbily-built

abodes is attenuated. This view is also held by Williams, Manez, Costa, Celliers & Sutherland (2018) about the rapid rise in the number and sizes of informal settlements in the province. In their study of the Quarry Road West informal settlement in Durban, the authors submit that informal settlements demonstrate the vulnerability to the built environment to the vagaries of climate change.

Mather and Theron (n.d.) discuss recent extreme events along the coast of South Africa. The coast of South Africa of which Kwazulu Natal forms an important part is highly vulnerable to extreme events. These have caused loss of infrastructure and services with long-lasting social, economic and environmental implications. The indicators of coastal vulnerability include measures of erosion and inundation along the coast. In 2006 and 2007, up to 400km of the coastline of Kwazulu Natal experienced erosions. Some of the most vulnerable South African coastal areas are in Kwazulu Natal. These include Durban, North of Richard's Bay and the developed areas of Kwazulu Natal South Coast. The paper made important attempts to link coastal hazards to climate change and dwelt substantially on the need for adaptation to the reality of climate change in South Africa and Kwazulu Natal which only dwelled on technical aspects of adaptation but was silent on the political dimension of adaptation to coastal erosion.

The bulk of the studies on the impact of climate change on cities and built environment in Kwazulu Natal is based on the eThekweni Metropolitan (Durban) (Sutherland, Hordijk, Lewis, Meyer & Buthelezi; Pillay & Pahlad, 2014; Lervik & Sutherland, 2017; Sim, Sutherland & Scot, 2019). This is because it is the most developed and urbanised area of the Province. Hence, it has received disproportional attention in literature. While this can be seen as a challenge to understanding the effects of climate change on the built environment in other cities, policymakers and other stakeholders can take important cues on ensuring sustainability in these other places. In this regard, Mather & Roberts (2015) posits that the biggest climate change threat to the built environment in eThekweni is sea-level rise. It would compound existing development problems in the Municipality. Alluding to eThekweni Municipality (2010) as cited in Mather & Roberts (2015:499), the problems are as follows;

- Low economic growth and high rates of unemployment
- Access to basic household and community services are less than optimal
- Relatively high levels of poverty
- Low levels of literacy and skills development
- Sick and dying population affected by HIV/AIDS
- Exposure to unacceptable high levels of crime and risk
- Many development practices are still unsustainable
- Ineffectiveness and inefficiency of inward-looking local government still prevalent in the municipality

To this end, the Municipal government developed the Municipal Climate Protection Programme (MCCP) in 2004. With the addition of climate change to these problems, climate change becomes a huge socio-economic risk for cities and built environment in the province.

Climate change also produces gory health outcomes in Kwazulu Natal. Chersich, Wright, Venter, Rees, Scorgie & Erasmus (2018) in this light assert that climate change in Kwazulu Natal can be summed up as a health issue. Health outcomes of climate change can be distilled from temperature and rainfall variability and the drop in precipitation. These lead to climate events such as drought, flooding and heatwaves, among others. Moodley, Tanser & Tomita (2021) observe that climate change has impacts on the reproductive health of women. In the uMkhanyakunde District, for example, it is noted that every 1°C rise in temperature comes with a 4% higher likelihood of pregnancy loss. Therefore, as the temperature rises in the province, women's health is predisposed to hazards. Another area climate change impacts on health in Kwazulu Natal is air pollution. The South Durban area of the eThekweni Metropolitan Municipality comes to the fore on this. The combination of industrial and commercial activities in the area predisposes people to cardiovascular issues such as asthma, lung diseases and other health issues (Jaggarnath, 2010; Naidu, n.d.).

The water stress arising out of the persistent drought in the Province also predisposes the people to health crises. The study of the uMkhanyakunde District, one of the rural areas in the province shows that diseases such as cholera, diarrhoea and other water-borne diseases portend danger to the province (Patrick, 2021). The resort to popular water reuse as a coping mechanism in the rural areas exposes them to diseases. This means attempts to creatively adapt to climate change-induced water stress brings with the high possibilities of maladaptation manifesting as negative health outcomes.

Given the high vulnerability of Kwazulu Natal to climate change, it is of note that climate change response efforts are in place to address the menace. The response has, however, been adjudged inadequate. In this light, Goble, Hill and Philips (2017) assess integrated coastal governance and implementation using the Drive-Pressures-State-Impact-Response framework in Kwazulu Natal. The implementation of the Integrated Coastal Management Act (ICM) is fraught with challenges such as financing and human capacity at the provincial and local government levels. Kwazulu Natal Government lacks the capacity for adequate implementation of the ICM and therefore has not been forthcoming in its role as the main driver of coastal governance. Coastal management in South Africa is also faced with the problematique of historical fragmentation of coastal governance. This accounts for the lack of clear governance mandates which in turn impact Kwazulu Natal ICM implementation. Hence, Kwazulu Natal has experienced “missed milestones” (Goble, Hill and Philips, 2017 p. 21) in its ICM implementation. While the work is a good contribution to knowledge on the environmental study of Kwazulu Natal, it did not envisage the impact of climate change adaptation on the ICM in the province. It alluded to weak Government capacity and the need for partnership with Non-Governmental Organisations (NGOs), Community-Based Organisations (CBOs) and related bodies but failed to discuss the roles played by political dynamics in ICM implementation in Kwazulu Natal.

Mthembu and Zwane (2017) analysed the vulnerability and adaptive capacity of smallholder mixed-farming systems to climate change in Kwazulu Natal. The impact of climate change on food security through sustainable agriculture is huge. The effects are in terms of resource scarcity which subject cattle farmers to economic crisis because of loss of cattle during drought. Other types of farming are also vulnerable to climate change as there was a shortage of water for irrigation. This has an immediate and fundamental impact on the household economy. Agriculture as a feasible source of economic livelihood is threatened by drought and other vagaries of climate change. Farmers became more dependent on the government for drought relief and as a result, overstretched the already constrained government drought relief support. The paper dwelt on the inadequacy of the financial capacity of government in terms of drought relief package but was silent on the role of institutions and political structure as they combine to affect provincial adaptation capacity which goes with huge economic implications for farmers and their households.

Zwane and Montmasson-Clair (2016) in a Policy Assessment on Climate Change Adaptation in agriculture in South Africa identifies critical areas of policy weakness in South Africa which also robs off on Kwazulu Natal Province. They include:

- i. Notable absence of national political agenda around climate change adaptation;
- ii. No guidelines for Local Governments to translate national climate action plans;
- iii. The South African government has not indicated potential sources of financing for adaptation measures in the agricultural sector; and
- iv. Currently no financial incentives for Local Governments to include mitigation and adaptation projects with planning.

The study also revealed that Kwazulu Natal is among the provinces that have climate change response plans. While this fact is commendable, there is a weak financial base for climate change adaptation in the province as in the rest of South Africa. Generally, in terms of policy and governance, misalignment of government policy, policy uncertainty, poor implementation of policies and absence of extension services are the issues noted by the authors. The Policy Paper affirms that government has a role to play in devising mitigation and adaptation strategies and coordinating bottom-up. The policy paper is very close to addressing the dynamics at play in environmental governance but silent on the political structure and how it impinges on devising and implementing adaptation strategies.’

Hannaford and Nash (2016) analysing climate, history, society over the last millennium in Southeast Africa note that Kwazulu Natal had over the centuries responded to change in climate variability. Climate variability response was evident in the organization of food systems, climate-related ritual and political power, social networks, and livelihood assets and capabilities, as well as the nature of climate variability. Climate variability response has over history been associated with social and political development in certain Southeast African societies including Kwazulu Natal. The configuration of political power determined the direction in which the present-day *Nguni* people of Kwazulu Natal adjust to climate variability. Hence, there is a dialectical relationship between climate and social change with society. This paper is an important historical lead to climate and environmental studies in Kwazulu Natal, but the historical analysis did not cover modern and new directions in the adaptation of climate variability and political dynamics in the Kwazulu Natal.

Climate change in Kwazulu Natal has received commendable attention in the literature. Climate change is a foremost discourse in the development agenda of Kwazulu Natal and the Province plays pivotal roles in subnational climate change not just in South Africa but also in Africa. Like climate change response in Lagos, literature on climate change in Kwazulu Natal remains silent on the political nature of climate change response and did not take cognisance of the policymaking process of climate change response in the province.

2.4 Gaps in Literature

Having extensively reviewed literature around issues and themes on subnational climate change response in Lagos State and Kwazulu Natal, the gaps that occupied the attention of this study emerged. In the first place, literature on climate change and climate change response has been largely dominated by studies in the core and agricultural sciences. While studies in the social sciences and humanities are on the rise in recent times, there has been no previous study that captures subnational climate change response and its political dynamics in Lagos and Kwazulu Natal. As a policy response, there is supposed to be a study that would take into cognisance what is being done by subnational authorities in Nigeria and South Africa and the impact of intergovernmental relations, climate finance, and institutions on their climate activities. It is also necessary to see how the local, national, and international political environments shape the climate ambitions of these subnational authorities. Given this, this study represents a first in the comparative study of subnational climate change response in Nigeria and South Africa.

2.5 Theoretical Framework

The theoretical framework is crucial to the academic tradition within which research is conducted. It is a framework based on existing theories in the field of research that relate to and/or reflect research hypotheses. It is the tradition of researchers to research through the lenses of existing theories. The theoretical framework should guide and be consistent in all aspects of the research process, from problem definition, literature review, methodology, presentation and discussion of results, and conclusions drawn (Adom, Hussein & Agyem, 2018). This study adopts the structural functional theory and the multilevel governance approach to environmental governance. These theories are discussed in the subsections below, showing their assumptions and postulations, weaknesses and relevance to the study.

2.5.1 Structural Functionalist Theory

Structural functionalism is one of the earliest theories or approaches to the scientific study of politics. It is one of the theories that were propounded in the quest for politics to stake its claim as a scientific discipline. It was adapted in political studies in the work of Almond and Powell (1966) on the basis that political systems must perform certain functions for the system to be in equilibrium and to persist (Gaub, 2003). It is essentially an approach for comparing political systems based on their respective functions and capacities. The basic assumption of the structural functionalist theory is that every political system performs certain functions and it is in the effective performance of these functions that a political system can be compared (Verma, 1975; Enemuo, 1999).

The structuralist functionalist theory is an outgrowth of the Eastonian system theory. Principally based on the functionalist tradition of biology and having previously been adapted to anthropology and sociology, Almond asserts that the theory offers an understanding of the political system through its functions (Verma, 1975). This means that every political system has certain functional prerequisites without which it cannot develop. The functional requisites of the structures within a system function are an ensemble in which a dysfunctional structure affects the overall performance of the system and leads to the development of strains that threaten the persistence of the system. Almond and Powell (1966) present seven functions (four input functions and three output functions) that are performed by the political system. They can be grouped into two categories as input and output functions. The input functions are political socialization, interest articulation, interest aggregation and political communication. These are functions that are fed into the political system for processing into governance mandates. They are essentially performed by non-governmental forces within the system, including citizens, CSOs, businesses and other stakeholders (Verma, 1975).

These functions stem from the issues within the polity that require governmental attention. For Verma, Almond was particularly interested in the input functions of the political system because it demonstrates the nature and character of the political society as shaped by the environmental, social, cultural, and economic forces of society (Verma, 1975). This affirms the measure of the quality of the input functions as fed into the political system by the citizens. The output functions on the other hand are rule-making, rule application, and rule adjudication. These are functions performed by the government and its agencies. Almond laid a lesser emphasis on these functions

compared to input functions. However, these functions are important because it is with the perceived and actual effectiveness of these functions that citizens and other non-governmental groups can further measure the development of the political system and its ability to cater to their needs.

Further to the input and output functions of the political system, Almond discusses the capability of the political system to effectively perform its functions. These further functions can be categorised as regulative, extractive, distributive, and responsive capabilities (Enemuo, 1999). These are the extent to which the political system can successfully deal with the inputs (Verma, 1975). This is because the system receives a lot of inputs that can overburden it. Therefore, an understanding of the functional capabilities of the political is necessary. This is because input functions deal with a variety of issues ranging from giving regulations on many processes within the political system, resource allocation and its issues, individuals and their place within the system, and responding to issues within the confines of the system and beyond it (Verma, 1975). Hence, while two political systems may possess similar structures, their differences can be distilled through the respective functions and the effectiveness of their capabilities.

The political system is not without challenges. Given the dynamics of the input function and the need for the political system to process these inputs, challenges, and pressures do mount on the system as to its capabilities to process the input functions. According to Verma (1975), these challenges come in three forms, which are;

1. Challenges from the political system, that is from the elites
2. Challenges from the environment, that is from social groups
3. Challenges from other political systems.

It is the quest for the mediation of these challenges by the political system that marks how developed a political system is. The dynamics of the political system demonstrates that the three types of challenges to the system do co-occur. The survival and persistence of the system are determined by its effectiveness in ensuring that the system is not overburdened. It also ensures that the system acquits itself in the production of its output functions.

The relevance of the structural functionalist theory to this study is in the understanding of the functional requisites of the political system in climate change governance. As places that are vulnerable to climate change respectively, Lagos State and Kwazulu Natal are political systems, albeit subnational systems because they are sub-systems of the national political systems of Nigeria

and South Africa respectively. This implies that their systems get inputs from the citizens on climate change and other environmental issues, among other development issues within them. The political system of Lagos State and Kwazulu Natal also perform the input and output functions towards responding to climate change. Their capabilities in performing these functions are critical to the effectiveness of their respective climate change response. As a transboundary problem, climate change requires the response efforts of many stakeholders with subnational governments arguably the most critical (Christoplos, Bashaasha, Dhungana, Friis-Hansen, Funder, Hunong, Khatri, Lindegaard, Mweemba, Ngoan, Nyambe, Ojha, Okiro & Thi-Hoa-Sen, 2016). Thus, the input and output functions and the capabilities of the system are necessary for drawing ambitious climate action plans to reduce emissions and implementing adaptation strategies.

Effective climate change response rests on the regulative, extractive, distributive and responsive capabilities of the political systems of Lagos State and Kwazulu Natal. Citizens in both locations, including those in coastal communities, perform the input functions, which are fed into the political system with the output functions as climate change response action plans. The capabilities of Lagos State and Kwazulu Natal to perform their respective set of functions informs about the quality of their contribution to their national and, in the final analysis, global climate ambitions. Therefore, the structural functional theory is a viable theoretical tool to engage in the comparative subnational climate change response of Lagos and Kwazulu Natal.

While the theory speaks to the functional imperative of the subnational climate change response focus of this study, it is not adequate enough to speak to the flow of interaction between the various governmental actors involved in the process. This is because climate change response is at once hierarchical and horizontal interactions between levels of government and other actors involved in climate change response. Therefore, to capture the essence of the intergovernmental relationships in terms of the flow of global climate mandates as processed into national climate action plans and subnational coordination and implementation, there is a need to consider a counterpart theory for this study. This helps in revealing the interstices of the relations between the international climate regimes, national governments of Nigeria and South Africa, and the Lagos State and Kwazulu Natal in terms of their political, fiscal, and institutional dynamics towards ensuring that the latter participate in climate change response meaningfully.

2.5.2 Multilevel Governance Approach to Environmental Governance

The theory of multi-level governance is one of the theories of international politics that spanned up in the post-Cold War era. It gathered theoretical momentum following the Treaty of Maastricht that led to the emergence of a supranational European Union in 1992 (Saito-Jensen, 2015). The initial outlook of the approach was to provide a theoretical explanation for vertical coordination from the supranational level to the national level as demonstrated in the emergence of the European Union that is a case in the pooling together of sovereignty among European countries towards policy and political cohesion (Benz & Eberlein 1999). Stephenson (2013) however notes that the theoretical application of Multilevel Government has grown and keeps growing because scholars find it theoretically handy to employ in the explanation of the several dynamics of international and national politics. Hence, multilevel governance has been used to provide the theoretical basis for studies of Europeanisation and regionalization; policy/country studies and implementation studies; and problem-solving, coordination, learning, among other emerging theoretical usage trends (Stephenson, 2013).

For this study, the multilevel government approach focuses on the functional uses of multilevel governance in terms of policy/country studies and implementation studies and problem-solving, coordination and learning. This is because the study is at once an attempt to understand climate change response in contribution to the overall global climate action to reduce emissions and cushion the effects of climate change on peoples around the world. As a theoretical approach, multilevel governance contends that states are no longer the sole or monopolizing actors in policymaking. Rather than this situation, policymaking is now being shared by actors within a multilevel framework (Saito-Jensen, 2015). The theory recognises that governance goes on within this multilevel framework with lower levels tasked with the implementation of the governance system (Partelow, Schlüter, Armitage, Bavinck, Carlisle, Gruby, R. L., ... & Van Assche, 2020). The theory notes that different political and administrative centres may be necessarily dispersed but in functional terms depend on a linkage that connects them to the centres of power (Stephenson, 2013). Benz (2006) cited in Newig & Fritsch (2009) in this light submits that multilevel governance entails “political structures and processes that transgress the borders of administrative jurisdictions, aiming to cope with interdependencies in societal development and political decision-making which exist among territorial units” (p. 3)

Dwelling on the functional plane of the theory, the core mandate of multilevel governance is coordination and integration between actors operating at different levels. This is because, with improved vertical integration between levels of governance, the achievement of policy goals would be more effectively done because of top-down driven governance (Partelow, Schlüter, Armitage, Bavinck, Carlisle, Gruby, R. L., ... & Van Assche, 2020). Given the multiplicity of actors, multilevel governance seeks to ensure balance and collaboration between local, regional, national and other authorities (Yi, Huang, Chen, Xu & Chen, 2019). In essence, multilevel governance harps theoretically that the complexity and multiplicity of social problems requiring policy intervention are encumbering such that it needs to leverage actors across different levels to proffer solutions. As a result of the emergence of many actors, it is only necessary to integrate and coordinate the levels of government so that such collaborative efforts between governance can yield maximum results.

An immediate concern on multilevel governance is the seeming attack on the state, which many critics have labelled as suggesting that the state system weakening. Rather than construe the approach in this light, Betsill & Bulkeley (2006) note multilevel governance does not imply the weakening of the state, it is rather a redefinition of the scope and scale of authority. While the role of the state may be seen as diminishing, the realist essence of the state still holds in that the state retains its controlling powers in the multilevel scheme of things. This implies that states are no longer the sole actors in policymaking in international and national matters as new strategies of coordination, steering and networking are being deployed to enhance the problem-solving profile of the state (Saito-Jensen, 2015). Within its functional outlook, multilevel governance has five components according to Homzy, Liu & Warner (2018). These components are;

1. Co-production of knowledge vertically and horizontally
2. Framing co-benefits
3. Engagement of civil society
4. Provision of capacity
5. Sanctioning and coordinating authority

These components of multilevel governance demonstrate that the state stands to benefit immensely from its functional offerings. This is because, multilevel governance, in the final analysis, involves multilevel actors pooling resources, knowledge, capacity, and other factors together while also ensuring coordination and integration for such multi-actor collaborations to be effective.

Hooghe & Marks (2003) posit that there are two types of multilevel governance which they label Type I and Type II governance. Type I governance has a federalist inclination. This is because federalism deals with issues of power-sharing between levels of government. In the same vein, Type I multilevel governance deals with power-sharing among limited numbers of government while the levels of government are few. The focus of this type of multilevel governance is the individual government rather than a specific policy. It also has system-wide frameworks as functions are bundled within that framework. Along with its federalist pattern, there are multiple but limited levels of government in the Type I multilevel governance. The basic characteristics of the Type I multilevel governance include, general-purpose jurisdiction, non-intersecting membership while the systemic characteristics are a limited number of jurisdictional levels and system-wide, durable architecture. In essence, Type I multilevel governance provides for a nested structure for levels of government. This manifests in a clear vertical structure with individual levels having decision-making powers (Saito-Jensen, 2015).

In contrast to the foregoing, Type II multilevel governance is more open and horizontal in structure with vast jurisdiction. The jurisdiction of this multilevel governance exists at numerous territorial scales. Unlike Type I multilevel governance that deals with function bundling and with durable architecture, Type II governance has a flexible and task-specific outlook. Type II multilevel governance has task-specific jurisdiction, intersecting memberships and at the systemic level, it has many jurisdictional levels and a flexible design (Hooghe & Marks, 2003). Type II multilevel governance manifests in a polycentric structure and that are jurisdictions blurred in such governance in contrast to the clear vertical structure of the Type I multilevel governance. This manifests further in the emergence of spheres of authority over specific policy rather than the general-purpose governance mandate of the Type I multilevel governance (Saito-Jensen, 2015).

The two types of multilevel governance do not necessarily occur in isolation of one another (Saito-Jensen, 2015). They can co-occur within a given jurisdiction. Hooghe & Marks (2003) posit that Type II multilevel governance is embedded in Type I governance, though the level of embeddedness varies from one system to the other. This depends on the legal context of the particular system. Furthermore, Type II multilevel governance is common in contemporary international and national political systems in the efforts to proffer policy solutions to social problems (Hooghe & Marks, 2003), which includes climate change. As a result, several works have been done on the relevance and application of multilevel governance in addressing climate

issues (Betsill & Bulkeley, 2006; Newig & Fritsch, 2009; Setzer, 2014; Marquardt, 2017; Kellow & Murphy-Gregory, 2018; Petrie, Wolpe, Reddy, Adriázola, Gerhard, Landesman... & Marie, 2018). The participatory plurality in environmental governance makes the coordinating and integrating utility of multilevel governance alluring.

Based on the foregoing, Petrie, Wolpe, Reddy, Adriázola, Gerhard, Landesman... & Marie (2018) holds that multi-level climate governance is a synergistic interaction between different levels of government and multiple non-state actors in the management of climate protection. The concept of multi-level governance means that the fight against climate change requires collaborative processes and stakeholders to act at several interrelated levels. It also focuses on vertical and horizontal coordination. This resonates with the rise in prominence of subnational governments and non-actors within the climate governance arena. The recognition of the subnational governments as critical stakeholders in global climate ambition in the Paris Agreement brings to the fore the need for vertical and horizontal coordination of the many multi-level actors and intersecting membership of the global climate regime even as states continue to dominate negotiations within the vertical climate regime structure.

The relevance of multilevel governance to this study lies in the applicability of Type I and Type II multilevel governance in the subnational climate change response outlook of Lagos State and Kwazulu Natal. While there are there three levels of government interacting and collaborating on mitigation and adaptation within their respective jurisdictions, the flexibility of design and ease of implementing climate action plans require critical discourse. As noted by Hooghe & Marks (2003) that the embeddedness of both types of multilevel governance is a function of the legal context and constitutional contexts of jurisdictions, the theory as an approach to environmental governance is suitable to understanding the impacts of intergovernmental relations, climate finance and institutions on the climate change response of subnational actors such as Lagos State and the Province of Kwazulu Natal in their respective countries. This is because the multilevel governance theory at once dwells on the coordination and integration of actors at different levels of government. As a problem-solving theoretical tool, multilevel governance theory brings to the fore importance of subnational governments in responding to the climate menace facing the world. Petrie, Wolpe, Reddy, Adriázola, Gerhard, Landesman... & Marie (2018) alludes to this as the ‘transformative power’ of the theory in that it has the potential to enable subnational governments like Lagos and Kwazulu Natal to make ambitious climate action goals. This would in the final

analysis give an immense push to the achievement of the national climate goals of Nigeria and South Africa on the one hand and gravitate the world towards its climate goals.

2.6 Conceptual Framework

This section offers the synthesis and demonstrates the application of the theories selected for this study. This is necessary because the conceptual framework provides the thread that runs through the basics of research. It essentially links the researcher's interests, identity and positionality, contexts and setting, formal and informal theory, and methods (Ravitch & Riggan, 2017). This means that conceptual framework is a further justification of the rigour of the process and thought-flow on research. It outlines the assumptions or propositions on which the researcher bases a study, thereby providing a guide for the researcher in gathering and analysing data in a manner that matches the thoughts that shape a study (Ravitch & Riggan, 2017).

Based on this, the major assumption of this research is that climate change response is a political activity. This is because climate change, though a scientific matter has acquired policy relevance (IPCC, 2021). As a transboundary, climate change requires the political will and resources of governments at levels across the world. Hence the negotiations at the level of the UNFCCC and other international regimes are political and requires political response from the national and subnational levels.

Subnational climate change response occurs within a multilevel political system. This means it at once has a supranational, national, and subnational outlook. This is because all three levels of political actors are critical to the global agenda of addressing the climate concern. This system is hierarchical with the international regime coming at the top of the system functioning as global coordinator of climate action plans and targets to reduce emissions and address the problems emerging from the menace. The national level is usually the main policy purveyor within its political system while the subnational units are strategic to the implementation of national policies and global mandates.

Climate change represents a challenge to the capabilities of the political system to accept the input functions and process them into output functions. This is because climate change is a threat multiplier of existing socio-economic problems within the society. Therefore, it represents a challenge both in causes through global warming and impacts through gory environmental, social, economic, and political outcomes. It is a combination of the three challenges to the political system, which shows the inadequacies of existing policies that have become exacerbated by

climate change. Two, challenges from the environment that is the contribution of citizens to carbon emissions in terms of land use, waste generation, and other anthropogenic activities. Lastly, challenges from other political systems speak to the transboundary nature of climate change. Considering the historically-low emissions of the African continent that houses Lagos State and Kwazulu Natal, climate change is a challenge from other political systems because of the relatively low emissions compared to other subnational actors from the developed nations.

Intergovernmental relations (IGR) and climate finance are environmental matters within the multilevel system while institutions speak to the structures of the political system itself. IGR occurs within the national political system; that is, it is the political relations between the national political system and the subnational political system. It covers a wide range of political issues that demonstrate the harmonious relations between the levels of government or otherwise. Climate finance occurs within the three environments. Through the UNFCCC, the developed countries, based on the principle of Common But Differentiated Responsibilities, have mandated the developing countries to ensure the availability of finance to developing countries to address climate change (Olajide, 2022). This is the source of international climate finance regimes such as GCF and GEF. Hence, countries are supposed to leverage these climate funds for mitigation and adaptation. At the national and subnational levels, there are also modalities for ensuring the financing of climate action plans and other environmental matters (Olajide, Tshidzumba & Ojakorotu, 2020).

The ability of the subnational political system to function optimally depends on the right combination of Type I and Type II multilevel governance. This combination determines the nature and character of intergovernmental relations and climate finance flow between the three levels of actors.

Type II multilevel governance addresses the forces that shape the input functions of the political system. The political socialisation, interest articulation, interest aggregation, and political communication functions of the political system all align with the flow and ebb of Type II multilevel governance. This is because it dwells largely on horizontal coordination, which means that the social groups within the system engage in politics among themselves to ensure that their interests are well-represented and well-communicated to the authorities. The efficiency of the system regarding the input functions addresses its environmental interventions responsibility and its capabilities to regulate, extract, distribute, and respond within the system.

Type I multilevel governance speaks to the capabilities of the political system as a constitutional matter. It dwells on the political hierarchy of the actors. Hence, subnational climate change response is a function of the constitutional context in which they exist. Their capabilities speaks largely to the type of the system and the salience of intergovernmental relations. A good combination of Type I and Type II multilevel governance with strong systemic capabilities can lead to effective climate change response. Within the subnational context, the right measures of Type I and Type II multilevel governance and constitutionally guaranteed or conferred capabilities can lead to effective climate change response. Hence, the politics of subnational climate change response dwells on the combination of strong systemic capabilities and a viable multilevel governance system.

SUPRANATIONAL



2.7 Summary of the Chapter

The chapter discussed literature review and the theoretical framework for the study. The themes include Climate Change and its overview, climate change response, climate change in international relations, subnational governments in climate change response, climate change and institutions, climate finance, climate change and climate change response in Nigeria, climate change and climate change response in South Africa, climate change and climate change response in Lagos State, climate change and climate change response in Kwazulu Natal. There was also a discourse of the theories upon which the study is based. These are the structural functionalist theory and the multilevel governance approach to environmental governance. Further to that, the chapter ends with the conceptual framework through which the problem of the study was navigated.

Chapter Three

Research Methodology

3.1 Philosophical Basis of the Study/Research Paradigm

The philosophical basis for this study is Interpretivism. Interpretivism is a departure from the positivist philosophical orientation that has staked a massive claim to dominance in social research (Alharahsheh & Pius, 2020). As an ontological position in social research, interpretivism takes research as not more than the worldview of an individual or a group of individuals. That is, the world is a social construction and cannot, therefore, be independent of an individual's or a group's knowledge of it (Marsh, Ercan & Furlong, 2017). Essentially, the nature of what is known is interpreted and a function of the meaning ascribed to it, in contrast to the positivism ontological orientation which holds that reality is independent of an individual's knowledge of it. Therefore, asserting that knowledge can be socially constructed can only result in value-laden outcomes (Raddon, 2010).

As a social affirmation of reality, interpretivism allows for the understanding of social processes as they occur in the world of an individual or groups of individuals. This then means that to understand a certain reality, there must be an effort to understand the social process and dynamics undergirding it. This means a researcher cannot arrive at the understanding of reality by standing aloof to the object of the study, a position held tenaciously within the positivist school. This situation explains that difference in the quest for value-free that is based on universal principles and facts and as “culturally and historically situated interpretations” that are “interpretations, meanings, motivations and values of social actors, structures and patterns” (Raddon, 2010). This means, as Marsh, Ercan & Furlong (2017) asserts, that reality is ‘a skin, not a sweater’. That is, in contrast to the positivist tradition, since the world cannot be independent of our knowledge, the kind of aloofness in the observation that positivism is canvassing cannot hold. This is because meanings and constructions of reality are not something that a researcher can be stripped of.

The process of knowing, that is epistemology, is a derivative of the foregoing. This is why Moon & Blackman (2014) posit that it is inseparable from ontology in meaning and usage. Essentially, epistemology speaks to the acquisition of knowledge, that it entails the debate on what knowledge is and how to gain knowledge (Tuli, 2010). It is “concerned with all aspects of the validity, scope, and methods of acquiring knowledge, such as, with what constitutes a knowledge claim; how

knowledge can be produced or acquired; and how the extent of its applicability can be determined. Hence, the epistemological basis of the study dwells on constructivism” (Moon & Blackman 2014:1171). It is essentially the debate on how to distil the explanation or understanding of reality as held at the ontological level at the level of knowledge. In line with this debate, this study adopts the constructionist perspective of epistemology rather than the objectivist perspective which aligns with the positivist orientation.

The constructionist epistemology holds that knowledge is not independent of the mind. That is, knowledge is mainly the construction of the individual and therefore emerges from his engagement with his world. Rather than the objectivist epistemological position that asserts that the objective truth is ‘out there’, waiting to be discovered, the truth has a pre-existence that is inherent in the mind would only emerge based on the meaning ascribed to it (Moon & Blackman, 2014). This leads to the plurality of knowledge in the constructionist tradition as the ascription of meaning varies with individuals or groups of individuals. The plurality runs counter to the objectivist epistemological tradition that canvasses universal knowledge and truth (Moon & Blackman, 2014). Therefore, the constructionist epistemology views knowledge through a subjective lens which in the final analysis means that legitimate knowledge can only be gleaned from the understanding and the meaning that emerges from such understanding. This is because such an understanding is socially constructed from the background of meaning.

This study of subnational climate change in this study is essentially taken from a local understanding of the phenomenon, its impacts and the response of Lagos State in Nigeria and the Province of Kwazulu Natal to it within their respective boundaries. While climate change is a transboundary phenomenon and response to it proceed from the international level, this study, based on its interpretivist and constructionist philosophical perspective holds that climate change response is an entrenched socially-constructed endeavour that emerges from the existing governance paradigm. This is because climate change response is political and as a product of the political process of their respective nations, what happens in Lagos State and Kwazulu Natal on climate change and climate change response is traceable to the social construction of governance of Nigeria and South Africa, respectively.

Given the requisite multilevel governance structure necessary for effective climate change response, it is to be noted that the reality of climate change and knowledge of it at different levels

affects the overall climate change response target of reducing emissions and global warming to below 1.5°C by 2100 (Gao, Gao & Zhang, 2017). This situation means that climate change response is a murky affair in that, despite the scientific exactitude of its anthropogenic causation, the political response to it all levels differs in terms of the urgency attached to the menace and its impact, intergovernmental relations, the role and the viability of institutions and finance are socially constructed. The climate change response of Lagos State and Kwazulu Natal, therefore, needs to be interrogated through the interpretive ontological and constructionist epistemological lenses to understand its dynamics and map out ways of entrenching an effective response in the two locations.

3.2 Research Design

This study dwells on the qualitative research design. The approach is essential to understand the construction of the world as held by individuals or groups of individuals. Qualitative research is a complex of processes involved in making sense of the world. This is because “qualitative research attempts to understand individuals, groups, and phenomena in their natural settings in ways that are contextualized and reflect the meaning that people make out of their own experience” (Ravitch & Carl, 2019:36). Qualitative research allows the research into the world of their participants to understand their constructions of the worldview and the meaning they ascribe to the social issues around them. This is because “qualitative researchers are interested in understanding the meaning people have constructed; that is, how people make sense of their world and the experiences they have in the world” (Merriam & Tisdell, 2016:15). Therefore, qualitative research taps on the lived experiences and perceptions of a study population to gain an understanding of the problem that is being researched (Onyebuka, 2017).

This study sought to explore the reality and understanding of climate change and climate change in Lagos State, Nigeria and the Province of Kwazulu Natal, South Africa by engaging participants to gain qualitative data that was processed to elicit policy recommendations to improve climate change response in the study areas. The flexibility of the data generation and handling in qualitative research is better suited to this study than the quantitative research. This is because the approach harps more on value-free data gathering process and outcomes which in essence does not show an understanding of the world of the study population. Qualitative research aids the fluid exploration and interrogation of the problem being studied to generate data that can lead to new insights on

the problem. Therefore, the study, based on the qualitative research design helped to isolate issues and challenges in subnational climate change response in Lagos State, Nigeria and the Province of Kwazulu Natal, South Africa respectively as seen and experienced by participants through the various data gathering methods employed in the study.

3.3 Study Areas

The study areas in this study are Lagos State in Nigeria and the Province of Kwazulu Natal in South Africa. The two subnational units of Nigeria and South Africa were chosen for this study because of their well-reported vulnerabilities to climate change and the observed impacts as coastal locations (Adelekan, 2010; Oladipo, 2010; Eely, Lawes & Pipers, 2009; Dube & Jury, 2000). This resonates with burgeoning populations and their economic importance within their respective countries and the possible overall outcomes of poor climate change response by their respective governments. Further information is provided on the study areas in the subsections below;

3.3.1 Lagos State

Lagos State is the economic capital of Nigeria (Oteri & Ayeni, 2016; Osho & Adishi, 2019), given the economic and human capital gap that exists between Lagos and other states in Nigeria. Lagos is divided into two areas, the Lagos Municipality and the Metropolitan areas of Ikeja, Agege, Ojo, Ikorodu, Epe and Badagry. Before the creation of the State, the Lagos Municipality was administered as the Federal Capital of Nigeria under the Federal Ministry of Lagos, while the Metropolitan Area were part of the Western Region (Lagos State Government, 2016). The state was created by the Decree 14 of 1967. The State has 20 Local Governments divided into 5 Political Divisions, namely: Ikeja, Badagry, Ikorodu, Lagos Island and Epe (IBILE). It is bordered on the North, East and West by Ogun State and in the South by the Atlantic Ocean. Figure 3.1 below is the political map of Lagos State, Nigeria.

Figure 3.1: Map of Lagos State



Source: Wikipedia Commons (2016)

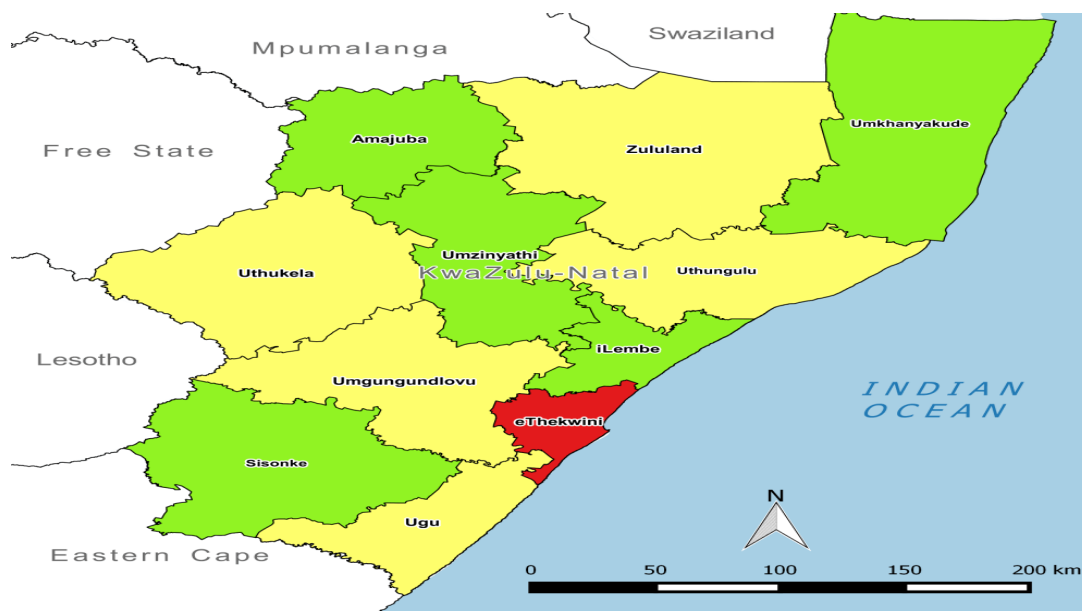
Lagos State is located in the South-Western part of Nigeria. It lies on longitude 20 42'E and 32 2'E and between latitude 60 22'N and 60 2'N. Lagos is a predominantly coastal state stretching over 180km along the Guinea Coast of the Bight of Benin on the Atlantic Ocean (Lagos State Government, 2016). As a group of islands, Lagos lies within the coastal lowland of the South-Western of Nigeria, sitting less than 100m above sea level. Lagos State has a landmass of 3,577km² with 22% of it being water bodies. (Resilient Lagos, 2020).

In terms of population, Lagos State had an approximated population of 26 million in 2018, which is 13% of the total population of Nigeria (Resilient Lagos, 2020). As a result of its huge population and small landmass, Lagos has a population density of 4,907 and up to 20,000 per square kilometre in the densely populated areas of the state (Lagos State Government, 2016). This allies with the large economy as the conurbation hosts Nigeria's major industrial and commercial concerns. Its \$136 billion GDP, representing 26% of Nigeria's GDP is touted to make the state the fourth largest city economy in Africa (Resilient Lagos, 2020). The economy of the state has a robust blend of formal and informal sectors.

3.3.2 Province of Kwazulu Natal

Kwazulu Natal is an important province in the Republic of South Africa. This is due to some factors such as the history, population, geography and the economy of the province, among other factors. The province was created in 1994 with the merger of the Natal Province and Kwazulu Bantustan that existed under apartheid rule in South Africa. The capital of the Province is located in Pietermaritzburg but there are also important cities such as Durban, Newcastle, Richards Bay, Margate and Dundee, among others. The Province has a landmass of 94,361km², making it the seventh-largest Province in South Africa. Kwazulu Natal is politically divided into one Metropolitan Municipality and ten District Municipalities. These are further divided into fifty Local Municipalities (South African Local Government Association, 2017). Figure 3.2 below is the political map of the Province of Kwazulu Natal;

Figure 3.2: Administrative Map of the Province of Kwazulu Natal



Source: Health Policy Project (2020)

Geographically, Kwazulu Natal is a coastal Province with a coastline of 580km stretch. The coastline is divided into three bio-geographical sections, which are, the North Coast, Central Coast and the South Coast (Palmer, van der Elst & Parak, 2011).

Kwazulu Natal is the second-most populous province of South Africa after the Gauteng Province with a population of 11 million (Statista, 2019). This constitutes 19.3% of the total population of South Africa. The population density of Kwazulu Natal is about 100 per square kilometre. According to the 2018 South African Census, a breakdown of the population of Kwazulu Natal shows that Blacks are the dominant race with 86.8% of the total population while Asians, Whites, Coloured and other groups are 7.0%, 4.1% and 1.4% of the population respectively (Statistics South Africa, 2012).

Structurally, the economy of Kwazulu Natal shows that there is a good blend of informal and formal sectors. The informal sector is dominated by subsistence farming in the hinterland, comprising mainly of the Blacks. The industrial clusters of the province are located in Durban, Newcastle and Richards Bay. Agriculture, mining and tourism are some of the leading contributors to the economy of Kwazulu Natal, with a GDP of \$35 billion, representing 16% of the South African GDP for 2017 (Statistics South Africa, 2019).

3.4 Sampling Technique and Research Instruments

The study adopts the purposive sampling technique, which allows the discretionary selection of participants based on their knowledge of the subject. The research instrument includes in-depth interviews and Focus Group Discussions (See Appendix I). Those that were interviewed included experts in the environmental institutions, the media, and civil society organisations. There were also Focus Group Discussions in selected communities as study areas.

3.5 Data Collection

3.5.1 Primary Sources of Data

Primary sources of data were gathered through purposive interviewing for institutions, experts, media and civil society organisations and (Focus Group Discussion) in selected communities in Lagos and Kwazulu Natal.

3.5.2 Secondary Sources of Data

Secondary data for this research were sourced from extant literature such as journal articles, chapters in books, online materials, newspapers, magazines and government publications and gazettes. This helps the research to have robust data for analysis and every of such sources was duly cited and referenced.

3.6 Study Locations

The study locations for this study are purposively selected by the researcher in Lagos State and Kwazulu Natal Province respectively. This is because both subnational units are coastal societies and as a result, they are faced with climate change risks. Five coastal local governments and districts are selected in the subnational units and the sites of study where sampling and focus group discussion were carried out are further selected. Table 3.1 below shows the study locations selected by the researcher in Lagos State and Kwazulu Natal respectively;

Table 3.1 Tabular presentation of selected location is Lagos State and Kwazulu Natal as Study Areas

Lagos State		Province of Kwazulu Natal	
Local Government	Study Location	District	Study Location
Amuwo-Odofin	Amuwo-Odofin	eThekwini	Durban
Apapa	Ijora Badia	iLembe	Ballito
Eti-Osa	Ajah	Ugu	Port Shepstone
Lagos Mainland	Makoko	uKhanyakude	St. Lucia
Shomolu	Ilaje	Uthungulu	Richards Bay

Source: Developed by the researcher

3.7 Sample Size

The sample size of this research consists of **92** participants. Through In-depth Interview method 22 participants were interviewed while a total of 70 people participated in the Focus Group Discussions. This in the judgement of the researcher gives the necessary saturation, which is a point at which interviews are deemed to have provided adequate information needed for the study (Guest, Namey & Chen, 2020). This followed the division of each study area into five study locations respectively. Tables 3.2 and 3.3 show the distribution of participants in Lagos State and Kwazulu Natal for In-depth Interviews and FGDs respectively;

Table 3.2 Breakdown of numbers of respondents for In-depth Interviews in Lagos State and Kwazulu Natal

Respondents	Lagos State	Kwazulu Natal
Institutions	2	3
Experts	5	4
Civil society	3	5
Total	10	12

Source: Developed by the researcher

Table 3.3 below the breakdown of the number of participants for FGDs in each study location in Lagos State and Kwazulu Natal respectively;

Study Locations (Lagos)	Number of Participants	Study Location (Kwazulu Natal)	Number of Participants
Amuwo-Odofin	5	Durban	7
Ijora Badia	8	Ballito	5
Ajah	6	Port Shepstone	6
Makoko	5	St. Lucia	5
Ilaje	12	Richards Bay	11
Total	36	Total	34

Source: Developed by the researcher

3.8 Data Analysis

The content analysis was adopted for this study. It is suitable for making sense of data in qualitative data which is based on the study of meaning in textual or verbal forms (Kleinheksel, Rockish-Winston, Tawfik & Wyatt, 2020). Newcastle University (2021) notes that content analysis “...identifies and analyses meaning and relationships within textual data in a replicable and systematic manner”. In the same vein, Columbia Public Health (2021) takes Content analysis as “...a research tool used to determine the presence of certain words, themes, or concepts within some given qualitative data (i.e. text). Using content analysis, researchers can quantify and analyze the presence, meanings and relationships of such certain words, themes, or concepts”. Bloor & Wood (2006) cited in Vaismoradi, Turunen & Bondas (2013) define content analysis as a method of analysis which can “...describe the characteristics of the document's content by examining who says what, to whom, and with what effect” (p. 400). As a method of data analysis, content analysis

pries to the interstices of textual and verbal communication to derive meaning in the quest for understanding the world.

To arrive at the desired level of processing for further analysis, interviews and FGDs from the various locations in Lagos and Kwazulu Natal were transcribed, reviewed, and annotated for codes. These codes were then processed for latent content analysis. Latent content analysis in contrast to the manifest content analysis seeks to probe into the interstices of qualitative data. Its mission is to interrogate the implied meanings of data in both textual and verbal form (Kleinheksel, Rockish-Winston, Tawfik & Wyatt, 2020). While the manifest content analysis quantifies codes, providing the basis for the research to make a deduction based on surface characteristics of data, latent content analysis allows the researcher to organise data, elicit meanings, and make the conclusions by reaching for the deep, impliedly expressed responses of participants. This allows for the affirmation of the Bengtsson (2016) assertion that “...the purpose of content analysis is to organize and elicit meaning from the data collected and to draw realistic conclusions from it” (p. 8). Therefore, rather than rank codes based on the annotation of the texts of data from respondents, the study proceeded to analyse the codes vis à vis the text to get deeper meanings on climate change response in Lagos State and Kwazulu Natal as construed by each participant of in-depth interviews and the FGDs.

3.9 Validity of Research Instrument

Questions on the interview guide were measured against each of the research objectives and research questions under the strict guidelines of the supervisor and other experts at the University of Lagos and North West University in December 2018. This provided good feedback for the researcher as ambiguous questions were rephrased to make them more intelligible for respondents of in-depth interviews and Focus Group Discussions.

3.10 Pilot Study

A pilot study was conducted by the researcher before embarking on the study. This was done with a smaller sample than the sample size of the study. It served as pre-field training for the researcher. Secondly, it served as a secondary means of validating the research instrument. This was done at the University of Lagos and North West University in December 2018.

3.11 Limitations of the Study

The main limitation of this study was the eruption of the Covid-19 pandemic. This prevented the researcher from physically conducting some interviews and FGDs in the two study areas. This did not significantly affect the data gathering process or the quality of data as the researcher adopted online interview tools such as Zoom and telephone interviews.

3.12 Ethical Considerations

The role and place of ethics in research cannot be overemphasised. This is because ethics essentially guide the governance of research as the various process and stages of a study have to conform to standard ethical principles. Goodwin, Pope, Mort & Andrew (2003) note that “ethics is an ever-present concern for all researchers; it pervades every aspect of the research process from conception and design through to research practice and continues to require consideration during the dissemination of the results” (p. 567). Ethics is a central feature of contemporary research to ensure that researcher carry out their studies right from conception to reporting conforms to required procedures for each stage of the research. This deals with the stages such as data gathering with respondent’s rights noted and complied with, issues in research report preparation such as plagiarism and several other ethical issues that can bring the research process into disrepute.

Thus, in line with the foregoing, every stage and process of this study was done within an ethical purview. The researcher made an effort to gather information from the respondent in Lagos State and Kwazulu Natal Province freely. The researcher underwent training in Research Ethics and got the approval of the Basic Social Science Research Ethics Committee (BaSSREC) of North West University (See Appendix II). Therefore, in conducting this research, the researcher ensured that the research is carried out in the best of academic traditions especially as they guide to research at the University of North West. The researcher ensured the voluntary participation of participants, the confidentiality of information gathered, and the anonymity of their persons. The dissemination of the findings of this research was done in a manner that did not constitute harm to respondents, their institutions, and communities. Furthermore, information gathered from respondents may be used for further academic purposes. They would appear apart from this work in research efforts such as journal publications and conference papers.

3.13 Summary of the Chapter

The chapter details the methodological methods and processes which the researcher employed in gathering the data for the study. These include the research design, information of the study areas, that is, Lagos State, Nigeria and the Province of Kwazulu Natal, South Africa. It provides the methodological details of the study such as sample collection, sampling technique, study locations, secondary sources of data, and data analysis. The chapter also covers the limitations of the study and ethical considerations made by the research in embarking on the study.

Chapter Four

Climate Change and Climate Change Response in Lagos State, Nigeria

4.1 Introduction

This chapter offers a discussion of the results of the study in Lagos State, Nigeria. The chapter commences with a background analysis of the climate change in the state to establish its vulnerability to the menace and its effects. It goes further into looking at the policies and programmes established and promoted by the state in terms of mitigation and adaptation. Other subsections of the chapter include considerations of results bordering on environmental institutions in Lagos State, climate finance in the state and the effects of intergovernmental relations on the ability of Lagos State to respond to climate change in terms of adequate and effective mitigative and adaptive policies and programmes.

4.2 Background to Climate Change Climate and Change Response and in Lagos State

Lagos is a conurbation of about over 20 million residents. The state is constitutionally divided into 20 Local Government Areas (LGAs) but given its population growth, the State Government during the Tinubu Administration created 37 Local Community Development Administrations (LCDAs) out of the existing local governments. This was aimed at bringing governance closer to the people. Lagos State is arguable Nigeria's foremost subnational entity. The main driver of the population growth of Lagos is the large economy of the state. The state is the economic nerve centre of Nigeria and it hosts the most lucrative industrial and economic concerns in the nation. The economic pull of Lagos finds expression in the fact that about 86 new persons arrive in the State by the hour to become residents of an already densely populated metropolis (Salam-Adeniyi, 2021). The composition of the residents of Lagos States makes it arguably one of Africa's most cosmopolitan urban centres. Apart from receiving residents from across the Nigerian federation, Lagos also attracts people from all over the world and the ECOWAS region in particular.

As a result of its large population and the effects of human activities that impinge on the environment, Lagos State is very vulnerable to climate change and its effects. The population growth of Lagos from merely 25,000 in 1886 residents to over 20 million by 2018 within two centuries of expansion and urban development shows how massively the city has grown (Filani, 2012). Climate change as an anthropogenic phenomenon is demonstrated in Lagos, given the fact that it is the major manufacturing hub of Nigeria. This means that Lagos contributes significantly

to carbon emissions in Nigeria. Though Nigeria and Africa, in general, are not historically high carbon-emitting nations, some of their cities are contributing significantly to emissions due to the huge population and the structure of their economy. Hence, the population and its economic enabler are an essential demonstration of the vulnerability of Lagos State to climate change. The vulnerability of the metropolis is demonstrated by a respondent as follows;

"Yes. There are two reasons. That is, alongside many other reasons. The first is population. I look at maps and sometimes lookup numbers. Why do countries like it? I wonder: "Algeria, which is much larger than Nigeria, has a much smaller population than Nigeria. It has a much smaller population, perhaps less than 30 million, like Cameroon, and its land area is about half that of Nigeria. I am now thinking about how many people can manage resources and manage them efficiently in this small country of Nigeria? That is, in my opinion, the biggest problem Lagos faces. The fact that it is very populous puts a strain on the resources available. The truth is that we can't say, "Oh, people shouldn't have basic needs," but we need to know that as the population continues to grow, so does the pressure on our resources. .. In the long run, it may take some time for people to change their lifestyles and practices so that they are on par with environmental resources. Population growth in Lagos is a challenge, and Lagos is at risk of climate change. The second reason, one of the largest global indicators of climate change, is rising water levels. As a result, coastal nations face the sea, and in other areas the ice continues to melt, causing occasional floods. It is in this one area that we can increase the amount of water as we continue to build our homes and try to protect ourselves by pushing away the rising water. Therefore, the fact that this top population and Lagos have a population and the fact that Lagos is along the coastal area. These two issues pose the greatest risk to Lagos in terms of climate change". (Interview with LSE B January 21, 2021, via Zoom).

The foregoing aligns with existing knowledge on the role of the population on the vulnerability of Lagos State to climate change. Lagos State has vast coastal communities given its long coast and many communities along the coast. These are the places that the vulnerability of the state finds the best expression. At least eleven of the twenty Local Government Areas of Lagos state have their share of the coastal communities along the coast and the Lagos Lagoon. Globally, Lagos is projected as one of the top ten most vulnerable cities (Adelekan, 2021). This has to do with the combination of a ballooning population and geographical features of the State.

Further to the complicity of the economy and population of Lagos is the geographical location of the State. Sitting well below the sea level, Lagos State is vulnerable to sea-level rise, coastal

inundation and other environmental problems associated with such topography. The Climate Risk Assessment of the state notes that the;

“Elevation ranges from 38 metres below to 78 meters above sea level, while its topography favours water retention inland. Water bodies cover a large part of the State; however, recent land-use changes have led to a slight decrease in water bodies as they have made way for settlements. As a result of these characteristics, Lagos’s population is highly vulnerable to extreme weather events and other climate hazards” (Lagos State Government, 2021:10).

The vulnerability of Lagos State is expressed by a participant as follows;

“We are vulnerable, when I say ‘we’, I am talking about Lagos, we are vulnerable because of our peculiarity. We have a 187 Kilometer coastline and some of the areas in Lagos state, have generally flat topography, and we are susceptible to sea-level rise. The impact is enormous. We have suffered from flooding over the years, we’ve suffered from a variety or the variableness of temperature, sometimes very, very hot. Sometimes we have a very increased volume of rainfall. And sometimes like last year, we don't have enough rainfall. And this is due to climate change. And in some areas in Lagos states, some villages or some communities, you know, they are at the receiving end of climate change. Because there is a study we just concluded where we found out that the soak way system of a house that is supposed to be at the back of the house is now about 100 meters away inside the water. You understand, and that is talking about even the house itself has gone. They only told us that used to be where the house is. So, vulnerable? Yes, we are.”

Source: (Interview with LSI A, Jan. 8, 2020, Lagos)

Lagos State is Nigeria’s economic nerve centre and the nation’s most populous city. With a population and economy that is larger than that of many African countries, the state is faced with daunting environmental challenges and pressures. The geographical location of the State also predisposes it to the vagaries of climate change. As a city well below sea level and a vast population of citizens residing along in the coastal areas, the vulnerability of Lagos State is well registered. The vulnerability assessment of Lagos shows that 13 million people, representing about 65% of the population of Lagos are vulnerable to climate change. A total of 6,563 assets across the state at an estimated value of ₦85 million are at risk of climate change (Lagos State Government, 2021).

Participants acknowledged the vulnerability of the State to climate change. An interesting part of this study is that there is variance in the awareness and understanding of the vulnerability of Lagos State between government officials, climate change and environmental experts, the CSOs on the

one hand and the residents of the state on the other hand from the FGDs across the state. The responses of participants in FGDs in the five study locations across the state suggests that residents' awareness of the vulnerability of climate change are low. This resonates, given the inclusion and exclusion criteria given by the researcher to the gatekeepers as to the understanding and awareness of the environmental dynamics of each location. While participants demonstrated the necessary understanding and awareness of the environmental problems in their communities, they demonstrated a clear inability to link them to climate change or at least their increased incidences and magnitudes. Some of the responses from participants on what climate change is are as follows;

"Climate change is the change we see in our environment."

Source: (LS FGD 4f, February 18, 2020, Lagos)

"Climate change is a change in the society"

Source: (LS FGD 2c, January 16, 2020, Lagos)

"Climate change involves the changes we see in the patterns of our weather and environment"

Source: (LS FGD 5h, October 21, 2020, Lagos)

The definitions above were given by FGD participants in the study locations in Lagos State. It is important to note that the definitions above were the most accurate among those offered by the participants, the least of which had six participants. This shows that climate change is not popular among the populace, ostensibly as a result of poor climate change awareness creation. It is also a function of the kind politics of survival and succession in Nigeria, which keeps the environment and its issues in the background (Olajide & Ojakorotu, 2020). The foregoing corroborates a study by Ojakorotu & Olajide (2018) which demonstrates that women in coastal communities across Lagos State know little or nothing about climate change. This situation also runs contrary to the provision on climate change sensitisation of citizens as laid down in the Lagos State Development Plan 2012-2015 that "the State will sensitise the local population to the problems posed by climate change and the need to adopt behaviours and actions that assist in mitigating its worst effects" (Lagos State Government, 2013:204). As in the current study, climate change is better understood descriptively by itemizing the environmental issues in the various environment. Lack and/or poor awareness of climate change is rather a national phenomenon in Nigeria (Ovuyovwiroye, 2013; Akpomi, 2016). In a related study carried out in Jalingo, Taraba State on climate change awareness among the citizens, it was revealed that majority of the respondents do not know about climate

change (Oruonye, 2011). This goes to show that climate change remains a policy issue on the table of government at all levels that are yet to make it known to the citizens or doing so poorly.

Lagos State is faced with diverse environmental problems. This was demonstrated by participants in the responses to the poser about the environmental problems in their communities. The foremost environmental problems in Lagos State, being dominated by coastal communities include flooding, coastal inundation, waste management, water pollution, air pollution, bad roads and poor drainage system, among others. Participants were very articulate in itemizing and analyzing these environmental issues and the passion with which they expressed and analysed them aptly demonstrates the gory nature of the Lagos environment that is increasingly impacted upon by climate change. The environmental reality in Lagos State as expressed in the study locations are represented below;

“This community is experiencing serious environmental problems. If you call even a little child in this area and ask him to tell you the problems of this area, I am sure the majority of the people here will tell you almost the same set of environmental problems. The environmental problems we have in this community are flooding and erosion especially during raining season, bad roads, poor drainage systems and air pollution from vehicles and generators. Flooding and erosion give the people of this area sleepless nights during raining season. If you look at the houses around this area, you will see that majority of the houses have experienced flooding because we are close to the Lagos lagoon. Landlords in the area spend a lot of money to repair the damages caused by flooding. I am now 73 years old, is it right that I spend all the little resources that I have on repairing and renovating every year? So, environmental problems in this community are many and they are serious because we are helpless”. (LS FGD 5b, January 16, 2020, Lagos)

The environmental problems of another coastal community studied is also expressed as follows;

“For us in this community, our environmental problems are already well known because many people have come here to ask us like you are doing now (LS FGD 3e, Dec 4, 2020, Lagos).

The vulnerability of Lagos State to climate change is further demonstrated by the outcomes it is producing in the state as represented across the state and in the coastal communities especially. The problems came up because the state sits well below sea level with a large population that continues to grow fast. This is brought into perspective by Ayeni (2017) by noting that the population of Lagos grew by 754% between 1963 and 2015, growing at 3.4% per annum. It is pertinent to state further the areas of the state that experienced the most population growth are the

coastal communities. This is because they are mostly low-income areas that have been found to attract more people than the medium- and high-income areas of the state. Hence, the combination of location and population produce unhealthy environmental outcomes in the state. Given the nature of climate change as a threat multiplier, the import of the vulnerability of Lagos State is that environmental problems in the state have become more regular and socially and economically more damaging. Given the establishment of the climate change vulnerability of Lagos State, climate change response becomes a necessity. This comes in terms of mitigation, adaptation, finance and other governance necessities to ensure that the State becomes resilient to the menace. The sections that follow discuss these issues in good detail.

4.3 Climate Change Mitigation in Lagos State

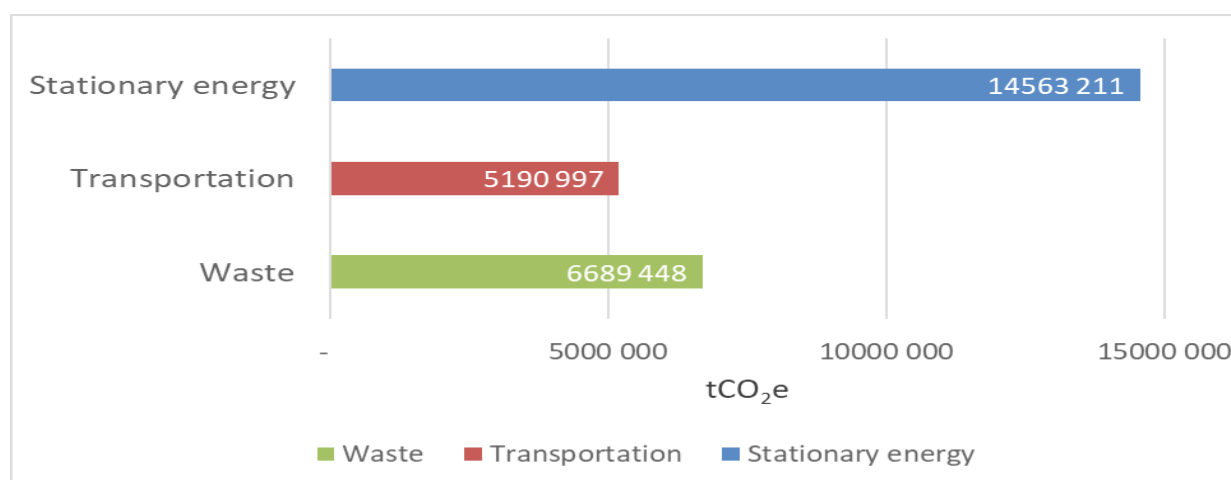
Lagos like other major cities around the world sees climate change response as a major plank of the development agenda. This is because climate change is triggering issues that are compounding development problems of cities across the world. It is apposite to note that it is a quest for the development of the world that led to increased carbon emissions into the atmosphere. Thus, as industrial and urban centres, cities are the largest contributors to the emissions that are triggering global warming and consequently, climate change (Moran, Kanemoto, Jiborn, Wood, Tobben & Seto, 2018). The future of cities and their development are by implication enmeshed in the crisis created by cities in their quest for development. Though located in a Tier-II nation, which historically has a low record of greenhouse emissions, Lagos finds itself in the category of high emitters compared to other cities in Nigeria and Africa respectively. (Lagos State Government, 2021). The implication of this is that the vulnerability of the metropolis to climate change has been exacerbated. This is to the extent that Lagos finds itself in a development quagmire. For this reason, Lagos State considers climate change mitigation as strategic to its development (Lagos State Government, 2021).

Climate change mitigation in Lagos finds expression in the climate national climate position and policies of Nigeria. Nigeria has a National Policy on Climate Change and Response Strategy (NPCC-RS). This policy instrument is allied to the ambitious goal of reducing carbon emissions conditionally and unconditionally by 2030 in the Nationally Determined Contributions to the Conference of Parties of the UNFCCC in 2015. According to the document, Nigeria aims to reduce carbon emissions unconditionally to 20% and conditionally by 45% by 2030. Lagos State carbon

reduction is critical to the achievement of both unconditional and conditional carbon reduction targets by 2030 (Olajide, Tshidzumba & Ojakorotu, 2020; Lagos State Government, 2021). This is because Lagos State contributes 29% of national waste emissions, 8% of residential energy emissions and 13% of national transport emissions. Given this unhealthy emissions benchmark, the state in its Climate Action Plan (2020-2025) proposed ambitious zero-emission by 2050 (Lagos State Government, 2021).

Lagos State climate change mitigation strategies span three important areas. These are transport, waste and energy, which are the state's highest sources of carbon emissions. As a densely populated state in Nigeria, each of these sources of carbon emissions constitutes considerable concern to the government as they heighten the social vulnerability of the people across the state. This resonates when the fact that over 60% of industrial flows into Nigeria and 90% of corporate businesses in the country are headquartered in Lagos State. Furthermore, there are over 3.2 million medium and small scale enterprises (SMSEs) in Lagos, which speaks to the fact of the massive carbon emissions profile of the metropolis (Resilient Lagos, 2020). In 2015, Lagos State had a total emission of 26,443,656 tCO₂e comprising 55% from stationary energy, 25% from waste, 20% from transport while the rest is from other sources (Lagos State Government, 2021). Figure 5.1 below is a graphical representation of the main sources of emissions from the state and the contribution of each source to the total emissions.

Fig 4.1 Sectoral Emissions in Lagos -2015



Source: Lagos State Government (2021) – Lagos State Climate Action Plan 2020-2025

As a conurbation of 22 million residents, energy need and consumption in Lagos is the highest in Nigeria and one of the highest in Africa. Nigeria is beset with an energy deficit such that about 96 million Nigerians had no access to electricity in 2015 (Olajide, 2020). This has a direct impact on Lagos which is deemed the fifth largest economy in the African continent. According to Governor Sanwo-Olu of Lagos State, the state has a 900MW energy deficit (Salau & Gbonegun, 2019). The state has massive commercial, domestic, and industrial energy demands which have remained largely unmet. Despite the promise of development that the state holds, its energy situation means that it cannot fulfil its ambition of being Africa's foremost smart city. The installed capacity of energy generation in Nigeria is around 12,000MW but the country lags seriously in distribution as it hovers between 4,000MW and 6,000MW. Comparatively, Brazil, South Africa and Egypt have 150,000MW, 42,000MW and 33,000MW respectively (Olurode, Isola & Adebisi, 2018). This explains why Nigeria has not been able to match its industrial capacity despite possessing a comparable size of the economy of these countries. The impact of this on energy consumption and deficit travails of Lagos State is shown in Table 4.1 below;

Table 4.1 Table showing electricity deficit of Lagos 2015-2019

Year	Electricity demand Ikeja DISCO (MW)	Electricity demand Eko DISCO (MW)	Total estimated DISCOs (MW)	Total supply by Ikeja and Eko DISCOs (MW)	Electricity gap/crisis (MjW)
2015	1335	1105	2440	1650	790
2016	1335	1105	2440	1650	790
2017	1335	1105	2440	1650	790
2018	1335	1105	2440	1650	790
2019	1335	1105	2440	1650	790

Source: Olurode, Isola & Adebisi (2018)

The import of the above is reliance on fuel combustion through the use of generators for commercial, domestic and industrial purposes. From the Table above, energy demand and supply to Lagos through the two Distribution Companies, Eko and Ikeja have remained the same despite an increase in population and the size of the economy. The near-dependence on combustion-powered energy, that is, stationary energy is the largest source of emissions in Lagos. Energy is a

driver of development and because of global warming and climate change, clean energy is the driver of the future development of cities and countries across the world.

The government of Lagos State recognises this and has committed itself to climate change mitigation through policies and strategies to address the energy crisis in the metropolis and reduce emissions through that source. The state government recently developed two climate change mitigation instruments, namely Lagos Resilience Strategy and Lagos State Climate Action Plan (2020-2025). Lagos State proposes three actions to reduce emissions through stationary energy in the state between 2020 and 2025. First, the state intends to campaign and encourage the use of photovoltaic (PV) systems in public buildings and institutions such as hospitals, schools and municipal buildings, among others (Lagos State Government, 2021). This leads to a focus on renewable energy as a veritable means of reducing emissions in the state. The utility of photovoltaic systems in Lagos State is registered in reducing emissions. Enongene, Abanda, Otene, Obi & Okafor (2019) in their study of the potential of photovoltaic systems are capable of reducing greenhouse emissions by 31.24 kgCO₂eq to 7456.44 kgCO₂eq annually. The photovoltaic systems energy generation of Lagos finds expression in Nigeria's drive to reduce emissions through the generation of energy with fossil fuels.

Second, Lagos State plans to reduce emissions in the state through collaboration with the Federal Government to ensure the decentralization of renewable energy generation in the country. This action plan "will promote the uptake of small-scale renewables through a package of measures, including improvements to the feed-in tariff regulation" (Lagos State Government, 2021:50). The Plan aims to ensure that Distribution Companies (DISCOs) generate 50% of electricity from renewable sources. The 2015 National Renewable Energy and Energy Efficiency Policy (NREEEP) comes into focus on this. This is because, by Nigerian laws, electricity generation is centralized and this hampers subnational units that can generate electricity as a result of their economy and energy demands such as Lagos State cannot do so. Esan, Akinola, Onakoya & Monnou (2021) note that NREEEP aims to ensure energy efficiency and removal of the encumbrances on the generation of power in the country. The success of the collaboration between Lagos State and the Federal Government on renewable energy generation would help achieve greenhouse gas emissions in the state.

Thirdly, the Lagos State CAP aims to promote the development of energy storage technologies and incentivise the deployment of microgrids in off-grid urban communities. This is intended to

encourage residents to adopt renewable energy in their homes. The state intends to provide funds and subsidies to businesses that are interested in going into renewable energy in the state. The state intends to encourage the production of storage technologies for renewable energy. With these provisions, Lagos State can leverage the opportunities inherent in the clean energy drive of climate change mitigation. Hence, the state would not only reduce its emissions, but it would also trigger economic development through the adoption of new technologies on renewable energy production and storage. As the economic hub of the West African zone, Lagos State can create a market for clean energy and technology that would further draw foreign exchange into the state.

Another pillar of Lagos State's climate change mitigation drive is to efficiently manage waste generation and disposal in the state to reduce emissions through that source. The mounting population of the state in recent decades and rapid urbanization mean that the amount of waste generated keeps increasing (Taiwo, Venter & Oso, 2016). This needs the State to develop plans, actions, and strategies for handling the dynamics of the waste sector. The waste sector contributes 25.3% of the total greenhouse gas emissions of Lagos State. This means that for Lagos State to efficiently mitigate climate change, waste management and wastewater management processes have to be revamped and updated to meet up global standards. Waste management in Lagos state is very complex. This situation is a function of many factors which are consequences of the rise in the population of Lagos. This includes improper waste management habits, poor attitude and perception of solid waste, lack of waste infrastructure, inadequate government policies, illiteracy, poor sanitary system and natural factors (Ajiboye, 2017). The overall implication of the combination of these factors is the high rate of greenhouse gas emissions from waste in the state. Policy and programmatic efforts on curbing waste sector emissions in Lagos can be said to be a combination of federal and state waste management instruments. This includes the National Environmental Standards Regulatory and Enforcement Agency (NESREA) Act of 2007, National Environmental (Sanitation and Wastes Control) Regulations of 2009, National Environmental (Base Metals, Iron and Steel Manufacturing / Recycling Industries Sector) Regulations of 2011, Environmental Impact Assessment Act of 1992, Lagos State Environmental Management and Protection Law of 2007, The Harmful Wastes (Special Criminal Provisions, etc.) Act of 1988, The National Policy on the Environment (Akande, n.d.), Lagos State Waste Management Agency (LAWMA) Law of 2007, Lagos State Development Plan (2012-2025), Lagos Resilience Strategy

of 2020 and the Lagos State Climate Action Plan (2020-2025), among other policies, regulations and laws bothering on the waste and the environment.

As part of the climate ambition of Lagos State to reduce greenhouse gas emissions to zero by 2050, the Lagos State CAP on waste sector emissions proposes seven policy actions that would ensure that the metropolis is clean and can leverage the blessings of the new philosophy of waste management which is to see waste as resources rather than expendable objects. The State plans to

“develop and implement a comprehensive strategy to expand and enhance solid waste management infrastructure; divert organic waste from landfill by encouraging separation at source and introducing composting technologies; implement composting, waste-to-energy and other waste recovery initiatives in underserved communities; evaluate and where necessary update waste collection contracts to double the collection rate of residential waste (to at least 90%); Convert existing open dumps into sanitary landfills and capture methane to produce electricity; equip low-income communities with biodigesters to treat solid and liquid waste, and institute incentives to ensure 50% of industrial businesses effectively treat their wastewater” (Lagos State Government, 2021:xiii).

The foregoing action plans would ensure that the smart city drive of the state government is complemented by efficient waste and wastewater management. The 12,000 metric tonnes of waste or 0.72kg/person/day waste generation in Lagos is massive and requires creative waste management and governance to reduce the sector’s contribution to greenhouse gas emissions (Olukanni & Oresanya, 2018). This would be achieved through targets listed by the state in its CAP, which is to;

“divert 50% of organic waste to composting sites by 2050; reduce open dumping and burning of organic waste by 50% by 2050; achieve landfill gas capture rates of 20% by 2050; increase anaerobic treatment of wastewater by 30% by 2050 and implement biogas capture; increase wastewater infrastructural outlay from 10% to 100% by 2050; decrease the direct discharge of wastewater from 85.4% in 2015 to 0% in 2050, and decrease use of latrines from 25.5% in 2015 to 0% in 2050.” (Lagos State Government, 2021:28).

The transport sector of Lagos is world-renowned for its anomalies. Lagos State aims to reduce greenhouse gas emissions by looking into the sector. As one of the world’s fastest-growing cities, transport and its infrastructure pose fundamental challenges to the people and the authorities. Emissions from transport constitute 19.6% of the total emissions from the state with over one million vehicles plying the routes daily. This is explained by the fact that Lagos utilises 40% of the fuel consumed in Nigeria daily (Lagos State Government, 2021). The transport profile of Lagos

is complex. This is due to the mismatch between a continuing steep rise in population and the transport system to cater for such a large population. There is also among other factors, a high vehicle density of 227 vehicles/km/ day, use of old vehicles that produce high emissions, high sulfur-content of petrol and diesel and limited options in the transport system (Croitoru, Chang & Kelly, 2020).

The poor transport system is a credible threat to the emergence of the smart city of Lagos. Hence, to avert this, the state government has come with some policies and plans to ensure that the emissions are reduced in the state, thereby aiding the drive towards the emergence of the smart city of Lagos. These include the Lagos State Transport Sector Reform Law 2018, Non-Motorised Transport Policy (NMTP), 2018, Bus Reform Initiative 2019, Lagos Urban Transport Project (LUTP) and Lagos State Water Transport Programme and the Lagos State Climate Action Plan (2020-2025) among others. The common thread running through these policies, projects, plans, and laws is to establish a transport system that would not only make transport enjoyable for the residents but also ensure that emissions and air pollution arising from transport congestion and poor transport system are reduced and in the long-run ceased.

The state through its policy actions aims to achieve a reduction in emissions and pollution by establishing a multi-modal transport system. The public transport system in Lagos has encouraged a rise in ownership of private vehicles and the proliferation of commercial buses, motorcycles and tricycles that are largely poorly maintained and old. Hence, an efficient multi-modal system envisaged by Lagos State would encourage residents to adopt public transport, through the establishment and enhancement of the Bus Rapid Transit (BRT), the light rail system and safe and efficient water transport system (Lagferry). The combination of these would lead to a reduction in the number of vehicles plying the roads and a reduction in emissions. For example, the establishment of the BRT yielded immediate carbon reduction gains. Peltier-Thiberge (2015) notes that the BRT in addition to its social benefits led to the reduction of CO₂ and greenhouse gases emissions by 13% and 20% respectively. The import of a multi-modal transport system in Lagos State is brought into perspective as noted by a respondent below;

“Thank you. In the overall vision of the state, all these yellow buses are not part of it. If not for the #ENDSARS that we lost about 67 High-Capacity buses, we are gradually introducing high-capacity buses and phasing out yellow buses. Once upon a time, we had ‘Molues’. There are no more ‘molue’ again. So, the vision of the state is to have you know, an efficient, comfortable, very safe transport system, high capacity buses to move people from one point to the other. Then for the first and last mile, that is, your last journey from the bus stop to your house will be taken care of by special, you know, slim buses that are going through the neighbourhood. You know, the carbon emission from the Keke NAPEP is so high, that's why they don't allow it in Europe. It is even higher than even the danfo.” (Interview with LSI (B), March 12, 2021, Lagos).

Apart from the above, Lagos is keying into the global campaign for the reduction and cessation of fossil fuels by exploring alternatives such as Compressed Natural Gas (CNG). The Federal Government plans to convert 1 million vehicles from petrol- and diesel-powered to CNG by 2021 (Gupte, 2020). This is because CNG produces lower emissions than fossil fuels and the greenhouse gases emitted from CNG have a lower lifetime than those from petrol, diesel and natural gas. The adoption focus of CNG by Lagos State is expressed as follows;

“Very well. Like, I think it was last month my Oga (Boss) here, director of transport operations went to LASEPA for the air quality project that was commissioned. As I speak, I'm part of the committee that has been formed to go for specific training that will commence today for air quality measurement using the equipment that was installed. For the CNG too, often when proposals to the ministry of environment, we are involved? Because it's for mobility, we are in charge of mobility and the fuel of the mobility, they are in charge. So we've had cases of having to effect proposals from the private sector, as regards the appropriate sustainable fuel for mobility.”

(Source: Interview with LSI B, March 12, 2021, Lagos)

Lagos State intends to enhance its transport system and reduce greenhouse gases emissions by adopting plans and policies to address road decongestion and reduction of emissions and their associated benefits through five policy actions in the Lagos CAP (2020-2025) as follows;

“expand and improve the BRT network, including by deploying low-emission buses, and construct bus gateway terminals to transfer passengers from interstate buses and private vehicles to the BRT at the edge of the city; introduce new requirements for spatial planning to promote transit-oriented development; develop infrastructure and introduce incentives for non-motorised transport, and expand and improve regulatory oversight of the ferry service; provide incentives and invest in infrastructure to promote the uptake of ultra-low emission vehicles and impose restrictions on the use of high-polluting vehicles; and establish rail

links between major ports, industrial centres and airports to allow for freight transportation by rail.” (Lagos State Government 2021: xiv)

These actions are latent with opportunities that the state can leverage to achieve its climate ambition. These opportunities include the following;

“Reduce share of private car travel from 11.5% of all trips (2015) to 2% by 2050; promote 50% modal shift from motorcycles to bicycles by 2050; promote 80% modal shift from private cars to BRT by 2050; 52% of buses (standard & BRT) to be electric by 2050; 20% of motorcycles to be electric by 2050; 8% of taxis to be electric by 2050; increased use of biodiesel in freight vehicles” (Lagos State Government 2021:39)

With the reduction in the 75,000 commercial buses, private ownership of vehicles, usually inspired by the claim to socio-economic status, tricycles (Keke NAPEP/Marwa) and motorcycles (Okada), all of which are powered by fossil fuels for modern, energy-efficient vehicles, rail and ferry, Lagos State would have an improved air pollution profile and greenhouse emissions. These can be powered alternatively by CNG and electricity which are proven to have little or low emissions. With strategic investments and regular policy enhancement, the multi-modal outlook of Lagos as a fast-growing city can be an inspiration for other Third World cities.

4.4 Climate Change Adaptation in Lagos State

The effects of climate change can be destructive such that the people, especially the poor, can find it difficult to cope or live with these effects. Hence, there is a need for adaptation, which is one of the key responses to climate change and its problems. The vulnerability of towns and cities across the world has been established, given their burgeoning populations, industrial capabilities and in many cases geographical locations as coastal spaces (Ayeni, 2017). The need for resilience to climate change makes climate change adaptation an allure in environmental policy circles across the world. The government of Lagos notes the metropolis’ vulnerability to climate change and endeavours to harness policy and programmatic efforts to adapt to the menace. This is because climate change has exacerbated environmental and climatic dynamics in Lagos in recent decades. There is also the need to ensure that the residents of the communities dotting the 187km long coastline and other areas of the State can live with minimal or no threat to their lives and livelihood.

The State Government has come up with some climate change adaptation policies, projects and programmes. These include the Lagos State Climate Change Adaptation Strategy (LAS-CCAS) of 2012, Lagos State Climate Change Policy (2012-2014), Lagos Resilience Strategy (2020) and the

Lagos State Climate Action Plan (2020-2025). These subnational policies are being operated alongside national climate change adaptation strategies such as the National Adaptation Strategy and Plan of Action on Climate Change for Nigeria (NASPA-CCN) of 2011 and the National Policy on Climate Change. The central aim of these policies and plans of action is to ensure that the impacts of environmental ills wrought by climate change are minimal. The Lagos State Climate Action Plan (2020-2025) being the latest of these action plans on climate change adaptation proposes five adaptation goals. These include “building an effective ecosystem in Lagos; ensuring a flood-proof Lagos; ensuring political flexibility and responsiveness; social inclusion of vulnerable groups; and developing an adaptive and resilient transport network” (Lagos State Government, 2021). These are further broken down into 26 targets to make them measurable, achievable, and evaluable.

Engaging in a comparative analysis of two of the policies and plans of Lagos State on climate change adaptation would offer a clearer view of the direction of the state on the subject. The Lagos State Climate Action Plan (2020-2025) is a massive improvement on the Lagos State Climate Change Policy (2012-2014). The difference lies mainly in the clarity, measurability and evaluability of the former compared to the latter. The Lagos State Climate Change Policy (2012-2014) is not a policy itemisation on adaptation but also a short-term policy instrument while the Lagos State CAP is a medium-term policy instrument. This shows that Lagos State is beginning to go into anticipatory and planned adaption rather than reaction adaption, which only swings into action after climate and environmental disaster. This situation was noted by USAID (2013) that the adaptation outlook of Lagos is in the early stages. It is however important to note that nothing much has changed between then and the time when the Lagos CAP was being prepared. The two instruments demonstrate the commitment of Lagos State to mainstreaming adaptation policies, plans, and strategies into the heart of development planning of the state.

The climate change response outlook of Lagos State shows that the state is stronger on climate change mitigation than adaptation. This is because, in almost all the policies, plans and strategies proposed by the state, climate change mitigation has been the dominant response to climate change. This is true of the Lagos State Climate Change Action Plan (2020-2025) which shows that despite improvements in climate change conception and formulation in the state, mitigation remains more dominant than adaptation. The near-sole focus of the state on climate change

mitigation rather than adaptation can be linked to the political economy of state development in Nigeria. While Lagos State stands out in the comity of states in Nigeria on climate change response commitment of successive Administrations in the state to ensuring that the state is resilient to climate change, the Nigerian pathology of poor investment in the people which adaptation represents still plagues the state.

Experts' opinions on the effectiveness of the climate change response of Lagos State brings the position on adaptation into a clearer perspective. Going further, it is instructive to note that the opinions of governmental respondents and non-governmental respondents on the issue of the effectiveness of climate change response in Lagos, which was posed with adaption at the back of the mind differ almost diametrically. Careful consideration of the response of governmental respondents on the subject shows an analysis celebrating the 'successes of the state in climate change mitigation. One of them opines as follows;

“Yes, in a way, because since about 2008, we started the campaign of tree planting. And then, governments were aggressive. And we declared the 14th of July as a tree planting day, all over the state. And we go to all the local governments and LCDA, and then we plant trees along the road, in a public place. We have LASPARK- the Lagos State Parks and Gardens Agency that is charged with greening: they create recreational parks here and there. Our open spaces are green and we know that green trees or shrubs and glass help you in carbon sequestration, so we try as much as possible to turn it into a green area. As a success story, we have the school advocacy group that has now turned to environmental peace club, we go to our schools, and we educate our children, try to catch them young because we believe that when you train a child, they are training the whole family because they're able to change the mindset of their parents, the mindset of their uncles, the mindset of people. Quite a lot of things that the state government is doing. And recently, we started talking about converting some of the BRT buses to CNG longer buses and in an attempt to that LASEPA, an agency under us recently converted one of their buses to CNG to tell people that it is possible. We know what that means, when your bus is running on CNG or Compressed natural gas or liquefied natural gas, you are cutting down the emission that ordinarily you get from fossil fuel or diesel. So and the old ministry, the old secretariat government's house is run by an IPP, independent power plants very close to us here that is running on gas. And that is one way of cutting down and we encourage renewables. We encourage the product, the market, we encourage the practitioners, and we encourage people to go so I will say yes. Quite a lot in the industry.”

Source: Interview with LSI A, Jan. 8, 2020, Lagos)

In contrast, while non-governmental respondents did not deny the fact that Lagos State has policies, plans and strategies to combat climate change, they argue that the actions are either not enough or poorly implemented. Below are two non-governmental respondents' positions on the effectiveness of climate change response in Lagos State.

“Yes, the Nigerian government, which is prominent on climate change in Lagos state, plausibly isn't matching their policy statements with the right actions in the right direction.” (Interview with LSCS B, January 26, 2020)

“No! Because when we are talking about preparing for climate change, there are proactive measures they are reactive measures. When we are talking about the proactive measure, there's proper waste management, the drains are there, enough awareness. Then, when flooding happens was the clean-up plan? What are we doing to ensure it doesn't happen again? So, I would say no. Yeah, let me put “no” because you need to have a balance of the proactive and reactive, adaptive measures and mitigation. Balance of both so if you're having one then I don't think you're prepared.”

(Interview with LSCS A, January 26, 2020)

The second non-governmental respondent's response demonstrates the struggles of Lagos state in climate change adaptation. The precarious situation of the people regarding flooding in the state shows that there is weak adaptation and/or maladaptation in the state. The absence of proactive measures shows that adaptation planning is lacking or weak in the state. When the response is compared with the position of the governmental respondent, it shows that the state still has a long way to go to formulate workable climate change adaptation policies and strategies. The foregoing demonstrates that the huge investment outlay of climate change adaptation is constituting a challenge to the state (Timilsina, 2021). This is because adaptation requires massive investment in the people in form of infrastructure and other adaptation buffers that the people need to live with the dynamics of climate change (International Labour Organisation, 2011).

Climate change adaptation in Lagos State is also controversial. This has to do largely with the efforts of the state government to relocate people from dangerous coastal areas in the state. The reality of this struck the researcher in one of the study locations where participants commented rather emotionally their fears regarding the potential loss of their property and disruption to their livelihoods. Lagos has a history of ejecting people from their communities without adequate provisions for the relocation of residents to new communities. In many cases, no provisions are made for the people to relocate. This situation can be traced from the military days in the administration of the state with the demolition of Maroko, now in Eti-Osa Local Government.

Members of the community were dispersed, with no relocation plans and compensation by the government (Agbola & Jinadu, 1997; Folarin, 2010). This led to loss of lives and livelihoods of the people due to the uncaring attitude of the state government.

Residents of coastal communities are in perpetual fear of the government giving them the Maroko treatment. This is expressed as follows;

“We in this community are afraid because we are hearing that Lagos State Government is planning to come and demolish this community like Makoko. They say it is an urban renewal project and it will be done by Lagos State Urban Renewal Agency (LASURA). We have sent our representatives to meet with the state government but they denied it. We have people in Alausa, we also have a representative in the House of Assembly from this community, so we are receiving information on their plans. What the plan to do is this. They will demolish all the houses here and build high rise buildings and they will now allocate one flat for each landlord. You see, I am a landlord now but when they demolish my house, they will give me a flat. Mind you, my house is a block of four flats. I can tell you that many landlords have sold their houses and relocated to other places but we all know it is panic-selling because they are selling below the amount they should sell the house. It is not easy for some of us to just and leave because our businesses are here. So you can see our dilemma now.”

Source: LS FGD 5i, January 16, 2020, Lagos

The foregoing corroborates the position that climate change adaptation is controversial. For example, USAID (2013) notes that adaptation in Lagos State has a high potential for conflicts while Adelekan (2021) posits that adaptation efforts through urban renewal led to the forced relocation of residents of coastal communities in Lagos as in the case of the demolition of the abodes of the 2,237 households in East Badia in Apapa Local Government, leading to the displacement of 9,000 people in 2013. There is a pattern of demolishing coastal communities and displacing their residents while giving the same land to the rich. This situation sums up the fears of residents of coastal communities across the state. Climate change adaptation is rather a tool for gentrification for disinheritance in Lagos State.

4.5 Climate Change and Environmental Institutions in Lagos State

Institutions are crucial to the formulation and implementation of governmental policies, plans, and programmes. They are the platform and the framework for governmental actions. In the case of climate change, the role of institutions from international to local levels cannot be overstressed. Institutions are central to the determination of vulnerability to climate change and the response measures to mitigation and adaptation to be adopted by government and other stakeholders in the

society. Agrawal, McSweeney & Perrin (2008) notes that institutions shape climate risks and impacts. This means that if any advancement is going to be made on climate change response, political authorities must develop institutions. This aligns with the functions of local institutions in climate change adaptation, for example, as enunciated by Agrawal, McSweeney & Perrin (2008:1). Institutions are saddled with “...information gathering and dissemination, resource mobilization and allocation, skills development and capacity building, providing leadership, and networking with other decision-makers and institutions”. This means that institutions are central to a resilient society without which no development agenda can be achieved.

Lagos State, understanding its vulnerability and the risks this portends for the state and the people has developed institutions to handle environmental issues, including climate change. These institutions are charged with determining the vulnerability and the risks facing the state through climate change and other environmental problems, developing response programmes, policies and advice on vulnerability and risks. Since 1999, Lagos State has made intentional environmental decisions, one of which is to develop environmental institutions and regularly enhance their capacity. The environmental campaign of Lagos State is championed by the Lagos State Ministry of Environment that is tasked with the charge to “...secure a clean, healthier and sustainable environment that will be conducive for tourism, economic growth and wellbeing of its citizenry”. The Ministry has a Climate Change Unit that is responsible for drawing climate change plans, actions and policies for Lagos State. Other institutions working on the various aspects of the environment in Lagos State include Lagos State Environmental Protection Agency (LASEPA), Lagos State Waste Management Agency (LAWMA), Lagos Water Corporation (LWC), Lagos State Park and Gardens Agency (LASPARK), Kick Against Indiscipline (KAI), Lagos State Waste Water Management Office (LASWMO), Lagos State Water Regulatory Commission (LSWRC), Lagos State Environmental Sanitation Corps (LAGESC) and the Public Utility Monitoring and Assurance Unit (PUMAU). These institutions are coordinated by the Lagos State Ministry of Environment.

Two immediate concerns on environmental institutions in Lagos State is the relatively unknown nature of many of the institutions. First, while interview respondents know some of the institutions, they are not known to the average resident of Lagos. This was gathered from the FGDs, which shows that LAWMA is the most popular institution with the people of the state because of the

direct interaction between the people and waste management workers across the state. This means the bulk of the environmental management efforts of Lagos State are not known to the people. This demonstrates the age-long poor relationship between public institutions and the public. While a lot is being done on the environment and its issues, the lack of popularity of these institutions means that the people are not able to buy into their agenda. This will have a fundamental impact on the conception, implementation, and feedback mechanism on environmental plans, policy, and programmes in the state. For example, the strategic importance of Public Utility Monitoring and Assurance Unit is largely unrecognised by the people. This resonates, given the poor public utility orientation among Nigerians. Environmental institutions need to bridge the gap between them and society for better policies and implementation.

Second, Lagos State environmental institutions demonstrate a lack of coordination among institutions which functions have environmental implications or that are impacted upon by environmental problems. These include the Lagos State Ministries of Transportation, Health, Housing, Science and Technology, Water Infrastructure Development, Work and Infrastructure, Energy and Mineral Resources, Agriculture, Wealth Creation and Development, Physical Planning and Urban Development and the Lands Bureau. The impression this gives is that of the problem of scaling of climate and environmental issues in the state. This is because the activities of these institutions have impacts on the environment as impacted by climate change. Hence, there is the possibility of under scaling the climate challenge in Lagos State. In one of the Ministries, the researcher was directed to the Ministry of Environment when approached for the research interview. This speaks to the fact that Lagos State has not mainstreamed climate change into its development agenda.

There should be a webbing of the climate-sensitive and climate-related activities of institutions in Lagos. Restricting the idea of environmental institutions to the Ministry of Environment and its agencies underplays the reality of climate change vulnerability and stifles the ability of the state to maximize the benefits of climate change response. The only exemption in the institutional coordination conundrum is the relationship between the Ministry of Environment and some of its agencies on the one hand and the Ministry of Transportation on the other hand. There is an ongoing collaboration between LASEPA and the ministry of Transportation on the air quality project and the CNG conversion programme in the State. This is because the transport sector on one of the key emission sources in Lagos, hence, it is necessary for the two institutions to collaborate.

Another problem facing environmental institutions is the lack of capacity. For a city with a fast-rising population, environmental institutions must have the capacity to match the environmental demands of the state. Important efforts by institutions such as LASEPA and LAWMA are inhibited by lack of capacity. This is brought into perspective by one respondent as follows;

“Let me talk for the ones I know presently. I know about LASEPA a lot. Presently, LASEPA is trying to get its foot right. They are coming up with ideas that can help Lagos state when it comes to air pollution but the only thing that is disturbing them is that they need more capacity building. They need more people to transfer. Knowledge transfer is very important for LASEPA. If you go to LASEPA now they are putting a lot of things in place, but who is going to have them achieve: they're looking for funding, they're looking for experts that would implement and give them ideas to make Lagos free from air pollution? So, for LAWMA, we just had a new managing director some days ago. I think LAWMA just technically needs someone that got them to look into turning waste to wealth”.

(Source: Interview with LSCS C, February 21, 2020)

The foregoing finding aligns with the position of Adam (2016) that Subnational institutions are weak in Nigeria and this includes Lagos State. Hence, in critical areas of environmental governance, Lagos State is challenged with weak capacity. This makes climate change response tenuous such that the air pollution management and waste management efforts are not yielding the required results for a mega city like Lagos.

4.6 Climate Change and Climate Finance in Lagos State

Climate finance is one of the key elements of climate change response as enunciated through the instrumentalities of Global Environmental Governance. Finance helps in the implementation of climate change mitigation and adaptation plans and actions. UNFCCC through its Standing Committee on Finance holds that cities are crucial to the achievement of climate change response objectives across the globe and for this reason, adequate finance must be made available to ensure that cities are sustainable (UNFCCC, 2021). Adequacy finance of climate change response at the subnational levels would transform the face of climate change response. It has been argued severally that cities and other subnational structures hold the key to mitigation and adaptation targets because they are closer to the people than national governments. Hence, enlisting cities as partners in the climate change struggle with the requisite finance would ensure that national policies are broken into smaller bits among subnational units for easier implementation and monitoring of climate goals and targets.

Lagos State's climate change response is dependent on its ability to leverage finance. As a highly vulnerable space, the state government recognises the need for adequate finance to fund its response to climate change. This has, however not been forthcoming as highlighted in the Lagos State Climate Action Plan (2020-2025) that, "...a common barrier to the implementation of climate actions is a lack of finance. State budgets are limited and certain climate change projects require budgeting and financing mechanisms that differ from those used for traditional projects" Lagos State Government (2021:70). The funding conundrum in climate finance in Lagos State is brought into a clearer perspective by a respondent as follows;

"You know, quite well, that no single government can totally finance climate change. A few weeks back, Joe Biden came up with this idea of taxing the rich more and he says that if you are paying anything above over 400,000 US dollars, you pay more tax. That is a benchmark, 400,000 US Dollars upward. Now, what is he doing is that he wants to raise 9 trillion Dollars for a green economy. Now here in Lagos, the state governments, like I said, have been investing in the climate change initiative. And we can see them all over the city and it cost a lot of money. So, the state governments on its part are financing our program, financing this department, financing programs and projects. Also, we are encouraged to partner with donor agencies. The Vulnerability Assessment I just mentioned was sponsored by UNDP. The other two studies on renewable energy were sponsored by C40. We are one of the pioneering members of C40. We have been there ever since and in fact, we are just completing our climate action plan with them. We have the drafts. We have climate meetings every Wednesday to review all we are doing. So, the funding, the state government is doing its bit. And then we also partner with other donor agencies for where the state governments cannot go forward".

(Source: Interview with LSI A, Jan. 8, 2020, Lagos)

The foregoing shows that Lagos State is drawing or intends to draw funds from two sources, namely internal and external sources. These sources and types of funds from each source are presented in Table 4.2 below;

Table 4.2 Source of climate finance in Lagos State

Internal	External
State Government Budget	International sources such as bilateral and multilateral donors
State Government with support of PPP	Concessional finance and funds
State Government loans and grants in collaboration with PPP	Co-financing through public-private partnerships
Community saving groups	Market-based approaches
Finance raised through taxes	Private sector investments
User fees	
Transfers and bonds within the municipality and through other spheres of government	

Source: Lagos State Government (2021: 70-71)

The two sources of climate finance are problematic for Lagos State. In terms of internal sources of climate finance, the main financing mechanism is the state's annual budget. Government is the main or near-sole financier of development projects as the Public-Private Partnership financing model is still in its infancy in Nigeria. PPPs in Nigeria remain unviable due to the risks associated with investing in Nigeria. These are political, sponsor, concession and legal risks (Owolabi, Oyedele, Alaka, Ebohon, Akinade,... & Ajayi, 2018). The climate of social, economic, and political uncertainty in Nigeria does not encourage private investors to partner with governments in the country. The lack of viability of PPPs leaves Lagos State with climate finance through the annual budget mechanism. The state is adopting a budget mainstreaming method of local climate finance by aligning its CAP goals with its annual budgets. This it believes would help to ensure that mitigation and adaptation goals are achieved in the state. It is, however, pertinent to question the feasibility of achieving the climate goals of Lagos State through budget mainstreaming. This is because the budgeting process is recurrent expenditure-dominated and the implementation of capital projects would be affected as the budgetary provision would be minimal. It is therefore unlikely that the State can achieve its climate targets within the planned time frame.

External climate finance in Lagos is as problematic as internal finance. This source of finance is dominated by funds from bilateral and multilateral agencies. African countries find it hard to leverage international climate finance (Olajide, Thidzumba & Ojkorotu, 2020). This is generally

due to the technicalities attached to the readiness for climate funds by African states. The case of subnational government's ability to leverage internal climate finance is even direr. This is because the international climate finance structure is dominated by states, which are the main actors in Global Environmental Governance. The lack of access to climate finance by subnational governments, especially those in the developing world is caused by the constraints faced by development finance institutions and multilateral development banks. These are constraints of mandates and balance sheets (UNFCCC, 2018). Hence, many subnational governments around lack access to climate finance. This is one of the main reasons why subnational climate change response is ineffective. The tenuous nature of leveraging international climate finance is expressed vividly below by a respondent;

"If you understand global climate fund, okay, you will also need to know the politics you need. So, I was in, I think in Cape Town for the last Future Adaptation Conference and we talked more about financing. African Development Bank (AFDB) was there, all these financing organizations out there. The problem is: sincerely, what do you want? How do I develop my concept notes to meet the needs or to meet their requirements? They will not tell you. It is a very tedious process. But since last year, I was on a committee with UNDP and we are looking at coastal resilience for Lagos. And it is GEF funded project. So, we have been working on it. We have developed the pre-concept notes, I think we passed through that stage and then we are UNDP is fronting it. And then now they appointed a consultant, I think E20 or E40, based in South Africa is leading the development of the concept notes.
(Source: Interview with LSI A, Jan. 8, 2020, Lagos)

The participant avers further that;

"So hopefully we will get something from that for coastal resilience for Lagos. And water aid and the UK also are on another one trying to look at the water aspects, how to get some fund on a water project for Lagos. So the consultation is ongoing. It is a tedious and strenuous exercise. You know, as I told you the one UNDP we started this time last year around March, during the lockdown, that was when we started the process and we meet almost every month. Imagine meeting from March and we are still in the process of developing the concept note. So when people hear about GCF, it is not free money. It is very tedious, but if somebody can tell me, okay, I have the technical capacity. And I can get the money in a record time of two weeks, two months. Let's go there! We need money to do projects".
(Source: Interview with LSI A, Jan. 8, 2020, Lagos)

The inability of Lagos State to leverage adequate climate finance resonates with the consideration of its CAP. The CAP has 26 targets across several sectors in mitigation and adaptation and the achievement of the targets depends on the availability of finance. The climate finance conundrum sums up the situation of Lagos State in its quest for sustainability and resilience. The state is experiencing increasing vulnerability as its population is growing. The bulk of the mitigation actions and targets of the state as to be potentially financed through international finance. Though the state is a member of some international subnational organisations in Global Environmental Governance such as 100 Resilient Cities (100RC) and C40 Cities, its membership of these bodies has not translated to higher access to climate finance. In critical areas of that, the development of the state depends such as increased energy generation through establishment of biofuels refinery and other sources of clean energy may not materialize due to the unavailability of climate finance.

4.7 Intergovernmental Relations and Climate Change Response in Lagos

The climate change response of Lagos is shaped fundamentally by the intergovernmental relations between the Federal Government and the state. The Nigerian federal arrangement constitutionally gives states functional and fiscal space to operate such that federal interference is not possible within such a space. Intergovernmental relations are a key factor in policymaking. This is because policies are products of the interplay of forces among governmental actors across levels of government. This is also true of climate change response. In Nigeria, the environment falls within the Exclusive legislative list as the 1999 Constitution (as amended) charges the National Assembly to make laws in pursuance of the Fundamental Objectives and Directive Principles of State Policy (Nwauzi & Amadi, 2019). This has an impact on climate change response in Nigeria and Lagos State in particular. The Nigerian grundnorm effectively locks out the states out of environmental management. This flies in the face of the environmental realities plaguing the country such as climate change, which is antithetical to the development quest of the society.

The constitutional position of the Nigerian Federal Government sets it in confrontation with the states. Having precluded that states from making laws on the environment, it is then clear that intergovernmental relations on climate change response are not a straightforward affair. However, States have found themselves addressing environmental issues due to their social and economic consequences. This is of course true of climate change, which worsens existing problems in society. Therefore, addressing the problems without responding to climate change means that not much can be achieved by the states in their quest for development. For this reason, there is a need

for good intergovernmental relations between Lagos State and the Federal Government on climate change. Though many respondents noted the political nature of the question on intergovernmental relations between Lagos State and the Federal Government, in the responses provided, few of them point to its centrality in the climate response of Lagos State. Below are some of the perspectives shared by respondents on the centrality of intergovernmental relations on climate change response in Lagos State;

“Climate change response is more effective when coordinated among cooperative bodies. This is so because climate change isn’t caused by an isolated entity. Greenhouse gases are global gases as much as they are local; for example, when emitted in Lagos, it equally impacts the climate in Abuja. Thus, there’s a need for well-coordinated intergovernmental approaches for the Lagos state government and the FGN. In effect, there must be robust intergovernmental approaches between Lagos state and the FGN, and possibly, extend this collaboration with the ECOWAS countries, which will form the region with the most interesting impacts on climate change as Lagos state sub-regional entity”
(Source: Interview LSE E, December 12, 2020)

“What they were supposed to do they won't be able to do because the Lagos government needs the assistance and collaboration with the Federal Government. For example, the federal Minister of Environment, the Climate Change Department is the designated authority. They need the efforts and collaboration with the federal government to approve some things in terms of accessing funding from international bodies like the green climate fund. Lagos state government needs the approval of the Climate change department of the ministry of environment to get some things done. So, if that collaboration is not there, the environment will suffer and Lagos state government will be the loser in the long run.”

Source: (Interview with LSCS A, January 26, 2020)

The Federal Government and Lagos State having realised the vulnerability of the nation and the state have some cordial intergovernmental relations on matters of environmental implication and climate change. In the main, the climate change response of Lagos State is a sub-set of the climate change response of Nigeria. Hence, Lagos and other states in the federal are critical to the achievement and implementation of national environmental policies and targets. Respondents point to instances of intergovernmental cooperation on climate change and the environment in general between Lagos State and the Federal Government as follows;

“I would say 95%. Since Dr Tafa, the former director of climate change is now a permanent secretary in the Federal ministry. He ensured that all states are carried along. Today, on my phone, I am part of the platform for climate change focal person in Nigerian where we exchange ideas. So, it's not only vertical integration, we're also doing it horizontally. So we are communicating, we communicate daily. Last year, we attended about three or four of their programs that were hosted in Lagos, and when they are hosting even outside Lagos, we still attend. So, we talk and we are good.

(Source: Interview with LSI A, Jan. 8, 2020, Lagos)

“The federal ministry of transportation and the state ministry of transportation has done a lot in recent times. For example, in Lagos-Ibadan rail projects, there are parts of the scope of that project is handled by Lagos, like the provision of Overpass and underpass with the view that by the time we have that Lagos-Ibadan rail project, there will be a subsequent reduction of carbon emission on the Lagos-Ibadan road. That is for the rail. Then for water transport, especially the one that involves badges. There's a committee that is set up now comprising NUWA, LASWA and NPA to shut up some illegal jetty terminal operating. For us here, we insist on anybody who has come for approval for a terminal to have EIA from the Ministry of Environment ensuring that they will not negatively affect the environment”.

(Source: Interview with LSI B, March 12, 2021, Lagos)

Despite the aforementioned cordial and cooperative intergovernmental relations between Lagos State and the Federal Government on matters that have implications on the environment and climate change, there are situations of actual and potential conflict between the two levels of government. The laws regulating some of the issues with climate change implications pose considerable threats to the response of Lagos State to the menace. A clear example of this is cited by Oke (2017) in the conflict in the provisions of the constitution of power generation in the country and the Electric Power Sector Reform Act of 2005 which centralised power, thereby making serious incursions into subnational policy space as provided in the concurrent list. While the constitution allows states to generate power for areas within their jurisdictions not already covered by the national grid, the Act established the Rural Electrification Agency. This places rural electrification in the hands of the Federal Government, bearing in mind that rural communities are mostly off the national grid. This lays the foundation for the crisis in reducing emissions in Nigeria because of Lagos and other states. This finds expression in the quest for generating power through renewable energy which must be done through the Rural Electrification Agency.

Another instance of actual and potential intergovernmental discord between the Federal Government and Lagos State finds expression in the nature and character of party politics in Nigeria. The 2013 action of the Jonathan Administration in politicising the granting of the Ecological Fund to states whose Governors were friendly with the Federal Government brings this into perspective. The Ecological Fund was established in 1981 with the dedication of the total fund in the Federation Account to be distributed on agreed formulation among the States and Local Governments in the federation to address environmental challenges across the country. This however became a political weapon as many states with serious ecological threats were denied the Fund in 2013 and the Buhari Administration repeated the same by paying the excluded states in 2015 (Olajide & Ojatorotu, 2019). This means that environmental problems are not first-order considerations in the Nigerian political process (Olajide & Ojatorotu, 2020). In this unhealthy intergovernmental relations climate, Lagos State's climate change response faces potential threats.

4.8 Summary of the Chapter

The chapter analyses qualitative data gathered from study locations in Lagos State by the researcher. This was done through the content analysis of data gathered from interview respondents and participants of Focus Group Discussions. The analysis data was done in themes such as the background to climate change climate and change response in Lagos State, climate change mitigation in Lagos State, climate change adaptation in Lagos State, environmental institutions in Lagos State, subnational climate finance in Lagos State and climate change and intergovernmental relations in Lagos State.

Chapter Five

Climate Change Response in Kwazulu Natal, South Africa

5.1 Introduction

This chapter offers a discussion of the results of the study embarked upon by the researcher in Kwazulu Natal, South Africa. The chapter commences with a background analysis of the climate change in the Province to establish its vulnerability to the menace and its effects. It goes further into looking at the policies and programmes established and promoted by Kwazulu Natal in terms of mitigation and adaptation. Other subsections of the chapter include considerations of results bordering on environmental institutions in Kwazulu Natal, climate finance in the Province and the effects of intergovernmental relations on the ability of Kwazulu Natal to respond to climate change in terms of adequate and effective mitigative and adaptive policies and programmes.

5.2 Climate Change and Climate Change Vulnerabilities of Kwazulu Natal

Kwazulu Natal is vulnerable to climate change and the environmental, social and economic problems that follow its trail. As a highly industrialised, coastal Province, Kwazulu Natal is critical to the economy of South Africa. It is one of the maritime gateways into the economy of South Africa as home to not just the country's but also Africa's two largest ports. These are the Durban Harbour, which receives 60% of container traffic of South Africa and the Port of Richard's Bay, which is one of the world's largest coal export terminals (eThekweni Municipality, 2019; Reuters Staff, 2011). The Province with its 11 531 628, is the second-largest provincial population in South Africa, after the Gauteng Province (South African Market Insights, 2020). Kwazulu Natal has one of the country's leading provincial economies. The Province contributes 16% of South Africa's national GDP (Statistics South Africa, 2019). The combination of the Province's population and the economy of Kwazulu Natal has implications for climate change. This has to do with the rate of resource use and economic activities drive greenhouse gas emissions.

The geographical location and features of Kwazulu Natal also predispose it to the vagaries of climate change. It has a coastline of 580km which makes a substantial part of the Province susceptible to coastal flooding and erosion. The inland areas of the Province is also susceptible to the effects of climate change. This is due to the predicted alterations in vegetation and general ecological features of the Province. The Province is already being impacted by climate change. This can be seen in observed changes in environmental indices of the Province. The Province has

experienced rise in temperature and rising cases of coastal floods in recent years. This is affirmed by respondents from the Province as follows;

“Yes. And we've seen it in the years, even before our major floods and so forth. So, in 2017, 2018, 2019, many more visible signs stated “Hey, we are in a state of climate change, or we are receiving, you know, climate shocks” as a sense that we could predict. Okay, we know when our seasons were we knew in summer was we knew in winter was but our summers are getting hotter. Our winters are even much warmer than what they used to be. Another contributing factor here cases it in what we've experienced as the sea level rise. So, these are things that are contributing to climate change. And over the past years, we've had flash floods, we've never experienced something like that. In a matter of seconds, our climatic conditions just changed. I mean 2018 was a good example where we were trapped inside, we couldn't go anyway. Trees had fallen into the roads. Flash floods that wipe the cause of bridges into the ocean, something we've never experienced before. So definitely Kwazulu Natal as at risk of and actually experiencing climate”.

(Source: Interview with KZNI A, March 13, 2021, via Zoom)

The respondent asserts further that;

“Yes, we are. And certain areas are more sensitive to climate change than others. And the coastal areas are probably less sensitive to temperature change. And the inland areas, more sensitive to temperature change because we have the warming influence or the moderating influence of a warm ocean current. And if one converts all of this into changes in crop yields or changes in extreme events, then yes, the province is subjected to climate change”.

(Source: Interview with KZNI A, March 13, 2021, via Zoom)

Environmental parameters in Kwazulu Natal are changing rapidly and haphazardly. In recent years, environmental events such as droughts, flash floods, and water shortage, among other environmental problems have become common in Kwazulu Natal. This is affirmed by the South African Local Government Association (2017) that the Province has vulnerabilities in key areas. These are natural systems, water resources, biodiversity, fire regime, coastal zone and agricultural sector. Kwazulu Natal faces considerable challenges in these areas, for example, in the coastal zone, the dynamics that have been observed are, rise in sea level, damages to properties due to storm events and the growing vulnerability of the South Coast to coastal erosion. The water situation in the Province became clearer to the researcher as he read in one of the locations of the study that water should be sustainably used due to water stress.

A respondent paints the picture of the recent drought that happened in Kwazulu Natal as follows;

“If we are to look at the water sector in the recent past, we have just experienced drought in our Province and this was what we can term meteorological drought. What does that mean? We have four seasons in terms of weather patterns. We have September to November which is our spring and we start getting rainfall around October and November. Then December to February is our rainfall season. So, one can expect rainfall during those 3 months. Then March to May is our autumn when we start to see fewer rains but you still get a few. June to August is our winter when it becomes very dry and cold. When we had the meteorological drought, what happened was that during the rainfall season, December to February, we did not get a lot of rainfall at the onset of rainfall season, November and December were very dry and then January when you should start to see lots of rain, there were no rains. Then, only in February, the rains came but now it was very late for rainfall season, which meant that water resources did not get charged at the time and then we were going to move into the winter season. So that was how our drought happened. Water was scarce because water resources were not filled up, we ended up having lots of shortage of water during the winter, autumn and late into the next summer when we were expecting rains”.

(Source: Interview with KZNE D, September 28, 2019, Kwazulu Natal)

The impact of weather events such as the drought that occurred in Kwazulu Natal was that it has multi-sectoral effects. In the agricultural sector for example, which relies significantly on rain-fed agriculture, the productivity of the sector was badly affected. Schulze, Manakan, Schutte, McNamara, Kunz, & Mabhaudhi (2018) note that climate is a driver of agriculture but adverse climate challenges that are arising from variable temperatures, rainfall patterns, wind fields, and climate extremes affect agriculture in Kwazulu Natal. This resonates because much of the Province is rural with families that are not just poor but also rely on subsistence and small scale farming for livelihood. The impact of this is that the food security of the Province and South Africa at large was affected. Agricultural activities and output are affected by climate change and its effects such that the society is not able to meet up with its responsibility of making the people access quality food in adequate quantities for healthy living.

The vulnerability of Kwazulu Natal is shown in flash floods in parts of the Province such as Durban in eThekweni Municipality. The flooding wreaked havoc in Chatsworth, Umlazi and Isipingo destroying 85 homes with 386 people displaced (Ryan, 2016). In recent times across the Province, the pattern of rainfall has been hugely distorted and while it rains for a short time, the rain produces massive floods that endanger the lives and livelihoods of the people. Kwazulu Natal is historically prone to flooding and erosions. Kataneksa, Mehta & Weingarten (2012:44) opine that “KZN has historically had the highest rates of droughts, floods and other climatic emergencies in South

Africa”. This is because the Province is located on the East coast of South Africa which is known for extreme weather events. This usually brought with them flooding of massive proportions, leading to loss of lives and livelihoods. Examples include 1984, when a storm named Domoina occurred in parts of Southern Africa, including parts of Kwazulu Natal. It flooded many river basins, making the Pongolapoort Dam attain 87% of its capacity (Sithole, 2016). In 1987, much of the coastal areas of Kwazulu Natal experienced severe flooding leading to the loss of 380 lives while the economic cost was valued at 600 million Rands. The impact of the flooding led to massive landslides and mudflow in the Province (Bell, 1994). This shows that Kwazulu Natal is vulnerable to climate change and the extreme weather events are predicted to be of worse magnitudes and more regular in incidence.

Climate change also has health outcomes in Kwazulu Natal. Variability in climate dynamics has brought about new human and animal health issues in South Africa, including the Province. Chersich, Wright, Venter, Rees, Scorgie & Erasmus (2018) frame climate change as health in South Africa. The rise in temperature in the Province is linked to the outbreak of cholera in 2000-2001. The now regular floods and erosions in the Province exposes the people to various health risks. This is especially true of rural communities with very little or no adaptive capacity. Other diseases such as malaria, malnutrition-induced diseases especially in children and maternal health issues, among others are rife. These have led to high incidences of morbidity and mortality in the Province. Climate change is compounding the healthcare dynamics of Kwazulu Natal, thereby putting pressure on the healthcare management system of the Province.

Climate change also produces socio-economic vulnerability in Kwazulu Natal. The water crisis arising from the recent drought in the Province affected the Province economically. This created water stress in the agricultural, industrial, manufacturing and other sectors of the economy as the rivers, lakes and waterbeds dried up. This had impacts on business productivity in the Province. Socially, water stress means that households struggled to meet their water needs. This is a recipe for the outbreak of communicable diseases such as cholera, especially in rural areas. In the uMhlathuze Local Municipality, for example, 2015-2016 affected the primary sectors of agriculture and forestry in which production dropped drastically and affected the contributions of the sectors to the GDP of the Province (Buthelezi, Rawlins, Ilesanmi & Oladejo, 2020). Climate change is a socio-economic crisis, a fact that has been demonstrated in Kwazulu Natal. It exacerbates poverty, disease burdens, causes displacement and even death.

Climate change is also going to affect the population dynamics of South Africa. This migratory effect of climate change would see a greater movement of the people from the Western side of the country to the east side of the country. It is projected that the Western parts of the country would become dryer as climate change bares its fangs on the biodiversity and weather patterns of South Africa. Kwazulu Natal is one of the potential Eastern destinations. This is noted in the KZN EDTEA Five Year Strategic Plan 2020-2025 (2020) regarding the likely effect(s) of climate migration on resource availability and usage in the Province. The Province faces an uncertain future in resource terms. As the second most populous Province in the country, concerns are already being raised about the ability of the Province to ensure that adequate resources will be available to cater for a burgeoning population.

5.3 Climate Change Mitigation in Kwazulu Natal

Kwazulu Natal as a fraction of humanity is also in the race to arrest global warming by reducing the emissions of greenhouse gases into the atmosphere. The responsibility of the Province resonates in the fact that South Africa is Africa's greenhouse gases emitters with Kwazulu Natal as the manufacturing hub (Amusan & Olutola, 2017). It is contributing 18% to the provincial economy. This is the highest of South Africa's nine Provinces. Other high-contributing sectors include transport, storage and communication, agriculture, electricity, gas, and water supply. The economic activities in these sectors are high sources of greenhouse gases emissions. Therefore, the Province of Kwazulu must respond to climate change by coming up with policies, action plans and programmes aimed at mitigating climate change.

Kwazulu Natal pays attention to climate change mitigation. Kwazulu Natal dwells on national and provincial action plans and strategies to respond to climate change through mitigation. These include the Constitution of the Republic of South Africa of 1996, National Environmental Management Act of 1998, Green Economy Framework, National Integrated Coastal Management Strategy, National Framework for Sustainable Development, National Waste Management Strategy, National Biofuels Framework, National Climate Change Response Policy for South Africa, National Development Plan (Vision for 2030), Nationally Determined Contributions (NDCs), Draft KwaZulu-Natal Green Economy Strategy, Kwazulu Natal Environmental Management Strategic Plan 2014-2019, 2030 Provincial Growth and Development Plan, KZN EDTEA Five Year Strategic Plan 2020-2025, National Kwazulu Natal Conservation Management Act of 1996, Kwazulu Natal Tourism Master Plan and the Oceans Economy Strategy, among

others. These legislative policy and strategic frameworks aim to ensure that South Africa and Kwazulu Natal, in particular, reduce greenhouse gas emissions.

The Province has made efforts to mainstream climate change mitigation action plans and strategies into its development agenda. The Province set up the Climate Change and Sustainable Development Council to ensure that stakeholders in the Province and beyond “...work together to achieve green and climate-smart economic recovery” (Dlamini, 2021). This is to ensure that the province responds to climate change in every way possible. One of the main environmental management drives of the Province is to stabilize greenhouse gases emissions in the Province. The responsibility of the government to ensure climate change mitigation in Kwazulu Natal is addressed by a respondent as follows;

“The government does have a role to play in terms of policy, policy development in terms of fossil fuel industries and how much they permit them to pollute the atmosphere which inevitably causes climate change.

Source: (Interview with KZNI B, October 3, 2019, Kwazulu Natal)

In line with the foregoing, climate change mitigation becomes strategic to the future of the economy of the Province. The Provincial government notes that for it to attain the goals in the KZN EDTEA Five Year Strategic Plan 2020-2025 depends on the extent to which the goals align with the principles of sustainable development (KZN EDTEA, 2020). As a Province bedevilled by the effects of climate change in recent years, it needs to ensure that its climate change response is comprehensive and actionable.

The control of greenhouse gases emissions is a key effort enunciated in the climate change action plans and strategies in Kwazulu Natal. As a province whose economy dwells fundamentally on the burning of fossil fuels, it is deemed necessary to ensure that it adopts the green development paradigm. This has to do with controlling the provincial greenhouse gases emissions. The Province aims to reduce its emissions using the 2010 baseline. KZN Provincial Planning Commission (2014:118) notes that “the 2020 target is 14,788,200 MtCO₂e from 2010 Baseline and the 2030 target is 10,603,200 MtCO₂e from 2010 Baseline”. The Province aims to achieve this through the interventions below;

Develop provincial alternative energy resource assessments, strategies and policy interventions; programme for the development of alternative energy demonstration projects; implementation of energy management systems and energy efficiency measures; Promotion of Renewable Energy Manufacturing in the province” (KZN Provincial Planning Commission, 2014).

The foregoing paves the pathway to the provincial green economy for Kwazulu Natal. There are many opportunities inherent in the transition to renewable energy as pressure on South Africa to increase energy generation mounts. This is because if the Province leverages its existing manufacturing hub status, it can extend its comparative advantage to being the hub for renewable energy technologies hub in South Africa. As the world transitions from dirty energy such as South Africa’s reliance on coal-fired energy, Kwazulu Natal can be one of the main centres of the emerging green economy in the country.

Other sources of greenhouse gases emissions such as Agriculture, Forestry and Other Land Use (AFOLU) and waste are also getting the attention of Kwazulu Natal in the effort to reduce emissions. Though the AFOLU Baseline for the Province is not available, that source contributes significantly to its greenhouse gases emissions. As a Province with vast agricultural and forestry sectors, the contribution of the AFOLU to climate resonates because it is one of the country’s largest contributors to AFOLU emissions. The Department of Environmental Affairs (2016) notes that while the Province’s land sink is predicted to increase due to an increase in land cover, the livestock emission will increase by 38.4% between 2014 and 2050. Poor waste management also produces a considerable amount of emissions in Kwazulu Natal (KZN EDTEA, 2020). This is because waste management is poor in parts of the Province as the 3 Rs of waste management, that is, reduce, reuse and recycle are not taken cognizance of.

To begin with, EDTEA in collaboration with its partners is planning to have its emissions inventory (The Climate Footprint, 2021). The availability of emissions inventory will aid the climate response strategies of Kwazulu Natal in that the scaling of the vulnerability will be accurate.

“First, we started from the four main sectors of the IPCC guidelines, those identified as key sources of greenhouse gas (GHG) emissions. We then took stock of our team’s capacity to process these different types of data, as well as the availability of it. From there we decided to focus on the waste sector, the stationary and mobile combustion components of the energy sector, and the livestock and manure management of the AFOLU sector. Another key point to note is that we consider this as our baseline and we decided to start small, and then move forward, strengthen our capacities, and expand to the other sectors.” (The Climate Footprint Project, 2021)

The import of emissions inventory is that the Province would be able to map out an adequate and measurable response to climate change. Having an emissions inventory also helps to leverage the opportunities inherent in climate change mitigation. In critical areas as such energy, emissions inventory would help to determine the right type of renewable energy technologies Kwazulu Natal can leverage and plan the transition of the Province to a green economy.

The Province is also committed to ensuring good air quality and atmosphere. The massive sugar cane industry in the Province is a source of pollution and emission. During sugar cane burning, there is incomplete combustion that leads to the release of pollutants such as carbon monoxide and particulates into the atmosphere (Department of Environmental Affairs, 2016). It is noted that there is a high rate of emissions among the poor in cooking, heating, and other activities. The document affirms that “The combustion of fuels for cooking, heating and lighting in residential areas presents an on-going challenge to air quality in the Province. Elevated PM₁₀ concentrations are observed in most urban centres and background sites in KZN” (KZN EDTEA, 2020:57). PM₁₀ contributes most significantly to air quality in Kwazulu Natal. Durban, the provincial economic hub is found by Air Quality Index (Air Quality Index, 2021). In addressing air pollution in the Province, EDTEA has six air quality monitoring stations to monitor the sources and types of air pollutants into the atmosphere (Department of Environmental Affairs, 2016).

Climate change mitigation in Kwazulu Natal is an urgent task due to the mounting vulnerability of the Province. The population of the Province is rising, hence, the energy requirement for development must be within the limits of sustainability. The location of the Province along the South African East Coast also means without adequate climate change mitigation, the Province will end up joining the rest of the world in putting its citizens at risk. The Province is one of South Africa’s leading emitters, given the structure of its economy as agriculture and manufacturing-based. The country has high potentials of being one of South Africa’s and Africa’s mitigation success stories because of its commitment to addressing climate change and mainstreaming it into its development policies, plans, and strategies.

5.4 Climate Change Adaptation in Kwazulu Natal

Climate change adaptation is the people-based response to climate change. This is because the effects of climate change are already being felt by the people. The people of Kwazulu Natal live in one of the most vulnerable spaces to climate change. The people of Kwazulu Natal are faced with vulnerability in areas such as agriculture and food security, natural resources and biodiversity, health, human settlement, water and marine and coastal (South African Local Government Association, 2017). These are caused by climate variability as rainfall, temperature and precipitation (Chersich, Wright, Venter, Rees, Scorgie & Erasmus, 2018). Therefore, there is a need for adaptation response to the menace ably led by the provincial government. This made the Province develop adaptation action plans, strategies and policies to cushion the effects of climate change on the people.

Some of the legislative, policy and strategic instruments to foster adaptation to climate change in Kwazulu Natal include the following; the Constitution of the Republic of South Africa of 1996, National Environmental Management Act of 1998, Green Economy Framework, National Integrated Coastal Management Strategy, National Framework for Sustainable Development, National Waste Management Strategy, National Biofuels Framework, National Climate Change Response Policy for South Africa, National Development Plan (Vision for 2030), Nationally Determined Contributions (NDCs), Draft KwaZulu-Natal Green Economy Strategy, Kwazulu Natal Environmental Management Strategic Plan 2014-2019, 2030 Provincial Growth and Development Plan, National Kwazulu Natal Conservation Management Act of 1996, Kwazulu Natal Tourism Master Plan and the Oceans Economy Strategy, among others.

The provincial government of Kwazulu Natal among other things has linked climate change adaptation to the development strategies and policies of the Province. Climate change as an essentially social-economic crisis requires strategic policies, plans, and actions to ensure that the people do not suffer from its effects. Climate change adaptation is an urgent task, unlike mitigation which is usually medium and long-term in outlook (KZN EDTEA, 2014). This is noted by the national government of South Africa and the provinces that short-term and medium-term interventions on climate change should be prioritised in sectors such as water, agriculture, health, biodiversity and human settlement, all of which are sectors that are pertinent to the dignity and livelihood of the people. Another feature of climate change adaptation response is that it is risk-

based. This way, the province will be able to evaluate the risks faced by the people and map out response strategies to the menace.

Kwazulu Natal adopted the ecosystem-based adaptation through its urban greening efforts. Due to the disruption of the biodiversity of the Province by climate change and the local farmers, the majority of whom are small scale farmers are hit by land degradation. Hence, the province has keyed into the national strategies to address the ecosystem-based vulnerability. The government aims to extend the protected areas in the Province. To this end, the province intends to engage in;

“The expansion of protected areas, identification of corridors to improve the connectivity of these areas as a means of maintaining ecosystem goods and services, and the involvement of private landowners in these initiatives are crucial in terms of the province’s adaptation to climate change and increasing the resilience and “buffer capacity” of the province”. (KZN Provincial Planning Commission, 2014:125).

This will ensure that there are enough wetlands in the province and that wastewater and other toxins that can destroy biodiversity are dealt with. With this, available land for agriculture and related purposes is rich enough for poor and smallholding farmers to make work. This seems to be the case as a participant in one of the Focus Group Discussions note that;

“I think KZN is the greenest province but maybe it's one of the top five because you have fertile soil. So that is a great export because if you take, for example, we have in Panini, Richards Bay we have a lot of trees. Of course, it's a business because it's trees and they use it for paper notes even furniture but in the growing process of the tree in house decreasing climate change absorbs some greenhouse gases”

(KZN FGD E2, September 29, 2019, Kwazulu Natal)

This is also linkable to some cutting edge scientific interventions in the Province. The KZN Department of Agriculture and Rural Development (DARD) developed a bioresource programme that is designed to advise on optimal crop types in a given area in the Province. DARD notes that “...this program serves to provide ready access to the natural resource databases for the Province, to empower clients and extension personnel to optimize potential and effect appropriate land use management systems to achieve greater productivity and food security while maintaining a sound resource base” (KZN DARD, 2010). This eases the adaptive capacity of farmers as the programme aid agricultural decision-making. This will ensure that the ecosystem dynamics that are necessary for agriculture are within the control of the farmers. This stands to benefit the cause of food security

in the Province as ecosystem issues that beset agriculture can be mitigated or mediated to the advantage of farmers in the Province.

Another aspect of climate change adaptation in Kwazulu Natal is that the government of the Province take disaster risk reduction and management as adaptation (KZN Provincial Planning Commission, 2014). Given the increasing regularity of climate extreme climate events in the Province, the government of Kwazulu Natal strives to ensure that the impacts of these events are reduced or averted in their entirety. Disaster reduction and management are some of the areas that demonstrate the inseparability of climate change mitigation from adaptation. The Province notes in the KZN EDTEA Five Year Strategic Plan 2020-2025 that improving climate change mitigation leads to a decrease in losses due to disasters caused by climate change (KZN EDTEA, 2020). Thus, Kwazulu Natal engages in mitigation as a form of planned adaptation through its disaster management strategies. According to the KZN Provincial Planning Commission (2020), the Province aims to achieve the following through its climate change policy, planning and monitoring, and disaster management planning and monitoring. These are event information sharing with an early warning system to alert the people of climate developments, reduction in response time to disaster events, increase forecast of impending climate events and response plan and knowledge sharing on the state of the art in disaster risk management. The Department has developed Provincial Disaster Management Centre (PDMC) in all District Municipalities in the Province (KZN Provincial Planning Commission, 2020).

Kwazulu Natal is aiming to improve the adaptive capacity of the rural citizens of the province through the adoption of community-based adaptation. The collective adaptation of the people is one of the best approaches to climate change adaptation. This brings to the fore the utility of the indigenous language system in addressing the environmental and socio-economic problems of climate change as analysed by the Central Kwazulu Natal Climate Change Compact (CKZNCCC) (Durban Adaptation Charter, 2015). The indigenous knowledge systems (IKS) buoys community resilience to climate change. This entails the use of indigenous technology and know-how in addressing problems wrought by climate change. In the Swayimane community, in uMshwati Municipality, Kwazulu Natal, IKS was found to be useful in seasonal climate information and weather forecast among local farmers. This is done through the use of indigenous climate indicators usually passed down through oral tradition from one generation to the other (Basdew, Jiri & Mafongoya, 2017).

Climate change adaptation is linked to the economic advancement of the Kwazulu Natal. The Province notes that if it effectively plans and implements climate change adaptation in a sectoral manner, this could trigger green jobs creation, thereby contributing to the achievement of the Sustainable Development Goals (SGDs) (KZN Provincial Planning Commission, 2014). Adaptation jobs usually come from investment in physical and natural infrastructure and capacity building and social protection of the people (International Labour Organisation, 2018). This would transform the economic outlook of the Province of Kwazulu Natal as some of the most problematic issues of the province such as water, agriculture and waste. As officials and stakeholders continue to think creatively on ebbing greenhouse gas emissions and ensuring resilience, such creativity elicits economic opportunities that can be leveraged for jobs. Another benefit of adaptation jobs is that they foster equity and inclusion in contrast to the political economy of carbon capitalism.

Kwazulu Natal counts fundamentally on climate change adaptation because it is one of the main demonstrations of the commitment of the government to the welfare of the citizens. As a highly vulnerable Province in South Africa and one also with a high rural populace, the allure of climate change adaptation response resonates. The need to ensure that the people are empowered through sound disaster risk management and adequate investment in infrastructural buffers against loss and damage drives the provincial adaptation regime. While the Province is making good strides on the mitigative side of the climate change response coin, it is also aware of the necessity of building the adaptive capacity of the people through sound legislative, policy, and strategic plans and actions.

5.5 Climate Change and Environmental Institutions in Kwazulu Natal

Kwazulu Natal relies on its institutions to drive its climate change response. As is the case world over, the effectiveness of climate change response is a function of the viability of the institutions built by governments to undertake the important task. They are the platform for climate change response planning, implementation, and monitoring. Ampaire (2020:1) holds that “...institutions structure impacts and vulnerability of individuals and communities, they mediate between the individual and collective responses to climate impacts, and influence how different actors in climate action access and use resources”. Across all levels of climate change governance, institutions play critical roles in ensuring mitigation, adaptation and securing, and allocation of resources.

The main environmental institution in Kwazulu Natal is the Department of Economic Development, Tourism and Environmental Affairs (EDTEA). It was established in 2014 following the merger of economic development, tourism, and environmental affairs functions of government to replace the Department of the Economic Development and Tourism (DERT) (KZN EDTEA, 2014). The Department is principally divided into three Service sections which are Economic Services, Tourism Services and Environmental Services. The Environmental Service section runs environmental management functions such as Policy Co-ordination and Environmental Planning, Climate Change Management, Environmental Compliance Monitoring and Enforcement, Environmental Quality Management, Coastal and Biodiversity Management, Environmental Empowerment Services. The Service sections and their programme units function as a system to achieve the mission statement of the Department which is the "...that attainment of a radically transformed growing, inclusive, innovative and sustainable economy, thereby optimizing employment in Kwazulu-Natal".

EDTEA is well known across the Province as interview respondents and FGDs participants had no problem mentioning it as the main environmental institution in Kwazulu-Natal. A respondent notes on environmental institutions in Kwazulu-Natal as follows;

"We have the department of environmental affairs. That is one of our environmental institutions that are meant to be proactive, responsive, the eyes and ears of the community".

(Source: Interview with KZNCS A, September 26, 2019, Kwazulu Natal)

While this is commendable, the environmental activities of the Department are less known because the programme units of the Environmental Service section are not popular with the people. However, interview respondents are aware of the climate change desk within the Environmental Services section of EDTEA.

Institutional climate change response in Kwazulu-Natal is faced with the problem of scale. This is because the climate change activities of other provincial Departments are unknown or even lacking altogether. For instance, the researcher was taken aback by the near climate change response sterility of many Departments. There are many Departments whose functions and services are fundamental to climate change response. These include the Departments of Agriculture and Rural Development, Human Settlement, Co-operative Governance and Traditional Affairs (COGTA), Public Works, Social Development, Transport and Community Safety and Liaison. While the

activities of COGTA are noted in the efforts of Municipalities on climate change response, most of the Departments lack a clear climate change response outlook. Collaborations between EDTEA and other Departments and institutions were noted in the 2030 Provincial Development and Growth Plan. For example, the implementation of many of EDTEA's mitigation and adaptation policies and strategies need to be done by COGTA but this may be difficult in the atmosphere of poor institutional coordination noted in the Province. This is despite the existence of inter-institutional bodies such as the Provincial Committee for Environmental Coordination (PCEC) that only comes alive during the policy planning phase. There is also the high-powered Climate Change and Sustainable Development Council which is headed by the Provincial Premier and Members of the Executive Council (MECs), Heads of Departments and other officials. This has not resulted in tangible institutional coordination on climate change response. This study gathered that cognate institutions lack climate change personnel to allow for the necessary scope for climate change response. This is noted by a respondent as follows:

“The main problem we still have at Provincial level amongst the line Departments is not having people who are dedicated to working within these line Departments. We have identified 8 sectors and we should be in a position to say, Department Transport, you should have a person in charge of climate change. If you want to engage the water sector, this is the person to see. This is the person driving research in the water sector so that when we review the provincial strategy, there are enough materials from departmental experts to say these are the issues in the water sector, let us update our strategy in this way or that way. At the local level, it is also the same challenge, at that level, there are no people dedicated to environmental issues in some Districts, let alone there are no people dedicated to climate change work. Then it creates a problem, we have response plans developed for the Districts but now we need people who will drive the work”.

(Source: Interview with KZNI A, March 13, 2021, via Zoom)

The foregoing makes robust climate change response in the Province difficult because climate change is a multi-sectoral and multi-stakeholder affair. Hence, the poor participation of these Departments in climate change response stifles sectoral data and information which are central to building a climate-resilient Kwazulu-Natal. The aloofness of other provincial Departments is alluded to in the KZN Environmental Management Strategic Plan 2014/2019. EDTEA notes that lack of cooperation among government institutions is a bane of Kwazulu Natal's ability to link climate change effects with its development imperatives (KZN EDTEA, 2014). This speaks to a lack or weakness of institutional coordination in climate change response in the Province. While

there are many legislative, policy, and strategic plans for responding to climate change in Kwazulu-Natal, the absence or weakness of institutional coordination means that the formulation of the instruments would be difficult due to possible lack of requisite sectoral data and in the situation even if such data exist, implementation is likely to be haphazard.

Apart from poor institutional participation and coordination in climate change response in Kwazulu-Natal, another weakness of Environmental institutions is lack of capacity. Climate change response entails individual skills and performances, organizational management capacity, networking capacity, public governance and social norms, values and practices (Willems & Baumert, 2003). Table 5.1 below explains the five levels of institutional capacity by further dividing them into two broad classes, that is, climate-specific capacity and climate-relevant capacity respectively;

Table 5.1 Climate-specific and climate-relevant capacity needs

	Climate-specific capacity	Climate-relevant capacity
Individuals	Sufficient government staff, experts, business and NGO representatives for the national assessment, the formulation of the national strategy, the design and implementation of climate-specific policies and measures, as well as for monitoring, reporting and review. Reasonable level of climate-specific skills and training Interest in climate change issues	Sufficient government and non-government experts developing climate-relevant policies in: energy, transport, agriculture, forestry, industry, R&D, economy, finances, education. General training opportunities Financial/non-financial incentives
Organisations	Specific mandate on climate change Climate “unit” within an organization Higher management “championing” climate change	Compatibility of other mandates of the organization with climate objectives, overall management structure and processes, level of human and financial resources, overall ability to fulfil missions
Network of organisations	Procedures and financial provisions, level of co-operation on climate issues, leadership of an organization, allocation of responsibilities, stability/adaptability of the institutional framework	Underlying public sector practices and procedures for policy integration

Public governance	Ability to influence mainstream policy- making in taking into account the climatechange issue	Political stability, voice and accountability; ability to implement sound climate-relevant policies and to provide a sound business environment, civil service independence, ability to collect sufficient resources; rule of law and control of corruption
Social norms, values, practices	Knowledge about climate change and positive attitude towards climate mitigationmeasures	Acceptance of laws; positive attitude toward environmental protection, attitude of co-operation among citizens

Source: Willems & Baumert (2003:18)

In the case of Kwazulu Natal, EDTEA and the other climate-relevant Departments lack the requisite climate-specific and climate-relevant skills in properly scaling the climate change vulnerability. This speaks to a lack of interest in climate change response issues in those climate-relevant institutions. For example, when the researcher contacted the Department of Agriculture and Rural Development (DARD), they lacked the data and information on climate change and climate change response in the Province. The submission of a respondent on lack of institutional capacity in the Provinces speaks clearly to the capacity conundrum of the institutions. The respondent submits as follows;

“Relatively weak in terms of climate change, they may say things but they don't do anything. I am very disappointed in the Department of Agriculture, for example, in climate change in the province. I'm quite disappointed in even water affairs, which is my field. They have too many other problems. And the big issue in government departments is that they have become over the past 25 years very de-skilled. They have a lot of people who can talk and very few people who can do it. And I know that from Kwazulu Natal because you're not asking me if I look at the technical capability 20 years ago versus now, it was much, much better. If I look at the technical capability, nationally at the Department of Water affairs, or agriculture or any other technical department, it was much, much better 25 years ago than it is now. People are leaving, people are not being replaced. They're being replaced by political appointments. And so, the technical skills are not there. Conceptually. No problem.”

(Source: Interview with KZNE B, October 6, 2019, Kwazulu Natal)

Rather than build capacity to tackle climate change and its manifestations, environmental institutions have over the years regressed in terms of capacity to address the challenges. The lack

of capacity in terms of manning and skills for climate change is noted in the KZN Environmental Management Strategic Plan 2014/2019, suggesting that the lack of manpower and skills in many of the phases and sectors of the climate change response in the Province (KZN EDTEA, 2014).

Many provincial institutions are also faced with issues in social norms, values and practices that border on climate change. The case of DARD cited above speaks to this fact. Though the institution developed software to optimize crop yields in the Province through the provision of ecosystem information in 2010, the necessary norms and values that guide climate change response is observed to be lacking. This explains the lack of climate change units in the provincial Departments because they do not see climate change as relevant to their activities. This leaves EDTEA overwhelmed in climate change response. Climate change response is a multi-institutional affair that requires the continuous and ongoing inputs of relevant institutions within a political space.

Environmental institutions are critical to the climate change response in Kwazulu-Natal. In terms of legislative, policy and strategic plans mapping out their structures and functions, environmental institutions in South Africa are well-positioned to the social, economic and environmental dynamics of climate change. While many institutions are directly and indirectly relevant to climate change response, they are weak and are performing below the threshold of resilience the Province requires for its development agenda. Weak institutions are a threat to the sectoral approach to climate change as they would not be able to fully capture the vulnerabilities and risks as they are evolving. Weak environmental institutions are also not well placed to plan mitigation responses to climate change. They may dwell mainly on short-term or even quick-fix efforts that would fail mitigation tests rather than well-planned efforts that may address issues in the short-term but are also focused on medium- and long term mitigative outcomes. In terms of adaptation to climate change, they may end up muddling up efforts rather than being platforms for succour to the environmentally inflicted pains of the people.

5.6 Climate Change and Subnational Climate Finance in Kwazulu Natal

Effective climate change response in terms of mitigation and adaptation is a function of the availability and access to climate finance. Climate finance, for experts, is taken as the third leg of the climate change tripod. This is because mitigation and adaptation require a huge financial outlay. This is especially true of the developing countries that are too economically weak to address climate change robustly without financial support from the international multilateral and bilateral sources. Subnational climate finance also flows from local budgetary allocations and other local

sources. Addressing climate change is critical, especially in sectors that emit large amounts of greenhouse gases, as large investments are required to significantly reduce emissions. Climate funding is equally important for adaptation and will require enormous resources, not just to enable countries to adapt to adverse impacts and reduce the impacts of climate change. (UN-Habitat Regional Office for Asia and the Pacific, n.d.).

The Province of Kwazulu Natal like every political system relies on the availability of funds to carry out its climate change response mandate. Like all subnational political units, the responsibilities foisted on the Province exceed that which it can unilaterally fund and implement. Therefore, the Province seeks a balanced combination of external and internal financing of its climate change response implementation. Due to the acute vulnerability of the Province to climate change, it has paid attention to sourcing the financing of its action plans and strategies on climate change response. There are two external sources of climate finance for Kwazulu Natal. First, the National Government of South Africa and international climate finance arising from the Province's networking with international climate groups focusing on subnational governments.

The chief source of climate change finance for Kwazulu Natal is funding from the National Government of South Africa. As an active member of the UNFCCC, the Government of South Africa scouts for finance for its Provinces and Municipalities. Kwazulu Natal has benefited from this financial support, among other Province in the Republic. This means that the international climate finance of Kwazulu Natal cannot be divorced from the ability of the National Government ability to leverage finance from global climate finance sources. An example of this was the funding leveraged by the National Government of South Africa from the German Federal Government which was disbursed to the Provinces to develop their climate change response strategies. Kwazulu-Natal was one of the beneficiaries of this funding. There is an ongoing project funded by the National Government on the human settlement sector with one District selected in Kwazulu Natal, Eastern Cape and Western Cape respectively. Hence, the National Government of South Africa is a strong mobilizer of climate finance for Kwazulu-Natal.

The Province has also been able to leverage international climate finance through its climate networking strategies. Kwazulu Natal is a member of several international subnational climate groups. This has been a veritable source of climate finance for the Province. It became a member of the Climate Group, a UK-based international organisation that brings different regions, states

and provinces across the world together on climate change response. The Climate Group is the Secretariat of the Under2 Coalition, which aims to cut global emissions by half by 2030 (Climate Group, 2021). Kwazulu Natal has benefited financially and in terms of capacity building from the Climate Group. Through its membership of the Group, KZN EDTEA has received financial support and technical expertise on different programmes. Officials have been trained in Australia for peer to peer learning on renewable energy and waste to energy programmes. They have also been on peer to peer learning in Mexico on Early Warning System and Disaster Management. The Climate Group also recently supported the Province in the preparation of its Greenhouse Gases (GHG) emissions inventory by identifying experts with know-how in building the inventory and in capacity building by training KZN EDTEA officials who would man the inventory process upon completion.

In the same vein, the C40, a coalition of many of the world's largest cities is supporting some climate change-related projects in Kwazulu Natal. This involves the Transformative Rivers Management Project, which is aimed at restoring rivers that have dried up in the Province. It also aims to deal with waste that cloaks the rivers. The project is taking place in the Ugu District on the KZN South Coast and uMgungundlovu District in the KZN Midlands. With this project, the Province aims to have rivers that are clean and healthy. This project resonates in Kwazulu Natal because of the water stress that is being experienced in the Province.

In addition to the aforementioned sources of climate finance, Kwazulu-Natal as a Province also dwells on its budgetary process as a source of climate finance. The Province through its annual budgets allocates funds for projects that are climate change-relevant. This, however, has been a problematic area for the Province. Given the inadequacy of external funds for climate projects, the pressure to carry on falls on the local source(s) of climate finance which is principally through fiscal allocation in the Province. The climate finance situation in Kwazulu Natal is one in which there is a lot of climate change-related goals and targets to be achieved with little or no resources to achieve them. The import of this is that the Province has not been able to drive its climate change strategy and action plans adequately.

As a result of the shortage of funds, many of the key performance targets of Kwazulu-Natal's climate change strategy and action plans have not been achieved. For example, the Province failed largely to achieve the targets highlighted in the Environmental Management Strategic Plan

2014/2019 that was not achieved before the expiration of the document. This situation was expressed and put into perspective by a respondent as follows;

“We get support from the National but as a Province, we have also taken initiatives of trying to be part of networks that would allow us to have access in terms of finance. As I highlighted, it is still not enough because there is still a lot that needs to be covered. The implementation that has to happen at the local level from the response plans as one would have liked to and those response plans are reaching their expiry dates or they are now coming to requiring reviews. Very little has happened in terms of implementation because of finances that are directed towards climate change response”.

(Source: Interview with KZNI A, March 13, 2021, via Zoom)

The fear arising from the fate of the Environmental Management Strategic Plan 2014/2019 is palpable when one considers that the 2030 Provincial Growth and Development Plan (PGDP) which was released in 2014 with many strategic climate change targets have attained about half of its lifetime with very little implementation done.

The provincial budgetary process can only give very little of what is required in terms of finances to climate change in a fiscal year. This is because the budget has to attend to competing needs in the Province, hence, there is a need for balance in the sectoral and departmental allocation of resources by the government. A respondent pointed to this fact as follows;

“In terms of climate finance, the government is faced with scarcity of resources. You know that budgetary allocations are competitive things and if a certain environmental issue is not pressing, they will not budget for it”.

(Source: Interview with KZNI A, March 13, 2021, via Zoom)

The import of this is that climate change response in the province is not holistic due to the availability of government plans, policies and their supporting legislations but weak on implementation due to paucity of resources. Another angle to consider in the challenge posed by the shortage of climate finance in Kwazulu Natal is that it hampers the institution’s capacity to deliver on provincial climate change mandates. Poor climate finance is linked to the absence of a fully-fledged provincial climate change unit within the EDTEA structure. The unit is currently staffed by two persons. This hampers the human capital needed for a robust climate change response in the Province. In contrast to the Province, the West Cape has a fully-fledged provincial climate change unit, which speaks to the exploits of the Province in climate change response.

Subnational climate finance flowing to Kwazulu Natal is very little compared to the vulnerability of the Province to climate change. As arguably South Africa's weakest link to climate change disaster, the Province requires huge financial outlay in mitigation and very crucially too, adaptation. Having seen challenges thrust into the Province by coastal flooding and drought with their attendant healthcare challenges, it is apparent that it needs all the finance it can leverage from multiple sources. The Province requires adequate climate finance for it to leverage the opportunities inherent in climate change response. The government and the people of Kwazulu Natal stand in good stead for a better socio-economic outlook if the challenge of climate finance can be dealt with in the Province.

5.7 Intergovernmental Relations and Climate Change Response in Kwazulu Natal

Intergovernmental relations is the hub around which climate change response revolves. This is because the nature of relations between the levels of government within a political system determines the direction and quality of governance. This is also true of climate governance. Intergovernmental relations speak to the necessity of diverse forms of interactions between levels of government. Intergovernmental relations involves governance issues such as functional allocation, fiscal and other issues as they may arise in the course of governance. Climate change response across nations bears the imprint of their intergovernmental relations. This also includes South Africa in its relations with the Provinces and Kwazulu Natal in particular.

The climate change response of Kwazulu Natal is a function of the prevailing intergovernmental relations in South Africa. As a transborder menace that is inflicting environmental challenges on the Province, the relation between the National Government of South Africa, the Province of Kwazulu Natal and the District Municipalities explains climate change response in terms of mitigation, adaptation, resource politics and other contestations shaping it. There is a constitutional provision for cooperative governance in South Africa, such that national, provincial and local levels of government must be "distinctive, interdependent and interrelated" (Constitution of the Republic of South Africa, 1996). It is the cooperative governance-based intergovernmental relations of South Africa that underpins climate change response in Kwazulu Natal.

Kwazulu Natal's climate change response takes its root from the National Climate Change Response Policy White Paper (NCCRWP) of 2011. Hence, all climate change strategies, policies and action plans of the Province is an attempt at providing the windows for the implementation of NCCRWP. Climate change response governance in South Africa has an elaborate structure that

features their three levels of government undertaking specific roles to ensure that the country is climate-resilient. The National Government is the main policy provider on climate change response in South Africa. It gives direction to the lower levels of government in the country. This is done through The Intergovernmental Committee on Climate Change (IGCCC), which is a multi-stakeholder structure comprising the National Government departments, Provincial government departments, the private sector, and civil society. This structure drives climate change response in South Africa by ensuring that all the stakeholders are carried along in terms of the vulnerabilities and the resources needed to address their vulnerabilities.

The Provincial government undertakes the coordination of climate change response within their boundaries. The Provinces do this through climate change response strategies and action plans targeting their specific vulnerabilities with the requisite mitigation and adaptation frameworks. On the role of the provinces in climate change response in South Africa, a respondent submits as follows;

“Mainly, the provincial government plays a coordinating role and ensures alignment with the NCCRWP and all other policies at the national level. It plays a coordinating role between different stakeholders at the provincial level which could be the private sector or even civil society. It also acts as the link between the national and local levels of government on climate change response”.

(Source: Interview with KZNI A, March 13, 2021, via Zoom)

As an intermediate level of government, national policies on sustainability and climate change are broken into workable, implementable bits among stakeholders with the political spheres. This brings in local governments which are the centres of implementation of climate policies. District Municipalities and Local Municipalities are implementing climate change strategies, policies and action plans developed by the provincial government in furtherance of NCCRWP and other national climate change response enabling policies.

The Province of Kwazulu Natal has cordial intergovernmental relations with the National Government of South Africa. As a coordinating level of government on climate change response, it has cooperated with the national government on many climate changes and sustainable development issues. One of such areas is biodiversity management in South Africa. There are elements of intergovernmental relations on biodiversity management as both the national and provincial governments manage the risks and adaptation together (Republic of South Africa, 2004). The national vegetation and its baselines are jointly determined and managed. This ensures that

local biodiversity data gathered by the Province is fed into the national biodiversity management mix.

The foregoing is one of the areas in which the National Government of South Africa cooperates with Kwazulu Natal and other provinces on climate change mitigation. Generally, there are many areas of cooperation between the National Government and Kwazulu Natal on climate change adaptation. The Province and other provinces in the country provided the data that fed into the making of climate change response-related policies. In the air quality management of the country, for example, the National Government provided support in the establishment of air quality monitoring stations across the Province. This has allowed the Province to move ahead in its climate change mitigation agenda. A good outcome of this is that it has been able to build on the establishment of these stations to have a provincial emissions inventory which would help Kwazulu Natal to plan its emission reduction scenarios and projections accurately.

Intergovernmental relations in its cordiality and cooperation is also evident in Kwazulu Natal's climate change adaptation strategy and action plans. In 2017, the National Government collaborated with and supported Kwazulu Natal to undertake its vulnerability assessment. The National Government provided the Province with situational analyses of climate change, the data upon which the assessment was built. This way, the National Government helped Kwazulu Natal pave the way for its climate change adaptation. Intergovernmental relations between the National Government and Kwazulu Natal is discernible from the formulation of South Africa's Long Term Adaptation Scenarios (LTAS). The document is an aggregation of subnational climate scenarios simulated to project future climate scenarios in South Africa (Department Environmental Affairs, 2013). This shows that the National Government of South Africa in collaboration with the provinces are forward-looking in mapping out future adaptation requirements for Kwazulu Natal and the country at large.

In terms of climate finance, intergovernmental relations between the National Government and Kwazulu Natal has been cordial and collaborative. As explained in the last section, the National Government engages in the search for finance to be distributed between Kwazulu Natal and other provinces in the country. The National Government got funds from the German Federal Government to fund the development of the climate change response strategies. As part of the quest of the Province to raise finance for its climate change response mandates, the National Government is in support of paradiplomatic efforts. This is because the National Government is

the only body with the full powers to enter into international treaties and agreements. Therefore, the National Government concludes climate finance negotiations on behalf of Kwazulu Natal and other provinces in their forays into the international system as they join global subnational climate change networks to respond to their vulnerabilities.

Kwazulu Natal has a robust pattern of intergovernmental relations that makes climate change governance seamless between levels of government. While the Province is working through its legislative, policy and strategic instruments cooperatively with the national government of South Africa, the province is also well decentralized to such an extent that municipalities are strategic players in climate change response in the Province. This explains the enviable performance of some of the municipalities in climate change response. A good example is eThekweni Metropolitan Municipality (Durban) which is renowned for its climate change response commitments. Some respondents opined that rather than credit Kwazulu Natal as a Province with good climate change response performance, any positive development on the subject should be traced to the Metropolitan Municipality. One of them expresses this position as follows;

“Most of the initiatives come at the national level and the different provinces, in my experience, and I've worked with about six of the nine provinces in this country, the different province provinces respond differently. KwaZulu Natal does not respond particularly well, in my opinion. They go through the motions, who responds very well is the city of Durban local government. Why? Because they have a champion who's driving the climate change agenda in Durban. So, Durban is very good. So much depends on a person at the local government level or a provincial government level. My experience in KwaZulu Natal is a little bit of talk and no action from government”.

(Source: Interview with KZNI A, March 13, 2021, via Zoom)

While opinions may differ on the climate change response of Kwazulu Natal, the provincial-municipality relations on the subject is robust. This is taken into cognizance in the KZN Annual Report 2018/2019 by noting that;

“To address climate change issues increasingly faced by the province, the department has conducted climate vulnerability assessments and developed climate change response plans for the ten districts. The department has also developed the technological road maps for the Province focusing on the water and energy sector in line with the outcomes of the vulnerability assessment”. (KZN EDTEA, 2019:18).

There are local-local intergovernmental relations in Kwazulu Natal on climate change. This deals with peer to peer evaluation and knowledge sharing among some District Municipalities in the Province. As the sphere of climate change response implementation in Kwazulu Natal, all the ten District Municipalities and the eThekweni Metropolitan Municipality have developed climate change response strategies. This is to further process national and provincial climate change response policy, strategies and action plans for implementation, monitoring and feedback. An example of such local-local relations in the province is existing between the eThekweni Metropolitan Municipality and the Ugu District Municipality on the KZN South Coast (Leck & Simon, 2018). The relations between the two Municipalities focuses on their shared vulnerabilities and their response to them. With this kind of horizontal relations between municipalities in Kwazulu Natal, the quality of climate change response implementation can be raised on account of sound knowledge sharing. This is true of the Ugu District Municipality gaining from the wealth of experience that eThekweni Metropolitan Municipality possesses as a leader in local government climate change response in South Africa.

Intergovernmental relations in South Africa with a focus on climate change response is largely cooperative. This is derivable from the constitutional arrangement that reduces the possibility of intergovernmental squabble between levels of government through clear and focused functional allocation parameters. To ensure cooperative governance in South Africa, the constitution places the responsibility on the National Government to formulate policies and give direction to the provinces towards the achievement of governance mandates. The provinces are links between the National Government and the local government and other stakeholders of which the local government is the sphere of policy implementation. The provinces also coordinate local government in their implementation of policy mandates of the state. In climate change response, Kwazulu Natal through the EDTEA breaks NCCRWP and related policies into working mandates for the Municipalities through its strategic documents on climate change and sustainability with key result areas. This is monitored by the Province, which then reports to the National Government on annual basis or a timeline agreed on among stakeholders.

5.8 Summary of the Chapter

The chapter analyses qualitative data gathered from study locations in Kwazulu Natal by the researcher. This was done through the content analysis of data gathered from interview respondents and participants of Focus Group Discussions. The analysis data was done in themes such as the background to climate change climate and change response in Kwazulu Natal, climate change mitigation in Kwazulu Natal, climate change adaptation in Lagos State, environmental institutions in Kwazulu Natal, subnational climate finance in Kwazulu Natal and climate change and intergovernmental relations in Kwazulu Natal.

Chapter Six

Comparative Analysis of Climate Change Response in Lagos State and Kwazulu Natal

6.1 Introduction

This chapter serves to compare and contrast the Climate Change Response in Lagos State and Kwazulu Natal through the data from chapters four and five. This analysis is done at two levels. First is data triangulation which is done by attempting to provide answers to the research questions of the study. The second is the triangulation of the conceptual framework of the study with triangulated data. This allows the researcher to do a synopsis of the climate change response in Lagos State and Kwazulu Natal. It also helps in situating the findings of the study within the Global Environmental Governance discourse, thereby distilling the contributions of the study to the broader study of international relations and environmental politics. The chapter ends with a summary of the chapter.

6.2 Comparative Analysis of Climate Change Response in Lagos State and Kwazulu Natal

This section deals with the comparative analysis of climate change response in Lagos State and Kwazulu Natal. This is done through the adoption of the most similar system design and most different system design. The aim of this is to interrogate the influence of the political system as seen in dynamics of institutions, finance and intergovernmental relations on climate change response.

RQ1: What are the impacts of climate change in Lagos State and Kwazulu Natal?

Findings from this study show that Lagos State and Kwazulu Natal are both affected by the impacts of climate change. Both entities suffer from negative impacts of climate change, such as coastal erosion, coastal flooding and inundation, biodiversity disruption, rise in temperature, water pollution, and temperature rise. It shows that as identical coastal spaces, they both felt these harsh climatic conditions, but the degree or extent of the impact differs. For instance, they both have different experiences of drought as an impact of climate change. These impacts are discussed in detail as they are experienced similarly and differently in the two locations. The influence of

population growth in Lagos State and Kwazulu Natal are first discussed to bring into focus the socio-economic context of these impacts.

Lagos State and the Province of Kwazulu Natal are experiencing population growth at proportions that are sensitive to climate change and the environmental dynamics that accompany it. While Lagos is Nigeria's and Africa's most populous city with a population of 22 million persons, Kwazulu Natal is South Africa's second-most populous province (Lagos State Government, 2021; The carbon Footprint Project, 2021). This situation has economic implications for the two locations because their respective high population is poised to grow even higher. An important feature of the population distribution of the two subnational units is that majority of their citizens live along their respective coasts. In the case of Lagos State, 11 of its 20 local governments have large urban coastal communities while Kwazulu Natal's 580km long coastline has the Province's largest District Municipalities divided into the North Coast and the South Coast respectively. This is in line with the established knowledge that coastal communities have higher population growth and urbanization than the hinterland (Neumann, Vafeidis, Zimmermann & Nicholls, 2015). Both locations are expected to keep attracting new residents due to the economic advantage offered by their coastal nature and economies. This in combination with climate change has serious impacts on the subnational units.

The most notable impact of climate change in Lagos State and Kwazulu Natal is faced with are the complex effects of global warming leading to sea-level rise (Uwaegbulam, 2019; Mather & Stretch, 2012). This is in agreement with scientific observations and predictions associating global warming to sea-level rise because of the melting glaciers and the icecaps in the arctic and Antarctica (Glick, n.d.). This happens due to the warming ocean temperature which causes thermal expansion of the waters, thereby making the sea rise. Sea level rise has been noted to have increased globally by 0.2m between 1901 and 2018 (IPCC, 2021). The growing regularity of flooding and erosions in recent years in the Lagos metropolis and Kwazulu Natal finds expression in the foregoing. The consequence of this is that in both locations, there is coastal flooding, coastal erosion, and coastal inundation. They both have low-lying topographies such that the former is just 78m above sea level while Kwazulu Natal lies within the coastal belt of South Africa (Lagos State Government, 2021; Mather & Stretch, 2012). These geographical features make Lagos State

and Kwazulu Natal vulnerable to coastal flooding which has been a major source of concern in recent years.

Lagos State and Kwazulu Natal are faced with coastal erosion that is one of the main effects of sea-level rise. This has gone on for many years in both locations as the shorelines are being washed off by ocean water. Respondents attested to this as many coastal communities are threatened about being washed away by the Atlantic and Indian oceans respectively. The erection of the 8.5km Great Wall of Lagos in 2009 seems not enough as parts of the coastline that are not covered by the Wall is being inundated and washed away by water (Eko Atlantic, 2021). In Kwazulu Natal, many coastal communities along the province's 580km coastline have experienced coastal erosion of varying scales. Respondents note that the property valued at millions of Rands have been destroyed in many parts of the Kwazulu Natal coast over the years. The coastal erosion incidences that happened in 2007 and 2011 in the province brings this into perspective. Coastal erosions are predicted to occur regularly in the province (Smith, Guastella, Mather, Bundy & Haigh, 2012).

Rainfall variability is an arch climate change event. This is linked to global warming that has reshaped seasons in many parts of the world. In both Lagos State and Kwazulu Natal, the character of rainfall has altered considerably. It is now late-onset and early cessation of rainfall. Another feature of rainfall is that there is a decrease in the regularity of rainfall and an increase in the volume of rainfall over shorter periods (Temi Ologunorisha 2021, May 12- In-depth Interview). The import of this in the study locations is that storms have become increased, leading to flooding in the coastal communities and also in the inland. Respondents opine that flooding has disrupted the livelihood of the people and led to massive displacements in coastal communities. In the Lagos metropolis, the incidence of flooding has been on a worsening trend. Flash floods from rains that fall for very short periods but with heavy downpours have become regular in the city. This affects both the low- and high-income coastal communities in Lagos. In low-income areas such as Makoko, Ilaje, Ijeshatedo, Ketu areas of Lagos, among others, flood water flow from the streets into houses as there is no adequate infrastructure to ensure a seamless flow of water during such period. This leads to the destruction of properties and on many occasions brings the socio-economic flow of the areas to a halt. In the same vein, in the high-income areas such as Lekki, Ikoyi and Victoria Island, social and economic activities are brought to a practical halt, immobilizing vehicular movement and destroying properties. This is also affecting the Mainland

areas of the city too. In Kwazulu Natal, flash floods have also been regular. In many suburbs of Durban in the eThekwin Metropolitan District, vehicles and other properties are regularly washed off. The case of the 2016 floods in the province that wreaked havoc in many parts of Durban remains fresh in the minds of respondents.

As highly populous units of Nigeria and South Africa respectively the need for adequate water for industrial and domestic use is upended by climate change through water pollution. Water pollution in both study locations comes from the flooding and inundations of both coastal and inland areas. The case of water pollution in Lagos is explained by its low-lying and water retention inland topography. The import of this is that the soakaway system of houses in many communities within the metropolis are discovered to be 100m inside water. This is caused by climate change through heavy flooding, the water of which is retained because of the poor drainage system in the state. The case of Kwazulu Natal is similar to that of Lagos. This is due to the inundation and retention of floodwater during flooding. This soaks the soil structure and causes pollution of the soil and water in the province. This has implications for the health of the people, especially in the urban low-income coastal communities in Lagos and the rural coastal communities of Kwazulu Natal.

Another impact of climate change in Lagos State and Kwazulu Natal is the destruction of biodiversity processes in the locations. The disruption of biodiversity in the two locations come in two different ways. In the former, the destruction of biodiversity comes largely from the sprawling population of the metropolis. Respondents note that the need to extend existing land for human settlement has led to the unrestrained reclamation of swamps in the state. This has disrupted the functioning of the erosion beds in the metropolis to the extent that there is an environmental crisis in terms of flooding across the space. The metropolis has lost most of its erosion beds to population explosion and uncontrolled expansion. This resonates with the poor drainage system in the state. This is such that at the sign of rains, flooding is expected across the state. The case of the destruction of biodiversity in Kwazulu Natal is close to that of Lagos. The need to feed the industries with primary products is affecting provincial biodiversity. Hence, land use is also the main cause of biodiversity in the province. Another cause of biodiversity loss is the rising temperature in the provincial hinterland that is degrading the land. Land degradation threatens the thriving of flora and fauna in Kwazulu Natal.

A critical dimension of the impact of climate change on Kwazulu Natal is drought. The province has a history of drought but that has intensified in recent years. This is another effect of rainfall variability as the seasons are being altered by increasing global temperature. Respondents recall the 2015/2016 drought in the province due to its far-reaching effects on many aspects of the lives of the people. Rural and smallholder farmers in the province were badly hit by the drought as their families were pushed further into poverty. This led to the drying up of many rivers that have not returned to shape as at the time this study was conducted. Figure 6.1 below shows a stream that dried up and is now been used for another purpose in kwaDlangzwa in the uThungulu District Municipality of Kwazulu Natal;

Figure 6.1 River that dried up in kwaDlangezwa that is now used for another purpose



Source: Researcher Fieldwork Report

Lagos State on the other hand has no recent history of drought, though rainfall variability has been recurring in recent years. Hence, drought is more prevalent in Kwazulu Natal than in Lagos State.

From the perspective of the citizens of Lagos State and Kwazulu Natal, their communities are reeling from the impacts of climate change. Findings from the study show that the locations are

vulnerable to climate change. Climate change impacts noted by citizens in Lagos are similar. These are floods, erosions, temperature rise, and drought. This agrees with climate change impacts noted by respondents of in-depth interviews in both locations. For the citizens, Lagos State and Kwazulu Natal are both at risk of climate change and given their experience of the environmental dynamics of their respective communities, they were unequivocal about their lived climate change experience. Their explanations of how climate change affects their communities and their residents show that Lagos State and Kwazulu Natal are identical in their climate change impacts outlook. This is because as coastal communities all the study locations in the two subnational units are affected by flooding. Representative excerpts from participants in one study location from Lagos and Kwazulu Natal reveal this as follows;

“When it rains here, there are always floods. The floods take over the roads when there is rain”

(Source: KZN FGD 2c, October 4, 2019, Kwazulu Natal)

“There are now storms even when the rain falls even for a short period. Our seasons are now facing disruptions because winters are now colder and summers are now hotter than they used to be”.

(Source: KZN FGD 1h, September 27, 2019, Kwazulu Natal)

The impacts of climate change have grown in recent years with sea-level rise leading to coastal flooding, shoreline erosion and coastal inundation. This means that in both subnational units, the incidence of poverty has been exacerbated by climate change. This has produced gory socio-economic outcomes in coastal communities, hence, the agreement in both places on the culpability of climate change as an exacerbator of the poverty situation in those communities. Coastal communities' living conditions in Lagos State present some of the worst scenarios of the poverty outcome of climate change. They are densely populated informal settlements with a lot of social and economic challenges (Ojakorotu & Olajide, 2018; Adenekan, 2021).

Findings from the study on the impacts of climate change in Lagos State and Kwazulu Natal agree with existing knowledge on climate change in the two study locations. On the risk of climate change in Lagos State, given the observed impacts in the state, vbv Elias & Omojola (2015) and Sojobi, Balogun & Salami (2016) note that climate change is biting hard across the state. This requires a response from stakeholders, given the development deficit that makes the impacts telling among the citizens. In the same vein, Ndlovu, Clulow, Savage, Nhamo, Magidi & Mabhaudhi

(2021) through the study of environmental data from 1968 and 2018 found that there are elements of climate change in Kwazulu Natal. They also call for adaptation response in the province. Lagos State and Kwazulu Natal are vulnerable to climate change risks which call for climate change response in the subnational political units in Nigeria and South Africa respectively.

RQ2: How effective are climate change policies and programmes of Lagos State and Kwazulu Natal Provincial governments in responding to climate change?

Findings from this study show that climate change response in Lagos State and Kwazulu Natal is problematic and therefore not effective. This is despite that the governments of Lagos State and Province of Kwazulu Natal note the vulnerability of their subnational political units to climate change and its impacts. This fact was well articulated by respondents from environmental institutions in both locations. The locations as coastal spaces predispose the largest number of their citizens to climate risks. It is therefore prudent for the two governments to set the modalities for climate change response in motion. The climate change response of the two locations involves policies, which are the climate action plans and programmes that are the specific targets to achieve climate action plans. Climate change mitigation and adaptation can be distilled from these two planks of response by the two subnational governments.

Climate change mitigation in Lagos State and Kwazulu Natal entails efforts by the government and other stakeholders to reduce greenhouse emissions within each entity respectively. The two locations are high emitters in Nigeria and South Africa respectively on account of the respective populations and industrial and commercial activities within them (Bola-Popoola, Fakinle & Odunlami, 2019; Hlahla, 2017). This is because of the nature and structure of their economies as national industrial hubs. This makes both political units harp on efforts geared towards ebbing the concentration of greenhouse gases in the atmosphere. The mitigation agenda of both units are shaped by their climate change response outlook. As leading voices in African climate change response, both countries have committed through their national and international climate change action plans and policies to reduce emissions within their territories. Lagos State and Kwazulu Natal as critical units within the two countries respectively are also keying into their mitigation efforts. Their climate change mitigation action plans and implementation are important to the achievement of national climate ambitions.

The two political units have made efforts as seen in the development of climate change mitigation action plans and policies. The thrust of their climate change mitigation efforts are identical as set out in their latest climate change response action plans; that is, the Lagos State Climate Change Action Plan (2020-2025) and KZN EDTEA Five Year Strategic Plan 2020-2025. The two action plans detail the mitigation targets that would help to reduce emissions in the Lagos metropolis and the Province of Kwazulu Natal. As a point of departure, emissions inventory upon which mitigation targets are based is unclear. This is especially the case of Kwazulu Natal whose emissions inventory is still being processed. In the case of Lagos State, it emits 26,443,656 tCO₂e of greenhouse gases into the atmosphere, making it arguably the highest subnational emitter in Nigeria (Lagos State Government, 2021). Hence, the main sectoral focus of climate change mitigation in Lagos includes energy, waste and transport while in the case of Kwazulu Natal, the sectoral focus of mitigation includes waste, energy, and agriculture. These sectoral choices were arrived at based on careful observation and analysis of the socio-economic dynamics and processes in the two locations.

The transition from fossil fuel-powered energy regime to renewables is the main anchor of climate change mitigation in Lagos and Kwazulu Natal. Both Nigeria and South Africa run their economies on fossil fuel respectively with the study locations as main economic nerve centres. This is why emissions from stationary energy are the largest contributors to the overall emissions of Lagos and Kwazulu Natal respectively (Lagos State Government, 2021; The carbon Footprint Project, 2021). The reasons for the large contributions of stationary energy to the emissions of the two locations differ remarkably. Emissions from the combustion of fossil fuel are because of the robust industrial and manufacturing sectors in Kwazulu Natal. This is powered by the burning of coal to run the economy without which the Province and South Africa would regress into energy deficit. On the obverse, stationary energy emissions are fueled by the massive energy deficit in the state and Nigeria in general. The state is reported to be in an energy deficit of 900MW, which means that citizens attempt to make up this deficit through unhealthy and environmentally unsustainable energy sources (Olurode, Isola & Adebisi, 2018). Hence, while the motivation for the adoption of renewable energy in Kwazulu is to diversify to energy sources that are environment-friendly and contribute low or no emissions into the atmosphere, Lagos State's motivation is to seek an expansion of its energy sources due to its energy deficit. For the latter, renewables serve two

purposes. The first is to shore up the energy deficit of the state and the second is to seek low carbon and other greenhouse gases emissions into the atmosphere.

In the waste sector, Lagos State and Kwazulu Natal are seeking to have plans to manage waste to ensure that environmental pollution is reduced to the barest minimum. In Lagos State, waste is the second-largest greenhouse gas emitting sector standing at 25% of the total emissions of the state. In the same vein, waste constitutes a considerable large amount of emission in Kwazulu Natal from both industrial and domestic sources. From the view of respondents and participants and the review of climate change action plans of Lagos State and Kwazulu Natal, it is apparent that both political units have problems with waste management. The inability to adopt or to fully operationalise the 3 Rs of ‘reduce, reuse and recycle’ in waste management hampered their ability to reduce emissions from waste (Akanle & Shittu, 2018; Khumalo, 2016). Lagos State has in addition to its waste management challenge wastewater management crisis. This arises largely as a result of the poor wastewater infrastructure in the state that allows waste to contaminate the soil and water sources in the metropolis. Wastewater is to a lesser extent a problem in Kwazulu Natal due to better infrastructure to deal with industrial waste and chemicals and better enforcement of environmental policies and legislation. The two political units note that improved waste and wastewater management would enhance their greenhouse gas emissions drive. This will aid air quality improvement and the general environmental viability of both locations.

Lagos State has a problematic transport reality. This stems from the poor public transport management system in the metropolis. In contrast, the transport sector constitutes a lesser source of emissions in Kwazulu Natal. While the volume of emissions from transport in the Province may not be known due to unavailable emissions inventory, the fact that it is not in the main sectoral focus on mitigation shows that emissions from transport are likely to be lower than that of Lagos, which is 20% of the total emissions in the state. Rather than transport, agriculture through land use is the third sectoral focus on mitigation in Kwazulu Natal. The Province has a vast forestry and agriculture sector which produces a significant volume of emissions, especially through sugarcane, livestock and manure production (Sithole, 2016). Hence, both political units attempt to address emissions in these sectors through wide-ranging and creative measures. This is aimed at ensuring that the transport sector of Lagos State is revamped through an increasingly low-carbon emitting inter-modal transport system while AFOLU emissions in Kwazulu Natal improved collaboration

between stakeholders in the sector by the enhancement of extension service on climate change and the dangers emissions from the sector portend for the overall development of the Province.

Lagos State and Kwazulu Natal also respond to climate change through many adaptation policies and strategies such as the Lagos State Adaptation Policy 2012-2014 and the Kwazulu Natal Environmental Management Strategic Plan 2014-2019. The aim of this is to ensure that citizens do not face the full brunt of the impacts of climate change. As a result of their large coastal populations that are vulnerable to the impacts of climate, the two subnational political units see climate change adaptation as a critical part of climate change response. In the view of respondents and participants, Lagos State and Kwazulu Natal have climate change adaptation policies and programmes aimed at ensuring that the people live with impacts of climate change such that it has little or no effect on the people. Relying on the perspectives of respondents of in-depth interviews, some observations are made from the adaptation of Lagos State and Kwazulu Natal.

To start with, Lagos State and Kwazulu Natal have anticipatory and planned adaptation outlooks as seen in their latest climate change response action plans and strategies. Despite this, the climate change response outlook of Lagos State is staked in favour of mitigation than adaptation. On the other hand, Kwazulu Natal's climate change response has more balanced attention on mitigation and adaptation than Lagos State. A critical review of the Lagos State Climate Change Action Plan (2020-2025) and KZN EDTEA Five Year Strategic Plan 2020-2025 shows that while Lagos State looks towards mitigation more than adaptation while the latter has them in almost equal measures. This situation stems from two factors regarding Lagos State's mitigative preference in climate change response. First, the nature and character of social policy in Nigeria, of which the State is a principal unit. The state has a poor social policy outlook, which means, investing in the citizens an arduous task. Hence, climate change adaptation as the people aspect of climate change response is weak compared to Kwazulu Natal which benefits from South Africa's comprehensive social policy and social investment outlook. Second, in Lagos State and Nigeria at large, mitigation is seen as the more relevant aspect of climate change response to its development mandate. Therefore, climate change adaptation is more tenuous in Lagos State than in Kwazulu Natal.

In terms of the methodology of climate change adaptation, both Lagos State and Kwazulu Natal rely comprehensively on adaptation methods such as ecosystem-based adaptation, disaster risk management and community-based adaptation. In their adaptation plans and strategies, both

subnational governments aim to ensure creative methods of ensuring that their citizens are cushioned from the debilitating effects of climate change. Adopting ecosystem-based adaptation would spur urban greening, which can boost food security in both locations. In the case of Lagos State, urban greening will make up for the non-availability of land for agricultural purposes. This will also be complemented with the tree planting exercise the state is already embarking on to ensure that that flooding and erosion are controlled in the state. This is the same for Kwazulu Natal that is attempting to ensure that its urban centres such as Durban and other places adopt urban greening. In the same vein, the province is also into wetlands rehabilitation which can boost the provincial water regime that has been problematic due to intermittent droughts.

Flooding is by far the biggest climate change risk facing Lagos State and Kwazulu Natal. This is because, in the past few years, the incidence and magnitude of flooding have become a major source of worry for the governments of the two subnational governments as the situation has led to wanton socio-economic crisis (Adelekan, 2016; Ndlovu, Clulow, Savage, Nhamo, Magidi & Mabhuadhi, 2021). The governments of the two subnational governments, therefore, hold qualitative and comprehensive disaster management systems as the core of climate change adaptation. The two subnational units harp on improving early warning systems that will ensure that the people have adequate information on what to do in anticipation of flooding, erosion, and inundations. Lagos harps more on need for drainage infrastructure than Kwazulu Natal as a component of disaster management. The government believes that this will help reduce damage and loss as a result of the increasing rate of flooding in the state. Kwazulu Natal on the other hand wants to reduce response time. This is a critical aspect of adaptation as it reckons that the reduction of disaster response time would increase its ability to reduce loss and damage arising from flash floods that may arise in the future.

Community-based adaptation is the method of adapting to climate change in a way that ensures inclusion and the needs of all segments of the community are reflected in adaptation actions and policies. Climate change adaptation takes this stance so that community-specific vulnerabilities are made bare and actions are taken to address them. The two case studies demonstrate that community-based adaptation spurs the adaptive capacity of the people. They encourage community-specific adaptation strategies that emerge from the participation of the people. This means that local knowledge is to be applied in adapting to climate change across the two locations.

Coastal communities in Lagos State and Kwazulu Natal are encouraged to be part of adaptation planning and implementation. The case of Kwazulu Natal with many rural coastal communities resonate in this wise and the encouragement of IKS across the Province demonstrates a determination to see the people understanding their vulnerabilities and proffering solutions to them.

While Lagos State and Kwazulu Natal are engaged in climate change policies and programmes along the planks of mitigation and adaptation as discussed in the foregoing, these policies and programmes have not yielded the right results. In the estimation of the respondents, both Lagos State and Kwazulu Natal have not performed outstandingly in climate change response. Respondents rated the climate change policies and programmes of Lagos State and Kwazulu Natal 5 and 6 respectively on a scale of 1-10. In the two locations, government-inclined respondents rated climate change policies and programmes on an average of 7 respectively. Among non-government-inclined respondents, the policies and programmes are rated 5 and 6 respectively. This is not surprising because climate change policies and programmes in the two locations exist mostly on the pages of the action plans and strategic documents of governments in the two locations. Hence, it can be said that climate change in the two locations is strong on paper but weak in implementation as government-inclined respondents reacted to study posers based on the climate change action plans while non-government-inclined respondents reacted based on the observed level of implementation of the action plans.

As beneficiaries of climate change policies and programmes, the people of Lagos State and Kwazulu Natal rated climate change policies and programmes poor. Participants of FGDs rated the policies and programmes in the two locations 6 on a scale of 1-10 respectively. Participants in the two locations hold that climate change policies and programmes are not effective. Respondents in both locations agreed that the coastal communities are not considered in climate change policies and programmes planning in Lagos State and Kwazulu Natal. Participants agree that both subnational governments respond to feedback on climate change policy but while they may appear well-planned on paper, in terms of implementation and carrying the people along in the policy planning process, they are not effective.

The foregoing analysis of this study shows that climate change response in Lagos State and Kwazulu Natal is guilty of climate change pamphleteering. This is because the two subnational

political units have moved from one ambitious climate change action plan and policy to the other without much success in implementation. The findings agree with existing knowledge on the effectiveness of climate change policies and programmes in the two locations. In the case of Lagos State, Elias & Omojola (2015) note that despite the vulnerability of the state to climate change, the response has been haphazard and unorganized. The state has failed largely to achieve its ambitious mitigation and adaptation action plans and strategies. In the same vein, Elias (2018) notes that climate change communication is not effective and this has made climate change adaptation problematic in the state. In the case of Kwazulu Natal, findings on adaptation align with Zwane & Mthembu (2017) who hold that climate change adaptation in terms of governmental drought relief for large scale cattle farmers is not effective. Generally, the finding did not find direct alignment with existing knowledge at the provincial level.

RQ3: What challenges do intergovernmental relations, environmental institutions and finance pose to climate change responses in Lagos State and Kwazulu Natal Province?

Research Question 3 deals with the comparative analysis of the political determinants and challenges of climate change response in Lagos State and Kwazulu Natal. The question is answered by analysing the challenges posed by intergovernmental relations, institutions and finance to climate change response in Lagos State and Kwazulu Natal respectively as follows;

i. Intergovernmental Relations

Intergovernmental relations are the platform for the planning, coordination and implementation of climate change response. Governing climate change requires the interactions and relations between levels of government. Environmental issues are complex issues that often require the attention of many stakeholders including that of governments at all levels, irrespective of the system or form of governance. Intergovernmental relations, though initially a federal practice, has become an alluring process of governance in unitary systems (Philimore, 2013). While Nigeria is a federation of thirty-six States and a Federal Capital Territory, South Africa is a unitary state of 9 provinces with federal features. It is therefore apposite that climate change response in Lagos State and Kwazulu is being interrogated through the prism of intergovernmental relations. This is because the possibility and effectiveness of the climate change response of the two subnational units bear the imprint of the intergovernmental relations outlook of Nigeria and South Africa respectively.

There is a strategic linkage between climate change and intergovernmental relations. As defined by Mentzel & Fick (1996:100) that intergovernmental relations is “a mechanism for multi and bi-lateral, formal and informal, multi-sectoral and sectoral, legislative, executive and administrative interaction entailing joint decision-making, consultation, co-ordination, implementation and advice between tiers of government at vertical as well as horizontal levels and touching on every sphere of governmental activities”, its relevance to climate change response remains critical to the achievement of global and national climate ambitions. Climate change response dwells on on robust, rancor-free and cooperative intergovernmental relations as the hub around which the governmental process revolves between levels of government.

Respondents note that intergovernmental relations affect climate change response in Lagos State and Kwazulu Natal respectively. Respondents note that climate change and other environmental policies and programmes in the two locations are shaped by the relations between the central governments and them. As a development problem, climate change response is a shared responsibility between levels of government. Therefore, the nature and character of the intergovernmental relations in Nigeria and South Africa determine the nature of climate change policies and programmes, either in mitigation or adaptation. Constitutionally, climate change falls within the environmental mandate of the state in Nigeria and South Africa. As a matter of constitutional policy outlook, matters on the environment form part of the rights enshrined in the constitutions of both countries.

In terms of functional allocation, environmental matters are more centralised in Nigeria than in South Africa. This means that Kwazulu Natal has more constitutional leeway for environmental and climate change action than Lagos State. Environmental policy and planning as an aspect of Fundamental Objectives and Directive Principles of State Policy in Nigeria is a matter that is non-justiciable; that is, the Federal Government cannot be taken into legal account on such matters (Ikpeze, 2015). Also, the functional allocation that is relevant to climate change response such as meteorology, mining, and waterways management, among others are exclusive of the Federal Government of Nigeria. Obversely, in the Constitution of the Republic of South, environmental rights are a critical aspect of the Bill of Rights and are justiciable (Mubangizi, 2006). The intergovernmental relations basis of climate change response of Lagos State and Kwazulu Natal is built on the foregoing.

The functional allocation on environmental matters, inclusive of climate change response in Lagos is largely residual. While states can have their environmental policies, intergovernmental relations on the environment and climate change remain hazy. In the case of Kwazulu Natal, as in other areas of governance, environmental matters, including climate change is based on the cooperative governance outlook of the Republic of South Africa. In contrast to the intergovernmental relations outlook of Lagos State Nigeria, which leaves the state with limited powers and scope on environmental issues, the National Government of South Africa is the main policy and regulation outlook while the provincial government is responsible for the coordination of the local governments that are charged with the implementation of climate change actions plans and strategies. Kwazulu Natal refer to national legislation, policies and strategies that are related to each of its climate change response efforts. This suggests robust intergovernmental relations between the provincial government of Kwazulu Natal and the national government of South Africa. For example, the strategic goal on environmental sustainability in the 2030 Provincial Growth and Development Plan flows from the National Climate Change Response White Paper (2011), National Communications reports under the UNFCCC, the national Greenhouse Gas inventory project and the Long Term Mitigation Scenarios (LTMS) study (KZN Provincial Planning Commission, 2014).

Respondents reckon that there is a cordial intergovernmental relation between Lagos State and Kwazulu Natal and their respective national governments on climate change. In the former, the interaction comes from the need to have its input in the national policy-making process. For example, Lagos State featured in the making of Nigeria's Nationally Determined Contributions in the areas of mitigation and adaptation. This was much attested to by participants. Much of these relations are at the institutional level such as the relations between the Federal Ministry of Environment and the Lagos State Ministry of Environment. In the same vein, there are robust intergovernmental relations between the National Government and the Province on climate change response. The Province, along with other provinces in the country participated in the making of the Nationally Determined Contribution of South Africa. In terms of climate change response projects, the cordial intergovernmental relations between the two levels of government.

Generally, intergovernmental relations influence or are likely to influence the climate change response of Kwazulu Natal more positively than that of Lagos State. This is covered in the view

of some non-governmental respondents in Lagos State note that while there may be some cordial intergovernmental relations between the Federal Government and the state, the general outlook of intergovernmental relations is not good enough. They refer to the centrifugal political process of Nigeria as the reason why intergovernmental relations may affect climate change response in Lagos State. In contrast, Kwazulu Natal approach the climate change challenge from the constitutional standpoint that discourages functional or fiscal feud between levels of government. The difference between the two locations lies in factors that are shaping intergovernmental relations in Nigeria and South Africa. The demographic and historical, social and cultural, historical, constitutional/institutional, political and circumstantial factors shaping intergovernmental relations in Nigeria and South Africa make climate change response in Lagos State and Kwazulu Natal almost diametrically opposite of each other (Cameron, 2001).

As part of the vertical relations between levels of government on climate change response in Lagos and Kwazulu Natal, state-local and province-local relations are notably part of the process and this also differs between the two locations. Province-local relations in terms of climate change response is more apparent in Kwazulu Natal than in Lagos State. In South Africa, when provincial climate change response is mentioned, the activities of municipalities in the climate change sphere is being mentioned. This is because there is a lot of policy and programmatic space for Municipalities and District Municipalities to act. In the case of Lagos State, while local governments are important drivers of state and federal policies, they are not apparent in climate change. District Municipalities in Kwazulu Natal have climate change action plans by which they intend to implement policies and programmes by the national and provincial governments (South African Local Government Association, 2017). The sterling performance of the eThekweni Metropolitan Municipality points to the robust national-provincial-state relations on climate change in Kwazulu Natal. Very scant efforts have been made to mainstream local governments into the climate change response orbit in Lagos State. While the Lagos State Climate Change Adaptation Strategy of 2012 notes that local governments are relevant actors in climate change response, the Lagos State Climate Action Plan (2020-2025) did not give any role to that level of government.

Respondents in Lagos State and Kwazulu Natal respectively note the importance of cordial and cooperative intergovernmental relations on climate change response. In Kwazulu Natal, there has hardly been any instance of an intergovernmental faceoff between levels of government while in

Lagos State, participants were quick to point to the instance of the 2014 Ecological Fund feud between the Federal Government and State governments that were deemed ‘unfriendly’ to the former. Lagos and other highly vulnerable states were affected by this development. Participants linked this to climate change response as nothing is spared in political disputes among the political class in the country. Hence, in the view of the people compared, Lagos State is more likely to be negatively affected by intergovernmental relations than Kwazulu Natal.

Among the respondents of qualitative sampling, the impact of intergovernmental relations on climate change response is affirmed. Comparatively, participants note that intergovernmental relations affect climate change response in Kwazulu Natal more than in Lagos State. They also maintain that intergovernmental frictions affect climate change response in Kwazulu Natal more than in Lagos State and, in the same vein, posit that there is more over-centralisation of intergovernmental relations in Kwazulu Natal than in Lagos State. It is apposite to state that intergovernmental relations are likely to affect Kwazulu Natal positively rather than negatively, given the constitutional guarantee of cooperative governance in South Africa. Secondly, the history of intergovernmental friction on the environment in Nigeria demonstrates that intergovernmental relations are not likely to be more pronounced in Kwazulu Natal than in Lagos State. The Constitution of the Republic of South Africa guarantees the absence of intergovernmental frictions between levels of government. Lastly, climate change response in South Africa cannot be said to be over-centralised concerning Kwazulu Natal. There is functional recognition for each level of government with the national as the purveyor of policies and regulations, the province as the coordinating level of government and the Districts are saddled with the implementation of climate change response action plans and strategies. In contrast, environmental functional allocation is more haphazard in Nigeria regarding climate change response in Lagos State.

ii. Climate Finance

Climate finance is an important factor in climate change response in Lagos State and Kwazulu Natal respectively. The ability of subnational governments to achieve climate change response targets depends on the availability of adequate finance for such. This is because climate change response requires huge capital outlay into both mitigation and adaptation. For many developing countries, climate change response requires a near-complete overhaul of their economic structures

to ensure that their development follows a clean path and that their citizens are well-placed to live the impacts of climate change with minimal consequences. In the case of subnational governments, the availability of adequate resources to finance climate change response will help national governments to fulfil local and international commitments and targets.

Lagos State and Kwazulu Natal have similar sources of climate finance. The two subnational governments depend on finance from external and internal sources. Externally, they leverage finance from multilateral and bilateral sources. Watson & Schalatek (2021) notes that there are twenty-three multilateral and eight bilateral sources as at the end of 2020. Many of these funds are domiciled within the UNFCCC structure covering response areas such as mitigation, adaptation, Reducing Emissions through Deforestation and Forest Degradation (REDD) and general environmental purposes. Subnational governments, including cities, also draw a considerable part of their finance from subnational multilateral organisations such as 100 Resilient Cities (100RC) and C40 Cities. Internally, climate finance comes from national fiscal transfers, subnational budgeting, public-private partnerships (PPPs), loans and grants, among other local sources.

In terms of the ability of Lagos State and Kwazulu Natal to draw external climate finance, the two locations differ considerably in their history and ability to draw international climate finance. The ability of the two subnational political units to draw international climate finance rests largely on their national governments' performance in that regard. This is because subnational climate change response is a fraction of a national government's response. Hence, Lagos State and Kwazulu Natal are as good as the ability of Nigeria and South Africa respectively to leverage the funds. In this regard, South Africa has fared better than Nigeria in leveraging international climate finance, hence, the better standing of Kwazulu Natal than Lagos State in subnational international climate finance.

Kwazulu Natal has received international climate finance through the efforts of the national government of South Africa in leveraging multilateral and bilateral funds. Respondents cited examples of the bilateral relations between the national governments of South Africa and Germany that led to the securing of funds for the development of provincial climate change strategies in the former, with Kwazulu Natal as beneficiary. In the case of Lagos State, its efforts at getting international climate finance are just developing. An example of this is the coastal resilience programme in collaboration with the UNDP which is to be funded by GEF in the State which is

still at the pre-concept level. Therefore, it has not been able to leverage climate multilateral and bilateral climate finance in the shape of South Africa's National Government's relations with the Federal Government of Germany. The performance of Nigeria and South Africa in international climate finance is brought into a clearer perspective by the fact that the former could only leverage \$63million compared to the latter's \$488million from multilateral sources (Olajide, Tshidzumba & Ojakorotu, 2020). Hence, Kwazulu Natal stands a better chance to leverage climate finance than Lagos State based on the ability of their respective national governments to leverage the funds.

In terms of multilateral subnational climate finance outlets for Lagos State and Kwazulu Natal, they have both gained support and funding from subnational climate change groups. The two subnational political units are members of 100 Resilient Cities (100RC), The Climate Group and C40 Cities, among other international subnational climate change organisations. Lagos State has benefitted from C40 Cities in two renewable energy projects recently. In the case of Kwazulu Natal, it has benefitted from The Climate Group and C40 Cities on adaptation, renewable energy, and waste management. In both locations, it is apparent that international subnational climate finance offers better chances of leveraging climate finance than other sources. This is because, for example, Kwazulu Natal has been able to leverage climate finance through this source than through the UNFCCC structure or the national government's network for bilateral finance.

Lagos State and Kwazulu Natal also draw climate finance from domestic sources. This is, however, problematic in both locations. This is because the domestic source of climate finance is acutely limited due to the constrained capacity of both governments to raise finance. The main source of domestic climate finance in the two locations is through subnational budgets. The budgetary process in the location is impacted by local dynamics based on the need to vote capital equitably among competing sectors. Hence, environmental issues, including climate change does not enjoy the requisite budgetary attention they deserve. In Lagos State, the structure of the economy and the nature and character of the budgetary process means that recurrent expenditure is more than or almost equal to capital expenditure. For an example of the State's 2019 budget, N873.53bn budget, N393.84bn representing 45% of it was dedicated to recurrent expenditure (Budgit, 2019). The implication of this is that there are fewer funds to address projects that are relevant to climate change response in the State.

Kwazulu Natal has a budgetary system similar to Lagos State's, though the outlook is better appreciated through its departmental allocation outlook within which recurrent and capital expenditures are determined. In the EDTEA for example, of the R3,009,296,000 departmental budget, the cost of Administration, which also covers the recurrent expenditure of the Department, was 271,110,000. This represents 9% of the Department's total budget in the 2018/2019 fiscal year. The import of this is further brought into perspective given that the vote for Environmental Management was R 1,009,677, which was 34% of the Department's annual budget (KZN EDTEA, 2018). This means Environmental Management received the highest fiscal attention of the sub-units in EDTEA. In terms of functional allocation in the budgetary processes of Lagos State and Kwazulu Natal, the former has an unhealthy recurrent and capital expenditure parity of N23.289bn, which is 50% of the N46.740 allocation on environmental protection in the state (Lagos State Government, 2019). When the two locations are compared, it means that Kwazulu Natal has more domestic resources for climate change programmes and projects than Lagos State.

Taken together, climate finance is a problematique in the climate change response of Lagos State and Kwazulu Natal. Despite the array of climate finance sources at the disposal of the two subnational governments, the amount of funds they can leverage is not enough to address their vulnerabilities. In both locations, there is a palpable lack of funds to complete the large volume of climate change response projects. The receipt of international climate finance is fraught with technical and methodological barriers that have largely prevented African countries, including Nigeria and South Africa from leveraging the funds. Hence, their subnational governments are affected by this development as they are as good as their national government's ability to draw the funds. Due to the good standing of South Africa in international climate finance, international climate change finance accrues to the provinces, departments and municipal governments directly, including Kwazulu Natal and its institutions (Montmasson-Clair, 2013). The case of Lagos State stands in contrast to this. Due to the unencouraging performance of Nigeria in international climate finance, that state finds it hard to leverage funds for its projects.

Adequate and timely leveraging of climate finance from international and domestic sources stands them in good stead for effective climate change response. In the FGDs from both locations, participants reckon that climate finance is inadequate and this affects the programmes and policies that are meant to help their communities adapt to climate change. In Lagos State, the inadequacy

of climate finance is culpable for the inability of the state to build infrastructure that would reduce their vulnerability to floods and inundation. In Kwazulu Natal, the inadequacy of climate finance, the many laudable projects proposed by the Province would not be implemented. In agriculture for example, which has a lot of valuable mitigation and adaptation projects, the inability of the Province to raise funds means that the various strategies aimed at reducing emissions from the sector will not materialise. The general implications of inadequate climate finance in Lagos State and Kwazulu Natal are the inability to implement climate change policies and programmes leading to the expiration of the targets and worsening their vulnerability to the impacts of climate change.

iii. Environmental Institutions

Lagos State and Kwazulu Natal have developed institutions to respond to climate change. The importance of these institutions in the achievement of climate change policies and programme targets cannot be over-emphasised. Institutions are the main vehicles for the implementation of these policies and programmes to ensure resilience. The interest in environmental institutions in Lagos State and Kwazulu Natal resonates because subnational or local institutions provide the homoeostasis for climate change response in that they determine societal vulnerability to climate change and propose the measures of response to the threat posed by it. They also determine the roles of different actors in climate change response. Their activities are not a one-off thing, they are a continuous set of activities that are measured and adjusted as may be necessary for the day to day response to climate change in the two locations. This is much noted in their climate action plans and strategies (Lagos State Government, 2021; KZN EDTEA, 2014).

The Ministry of Environment is the main and coordinating environmental institution in Lagos State. The Ministry coordinates its nine units that work as a collective to address the various environmental challenges facing the state, including climate change. These units include Lagos State Environmental Protection Agency (LASEPA), Lagos State Waste Management Agency (LAWMA), Lagos Water Corporation (LWC), Lagos State Park and Gardens Agency (LASPARK), Kick Against Indiscipline (KAI), Lagos State Waste Water Management Office (LASWMO), Lagos State Water Regulatory Commission (LSWRC), Lagos State Environmental Sanitation Corps (LAGESC) and the Public Utility Monitoring and Assurance Unit (PUMAU). In Kwazulu Natal, the Department of Economic Development, Tourism and Environmental Affairs (EDTEA) is the provincial environmental institution. Unlike the Lagos State Ministry of

Environment, the Environmental Affairs unit is under the umbrella of EDTEA with other units, which are Economic Development and Tourism.

The two locations are similar in their relative unpopularity among the people. While the Ministry of Environment and a few of its units are known in Lagos, the vast majority of the institution is unknown to the people. LAWMA is the most popular of the Ministry's units because of the day to day daily interaction with the populace in waste management. PUMAU is the least popular as none of the respondents of in-depth interviews and participants of the FGDs mentioned it. In the same vein, EDTEA is well-known among the people in Kwazulu Natal. It is, however, the environmental activities of the institution that are less known among the respondents and participants. The unpopularity of the environmental Affairs unit of the EDTEA is registered by the fact that many of the respondents, including those of CSOs, had very little to say about the activities of the unit. The import of this is that the relations between the institution and society on environmental issue, including climate change, is weak. The silent nature of the functioning of the institutions means that the people are not carried along in their climate change and sundry environmental functions which is against the position of the Department for International Development (2010), which note that the social groups are an integral part of the functioning of state institutions. The weakness of institution-society relations on climate change is a core reason why climate change response is ineffective in Lagos State and Kwazulu Natal.

The institutionalisation of climate change and climate change response is weak in Lagos State and Kwazulu Natal. This is because the idea of environmental institutions is restricted in the two locations, given the multi-sectoral nature of vulnerability and the requisite response to it. In both places, the idea of environmental institutions is restricted to the Ministry of Environment and EDTEA, leaving out many institutions whose functions are central to effective climate change response. In Lagos State, important institutions like the Ministries of Transportation, Health, Housing, Science and Technology, Water Infrastructure Development, Work and Infrastructure, Energy and Mineral Resources, Agriculture, Wealth Creation and Development, Physical Planning and Urban Development and the Lands Bureau have very little climate change responsibility despite their relevance to achieving climate resilience in the state.

In the case of Kwazulu Natal, Departments of Agriculture and Rural Development, Human Settlement, Co-operative Governance and Traditional Affairs (COGTA), Public Works, Social

Development, Transport and Community Safety and Liaison have limited climate change activities despite their relevance to achieving climate resilience in the Province too. It is quite interesting that despite the strong stance of the two governments on effective climate change response, their inability to achieve the proper scaling of the threat facing them through wholesome institutionalisation is palpable. This stands in the way of efficient sectoral data gathering and management to plan mitigation and adaptation in the two places. This results in the poor scaling of climate risks and the necessary wide-ranging institutional support for building resilience. This has effects on developing reliable emissions inventory and having the requisite mitigation strategies in place. On adaptation, for example, not incorporating social development institutions has the effect of poor envisioning of climate change as a social problem. This affects the inability to develop the right social adaptation inputs in the two places.

Arising from the foregoing is the institutional coordination challenge in the two locations. In Lagos State, the poor institutional coordination was palpable as the state does not have a coordinating body in the form Climate Council. This is much noted in the State's Climate Action Plan (2020-2025) as such, a council is still being proposed (Lagos State Government, 2021). Kwazulu Natal attempts to achieve institutional coordination on climate change through the establishment of the Climate Change and Sustainable Development Council, which is a body that has the provincial Premier and all Members of the Executive Council (MECs). It also has the Provincial Committee for Environmental Coordination (PCEC) in which the EDTEA and environmentally relevant institutions are represented. Despite the existence of these bodies in the Province, climate change institutional coordination is weak. The bodies are largely ad hoc and more impact-based than vulnerability-based.

The import of this is that climate change response is haphazard and have poor sectoral representation. It is noted in the successive climate change response action plans and strategies that some sectors are not adequately covered. For example, in the KZN Environmental Management Strategic Plan 2014/2019 and KZN EDTEA Five Year Strategic Plan 2020-2025, the necessity of inter-institutional synergy, which is ongoing and unceasing was glossed over. Rather, it is much of the celebration of the ad hoc nature of coordinating bodies. In the case of Lagos, poor institutional coordination is the main reason for the weak climate change adaptation outlook of climate change response in the state. The state lacks the necessary data to develop a comprehensive

and implementable adaptation action plan due to the poor climate change outlook of many of the state's institutions. In all, Kwazulu Natal is better placed in institutional coordination for climate change than Lagos State because of the latter's lack of a coordinating council for climate change.

The effectiveness of institutions is a function of their capacity. In this wise, environmental institutions in Lagos State and Kwazulu Natal lack capacity in terms of shortage of manpower. This is a fallout of the lack of the scaling and coordination conundrum facing environmental institutions in the two locations. While the Lagos State Ministry and Environment and its units appear to be well-manned, the absence of climate change units/desks across other climate change-relevant institutions speaks to the shortage of staff with climate change knowledge and skills to drive the multi-sectoral and multi-stakeholder quest of climate change response in the state. The case of Kwazulu Natal is worse than that of Lagos State. The Environmental Affairs section of EDTEA is poorly manned. At the same time, there are no officials that are knowledgeable in climate change across climate change-relevant institutions in the Province. The ad hoc nature of institutional coordination in the Province is shown in the existence of staff of other institutions who are seldom briefed to undertake climate change or climate change-relevant tasks. Because these are secondary tasks, many of such tasks are delayed or not adequately carried out. The lack of capacity issue in Kwazulu Natal derives from the shortage of resources to set up fully-fledged climate change units across institutions in the Province.

6.3 Synopsis of Climate Change Response in Lagos and Kwazulu Natal

6.3.1 Nigeria and South Africa in Global Environmental Governance: The Multilevel Governance Approach

Nigeria and South Africa are the leading economies in the African continent and two of the leading members of the African Group of Negotiators within the UNFCCC framework. While they are located in a continent that is historically the lowest emitter of carbon, they are arguably the two largest emitters in the continent. The two countries are active participants in Global Environmental Governance with their membership of several multilateral and bilateral forums on climate change. Given their vulnerabilities to the impacts of climate change and the utility of Global Environmental Governance to aid their development quest, two leaders of Africa have been members of the UNFCCC since inception following the Earth Conference in Rio de Janeiro in 1992. The two countries are signatories to important Global Environmental Governance protocols such as the

Kyoto Protocol and the Paris Agreement (Olajide, 2022). Like other African countries, Nigeria and South Africa have demonstrated tremendous faith in the global climate governance processes.

The import of Global Environmental Governance is to develop the measures for climate change response such as mitigation, adaptation and finance. In terms of mitigation, the processes of GEG has been directed to reduce emissions to ensure that global warming is limited to below 2°C and not surpass 1.5°C above pre-industrial levels by 2050 (Gao, Gao & Zhang, 2017). Global Environmental Governance also entails that while the quest for reduction of global warming is forging ahead, on the one hand, the efforts to cushion the impacts of the resultant climate change is undertaken on the other hand through adaptation. It has been affirmed at successive Conferences of Parties to the UNFCCC to pursue climate change mitigation without adaptation would thrust the world into further social, economic, environmental and political crises (Ayers & Huq, 2009; Parker-Flynn, 2014). The two streams of climate change response are predicated on the availability and access to climate finance which has been agreed should come from the historically high-emitting, developed nations to developing nations (Roberts, Stadelmann & Huq, 2010; Sayegh, 2018). Hence, Nigeria and South Africa are a part of this global structure to ensure that their contributions to global warming through emissions are controlled and reduced and that their citizens can live with little or no disruption to their lives and livelihoods by the impacts of climate change. Furthermore, the two countries also attempt to leverage climate financial and technological transfers in order to ensure quality mitigation of global warming and adaptation.

The process of climate change response at the global level involves the transposition of global climate mandates into country-specific actions in mitigation and adaptation. This has developed by the way of national climate change response policies, actions plans and strategies across the world. Countries have domesticated global climate mandates and mainstreamed them into their development plans as climate change has the potential to derail the development capacity of nations. In the case of Nigeria and South Africa, they have responded to and domesticated international climate mandates through their national climate change policies. For example, Nigeria developed the National Policy on Climate Change and Response Strategy (NPCC-RS) while South Africa developed National Climate Change Response Policy White Paper (NCCRWP). Furthermore, in response to the mandate of the Paris Agreement to the depositing of country-specific contributions to global climate change response mandate, both countries

deposited their Nationally Determined Contributions (NDCs) to the UNFCCC in 2015 (Olajide, Tshidzumba & Ojakorotu, 2020). They have also submitted the updated versions of their NDCs in 2021 in line with the five-year review and update quest of the Paris Agreement.

As a development conundrum, climate change requires the concerted efforts of a broad spectrum of actors from beyond and within countries. At the political level, climate change response is a shared concern between different levels of government. The often gory impacts of the menace mean that governments have to collaborate to ensure effective climate change response. In response to this need, countries have adopted multi-level governance to ensure that all levels of government not only contribute to climate change response but also that the contributions are done in a coordinated and cooperative manner (Capizzi, Castro, Gonzalez, Kehew, Linderman, Lizarazo... & van Staden, 2017). This means that subnational governments have important roles to play in climate change response. The roles of cities and other subnational entities in ensuring effective mitigation and adaptation to climate change is noted in literature. Generally, the policy outlook of a nation is a combination of the policy outlooks of their subnational governments.

Multilevel governance outlook of climate change response reckons that climate change as an international crisis is addressed as a ‘collection of national and subnational responses’. Flowing from the regime building of Global Environmental Governance through the instrumentalities and structures of the UNFCCC, state parties are encouraged to defer to the technical multilateral platforms of the United Nations and later regional groupings. As members of these multilateral gatherings of states, states invest their capacities to individually respond to climate change in the supranational bodies. As an outgrowth of globalisation, Global Environmental Governance takes root from Mitrany’s functionalist theory of international relations (Olajide, 2022). With this, the UNFCCC and other multilateral climate regimes coordinate state responses to climate change through its Conferences of Parties. State parties’ direction in climate change response is shaped by the system. On the other hand, states parties are encouraged to incorporate their subnational units into their climate change response structure. This is because climate change response is an embedded set of actions that straddles political, economic and jurisdictional boundaries and contexts (Chu, Hughes & Mason, 2018). Hence, multilateral governance is an allure in climate change response.

Generally, cities and subnational units have been recognised as the centres of subnational climate action since the inception of the Global Environmental Governance at the Earth Conference in Rio de Janeiro in 1992. Before then, the Brundtland Commission in its Report had reckoned that cities are faced with diverse environmental challenges in one of its chapters (Climate Policy Watcher, 2021). Hence, cities, local governments, regions, states and other forms of subnational governments are recognised in the international climate change regime. The understanding of local environmental and climate dynamics forms the bedrock of climate change response. Hence, while states are the main actors in the international climate regime, the role and place of subnational units must be reserved and guaranteed. The Paris Agreement, the latest international climate instrument notes that subnational governments have important roles to play in climate action. In line with the idea of failure of governance due to over-centralisation, reserving roles for subnational governments has the benefits of not just having local realities and dynamics registered in climate action, it helps in its implementation and achievement of targets.

Nigeria and South Africa defer to the UNFCCC and other regional climate regimes by signing successive Global Environmental Governance protocols and agreements. The countries are signatories to the Kyoto Protocol and the Paris Agreement both of which are dependent on the active participation of subnational governments in their implementation (Koehn, 2008; Duggan, 2019). It is of note that the largest subnational economies in Africa are located in the two countries. The import of this is that these cities/subnational units are also the largest subnational emitters on the continent. The case of Lagos having higher emissions per capita than cities like Accra, Dar Es Salaam and Addis Ababa gives a fair idea of the relationship between the size of subnational economies and levels of emissions (Lagos State Government, 2021). It is, therefore, necessary that Nigeria and South Africa cooperate with their subnational governments in climate action to reduce emissions and ensure effective adaptation within the two countries.

Despite Nigeria's active role within the international climate regime, the necessary multilevel governance for effective climate change response is weak in the country. This is because of the centralised nature of the country's federal practice. While it is true that there are instances of cooperation between the Federal Government of Nigeria and the states, multilevel governance is made tenuous by the constitutional issues surrounding many of the issues that are relevant to climate change in the country. As a matter in the Exclusive List of the 1999 Constitution as

Amended, the environment and many of the matters that are proximate to it such as water, waterways, mining, energy and electricity and meteorology, among others fall within the functional exclusivity of the Federal Government. Matters that fall within the Concurrent Legislative List in the Constitution are muddled up in contradictions. In the case of electricity generation, the Constitution empowers states to generate electricity in areas that are off the national grid but the Electric Power Sector Reform Act of 2005 takes the power from them by stating that electricity generated from renewable energy must be done through the Rural Electrification Agency (Oke, 2017).

Another point that points to the near inoperability of multilevel governance in climate change response in Nigeria can be seen from the constitutional exclusion of states from mining activities in the country. This is to the extent that states are powerless in addressing the environmental problems arising from resource exploration in the country. The absence of multilevel governance arguably accounts for the loss of legitimacy of the Nigerian state in the Niger Delta region which was for years bedevilled by youth restiveness and militancy. Osaghae (1998) and Anifowose (2011) note that the concentration of mining powers in the hands of the Federal Government led to iron hand response by the state to agitations against the environmental damage by oil and gas exploration of the multinational oil corporations. When climate change is added to the gory environmental outcomes in the Niger Delta and the weakness of the states to join the Federal Government in revamping the environment, multilevel governance in climate change response is brought into proper perspective.

South Africa in contradistinction to Nigeria has a better multilevel climate response profile. From the South African constitutional standpoint, the possibility of multilevel governance in climate change response is feasible and high. Though a unitary state with many federal features in terms of the functional and fiscal autonomy with which to take climate action, the country has as a result of the constitutional philosophy that encourages cooperation between levels of governance achieved gains towards the institutionalisation of multilevel climate change governance (Petrie, Wolpe, Reddy, Adriázola, Gerhard, Landesman... & Marie, 2018). The various environmental and climate change response action plans and strategies by the South African government have demonstrated that subnational governments have important roles to play in ensuring emissions

reduction and resilience building. The national, provincial, and local governments are engaged in vertical cooperation and integration on climate change.

Petrie, Wolpe, Reddy, Adriázola, Gerhard, Landesman... & Marie (2018) note that South Africa's multilevel climate governance can be traced to the history of Apartheid in the country in which levels of government were solely hierarchical. To avert possible reversion to the ills of racial segregation on governance, the 1996 Constitution of South Africa provides for cooperative and interrelated governance between levels of governance such that the chances of inter-governmental feuds and litigation between levels of government are prevented. Hence, the climate change response of South Africa sees the national government as the main policy and legislation purveyor in the country while the provinces act as the coordinating level of government and local governments implement climate change action plans and strategies. The robust multilevel governance has impacts on domestic and international climate finance in South Africa. While the national government engages in climate finance drive for the provinces, there is also cooperation between the national government and the subnational governments on domestic climate finance (Peltrie, Wolpe, Reddy, Adriázola, Gerhard, Landesman... & Marie, 2018).

Nigeria and South Africa's engagement in climate change response involves an input-output interaction from the international system to the local level (Urban Low Emissions Development Strategy, 2020). The input of the international system into national climate change response includes the facilitation of the technological transfers, allocation of resources and finance and call for multilateral engagement. The national governments on their input national policies, build capacity and skills, mobilise resources and coordinate local climate action. Subnational entities engage in implementation and cooperation on climate action. On the output side, subnational entities report to the national government by reflecting local dynamics in national climate policies, supporting in the implementation of national climate policies and sharing inputs, experiences, and successes. Lastly, the national government reports to the international climate regime and defines its inputs into the global climate policy drive.

6.3.2 Subnational Climate Change Response as Political Activity: Lagos State and Kwazulu in Perspective

While climate change is a scientifically proven occurrence, responding to its causes and the challenges it poses to humanity is a political issue at the international, national, and subnational levels. This is because it is the tone of the relationship between levels of government that shape climate change response. The climate mandate flows from the supranational level through the UNFCCC structure to the national level through its institutional structures on the environment and then onto the subnational level. As political activity, the demand for good environmental ambience from climate change and other environmental challenges entails cooperative, multilevel governance from the international to the subnational levels. At each level, the dynamics of governance and the nature of the political system shape the quality of climate change response. This means that climate change response is a vertical, downward and upward flow of the political outcomes of global warming and its associated problems.

As a transboundary environmental problem, climate change is the outcome of a rise in the earth's surface temperature which has been on the rise since the Industrial Revolution (World Commission on Environment and Development, 1987). With this development, the ecological ambience of the world has been altered such that the human species, flora and fauna are daily threatened by environmental crises. No region of the world is exempted from the impacts of climate change. As the world battles to limit and reverse global warming to ensure that the earth's surface temperature reverts to below 1.5°C by 2100, the impacts are already producing social, economic and political outcomes (Gao, Gao & Zhang, 2017). The twenty-first century has witnessed massive environmental crises such as increased floods, droughts, wildfires, cyclones, typhoons, coastal erosion, loss of biodiversity, degradation, desertification, etc. (United Nations, 2020; SOAS University of London, n.d.). These negative climate outcomes are turning the world into a hostage of its very own development. As a product of growing scientific exactitude, climate change is affecting coastal regions of the world very adversely.

With the realisation of the dangers climate change portends for the world and its future, countries around the world came together under the auspices of the United Nations to establish an international climate change regime. With this, the general idea of mitigation, adaptation and climate finance are negotiated among state parties to the international climate regime. Moving

from this level, state parties develop climate change policies, action plans and response strategies to ensure that they contribute their quota to emissions reductions and cushion the effects of climate change impacts on their citizens through quality adaptation plans and targets (Olajide, 2022). In the same vein, states are encouraged to enlist their subnational entities into the climate change response agenda (The Climate Group, 2010). States are quite visible in the climate change response circle as they are the main actors in the climate negotiations, however, they are dependent on subnational entities for climate information, popular awareness, and implementation of internationally mandated and nationally determined response efforts.

It is from the foregoing that places such as Lagos and Kwazulu Natal in Nigeria and South Africa come to the fore. This is because like other regions of the world, they are faced with a gory environmental future due to the worsening impacts of climate change (Elias & Omojola, 2015; Smith, Guastella, Mather, Bundy & Haigh, 2012). The two subnational entities have long coasts with large populations and they serve as some of the apt demonstrations of the vulnerabilities of Nigeria and South Africa to climate change respectively. Their large coastal populations are daily faced with the climate change impacts such as flooding, coastal erosion, inundations, drought, water pollution, soil pollution, and loss of biodiversity, among others. Therefore, failure by their governments to muster effective climate change response could hamper their development quest. The effectiveness of their climate change response also depends on the political dynamics of their national politics and the nature of politics within the international climate regime.

The multilevel political reality of climate change response in Lagos State and Kwazulu Natal is as follows: the large population of the two subnational units require quality environmental governance as a response to the local manifestations of climate change, which is a transboundary environmental problem. This is fed into the political process as an input through the coalition of civil society, citizens and other interests with the two subnational spaces. These inputs are shaped by their political processes as dictated by the prevailing political socialisation, interest articulation, interest aggregation and political communication. – the four political dynamics of location-specific. Hence, the political processes shaping climate change response in Lagos State and Kwazulu Natal are different in terms of context and outcomes. The governments of Lagos State and Kwazulu Natal then process the inputs, which are then produced as outputs in terms of

environmental/climate change response through their rule making, rule application, and rule adjudication apparatuses.

As a multilevel process, subnational units also feed their inputs into the national political level in Nigeria and South Africa. The inputs are shaped by the national political dynamics through political socialisation, interest articulation, interest aggregation, and political communication at the national level. The inputs are processed by the national political system with outputs in the form of environmental and climate change rule making, rule application, and rule adjudication (Verma, 1975; Gauba, 2003). This process is finally extended to the supranational level input-output process and is shaped by the dynamics of the input process of international political socialisation, interest articulation, interest aggregation, and political communication. The climate change response political process proceeds in a continuous upward-downward pattern bearing inputs and outputs within a three-tier system of governance. Lagos State and Kwazulu Natal are different in terms of the climate change response functions performed by the three-tier political system in terms of the impacts on intergovernmental relations, finance and institutions on subnational climate change response in Lagos State and Kwazulu Natal.

Intergovernmental relations are a major factor in climate change response in Lagos State and Kwazulu Natal. The whole gamut of relations between levels of government in Nigeria and South Africa affect the way subnational governments respond to climate change. This resonates with the constitutional, legal, economic, institutional, political and social factors that shape climate change response in turn shaped by intergovernmental relations. Hence, intergovernmental relations define the politics of climate change response within a state. Every other factor in climate change response is determined by the nature and character of intergovernmental relations between levels of government. That is why it can be said that intergovernmental relations are the hub around which climate change response revolves.

Climate change response as a multilevel activity responds to the temper of intergovernmental relations within a state. While Global Environmental Governance takes inspiration from the international system, detailing the scientific basis of climate change and suggesting policy recommendations to state parties, their actual governance and implementation are determined by the nature of relations within each state party. The various determinants of intergovernmental relations as itemised by Cameron (2001) define and determine the domestication of international

climate mandates and their subsequent implementation. Intergovernmental relations brings each level of government within federations and quasi-federations into focus. The measure of decentralisation and devolution of function and fiscal powers to them by central governments demonstrates their capability to conceptualise the climate challenge, map out action plans and strategies for dealing with them. This also goes with their ability to leverage funding to act out their plans.

The foregoing resonates because intergovernmental relations covers the whole gamut of relations among levels of government on issues of functional and revenue allocation, among others. Climate change being a multi-issue and multi-level phenomenon dwells on the processes of intergovernmental relations within a nation. With the growing importance and indeed, the enlistment of subnational governments into the climate change response process, Smoke & Cook (2022) note that intergovernmental relations needs to greater dose of decentralisation to subnational governments for them to contribute robustly to the process. Smoke & Cook (2022) reckons further that the link between climate change and intergovernmental relations lies in governmental reforms that decentralise functional and financial processes of government that allows subnational governments more leeway to develop and implement strong and ambitious climate change goals.

Intergovernmental relations determine the quality of contributions of countries to global climate targets. This is the case of Nigeria and South Africa regarding climate change response in their subnational units of Lagos and Kwazulu Natal respectively. An excellent scenario is a request by the UNFCCC that state parties deposit their NDCs with the body to determine climate change response on a global scale. That Nigeria's NDCs lacked substantial subnational contribution casts serious validity doubt on the country's submission (Olajide, Thidzumba & Ojakorotu, 2020). In contrast, South Africa ranks among developing countries' best on the multilevel governance thrust of its climate change response (Peltrie, Wolpe, Reddy, Adriázola, Gerhard, Landesman... & Marie, 2018). This is a function of the cooperative and interdependent framework within which the levels of government relate and interact on climate change response. This shows that its NDCs have more subnational contributions than that of Nigeria.

The impact of intergovernmental relations, finance, and institutions on climate change response in Lagos State and Kwazulu Natal aligns with existing knowledge on the political dynamics of

climate change response. These factors shape the way governments respond to the risks posed by climate change to the wellbeing of the people. In terms of intergovernmental relations, the findings align with those of de Oliveira (2019) in a study on two Malaysian states in the sense that different political alignments affect climate change response as a possible result of zero-sum politics, cronyism and patrimonialism. In the same vein, Wise & O’Leary (1997) note that intergovernmental relations on the environment can be a matter of litigation not just between levels of government but also between arms of government with a federation. Findings also align with the position of Nelson, Wei, Peterson & Wennberg (2014) on the two possible outcomes of intergovernmental relations in climate change mitigation. Coordinating policies promote cooperation and interdependence between levels of government while competitive policies promote conflict between them. The situation in Lagos State, Nigeria bears the imprints of this as intergovernmental relations are tempered with a constitutional guarantee for cooperative relations between Kwazulu Natal and the national government of South Africa.

Subnational climate finance is also a subject on multilevel politics right from the supranational level. The politics of the availability and access to finance has been the main thrust of the international climate regime since its inception (Pickering, Jotzo & Wood, 2015; Falkner, 2016). Typically, climate finance for subnational governments comes from international, national, and local sources and each of these sources is shaped by international, national and subnational political dynamics. Hence, the effectiveness of subnational climate change response is a function of the moderation of the dynamics of politics within the multilevel system. This implies that climate change response as a combination of subnational and national responses is shaped by the availability and access to diverse sources of finance as climate change response requires huge financial outlay. This means that no single source of climate finance can be adequate to plan and implement climate change response at the subnational level.

As subnational entities of developing countries, attracting international climate finance to Lagos State and Kwazulu Natal has been difficult. This is tied to the ability of their national governments to draw international climate finance. Generally, there is a problem of inadequate international financial flow from the developed to the developing nations to plan mitigative and adaptive actions and strategies (Yeo, 2019; Roberts, Weikmans, Robinson, Cipler, Khan & Falzon, 2021). This has hampered the ability of the developing nations such as Nigeria and South Africa and by extension

their subnational units of Lagos and Kwazulu Natal to respond to climate change adequately. The politics of climate finance at the international level can be said to be the politics of failure on the part of the developed and historically emission-culpable nations to provide resources and technology transfer for robust climate change in the developing nations.

While the inadequacy of international climate finance is noted and widely publicised in climate circles, African countries have difficulty in leveraging climate finance. This is due to the highly technical nature of climate finance readiness and the perception of corruption in many African countries (Nakhoda, Caravani & Bird, 2011; Transparency International, 2016). In terms of these two factors, South Africa has fared better than Nigeria in climate finance. The fact that Nigeria was only able to leverage \$63million compared to South Africa's \$488million in 2011 attests to this (Olajide, Tshidzumba, Ojatorotu, 2020). The fallout of this is that climate change response at the national and subnational becomes weak. It also serves to weaken the development of global climate response because the uncertainty of climate finance prevents countries from making financial projections for their commitments. The hazy financial outlook of Nigeria's NDCs, for instance, is a result of the politics of climate finance at the international level.

With inadequate international climate finance, the politics of climate finance moves to the national and subnational levels. Climate finance at this level is dominated by the prevailing fiscal political reality. In the case of Nigeria and South Africa, domestic climate finance is minimal and hazy. The NDCs of both countries demonstrate the tenuous situation on climate finance as the bulk of the contributions are conditional on leveraging international climate finance. Subnational climate change in Lagos and Kwazulu Natal are faced with the reality of scarcity of funding needed to tackle climate change. The national governments have largely failed to institute national climate funds while attempts to mainstream climate finance into national budgetary processes have been hampered by the inadequacy of funds (Olajide, Tshidzumba & Ojatorotu). Domestically, Nigeria and South Africa are diametrically opposite in adhering to principles of fiscal discipline and probity. This situation also extends to matters of environment and climate change (Olajide & Bamidele, 2019; Olajide, Tshidzumba & Ojatorotu, 2020). Both countries gained their reputation in climate finance based on the fiscal discipline on the domestic front. Therefore, why South Africa has been able to leverage climate finance more than Nigeria and why its subnational entities have access to climate finance is apparent.

At the subnational national, climate finance is hard to come by in Lagos and Kwazulu Natal. Despite the latter's access to climate finance based on its national government's better ability to draw international finance, climate finance remains a serious threat to climate change response in the Province. In the case of Lagos State, lack of access to climate finance is noted as the bane of climate change response. The nature of the Nigerian fiscal federal is the biggest shaper of climate finance in Nigeria. This is due to the poor fiscal position of subnational governments in relation to the Federal Government. Nigeria's fiscal federalism is such that states do not have enough resources to address an emerging and existential threat such as climate change. In Nigeria, this situation is stifling the potential for development from below (Omitola, 2016). The nature of intergovernmental fiscal relations in South Africa is less cumbersome than that of Nigeria. The fiscal synergy between levels of government in the country is leading it to the path of a robust green economy due to the seamless flow of resources to tackle climate change across levels of government (Cassim, Radmore, Dinham & McCallum, 2021).

There is a better multilevel climate finance structure in South Africa that is affecting the climate change response of Kwazulu positively. This is the ability of the country to leverage climate finance from private sources. This is brought to the fore by the fact that 57% of South Africa's climate finance in the 2017/2018 fiscal year came from private sources. Important mitigation and adaptation efforts such as clean energy, low-carbon transport, water, AFOLU, circular economy, and material substitution are financed from this source (Cassim, Radmore, Dinham & McCallum, 2021). The multilevel climate finance proceeds in South Africa trickle down to Kwazulu Natal, other provinces and local governments through the country's viable intergovernmental fiscal transfer channels. In contrast, private climate finance contributes little to the climate change response drive of Nigeria and Lagos State. This can be linked to the weak private sector in the country compared to South Africa (Fatoki & Sasona, 2016). Another factor includes the absence of political will for the across-the-board mobilisation of stakeholders. Hence, there is a vast differential between Lagos State and Kwazulu in terms of the financial mix for climate change response.

Local politics is also a factor in climate finance. This is linked to the political will of subnational leadership to commit resources to climate change response. This is noted in Lagos State as a difference was noted in the commitment of successive state governments to climate change

response. The Fasola Administration's commitment to climate change and climate finance in the state remains a reference point. In this study, respondents opine that there is a direct link between climate change policy commitment and finance. In contrast, the succeeding Ambode Administration in the state did not show a commensurate enthusiasm for climate change response like the preceding Administration. The annual climate change conference that had served as a platform for shaping the climate change policy of the state was discontinued. This led to poor policy choices that had impacts on the environment and climate change. The controversial Cleaner Lagos Initiative which was deemed a failure had implications for succession politics in the state, leading to the failure of Governor Ambode to achieve a second term in office. Hence, local politics affects climate change and climate finance and vice versa.

Multilevel governance is discernible in climate change response at the institutional level. Institutions are strategic to the development of climate change policies, action plans, and strategies. The development of institutions was the very set of policies on climate change at the inception of the international climate regime. This deals with the emergence of the UNFCCC structure within the United Nations institutions. This means that without institutions, climate change response is unthinkable because it involves a set of actions that require a platform to be effective. In mitigation and adaptation, the role of institutions is to ensure that the modalities for framing actions, plans and strategies and their implementations are present. Ampaire (2020) notes that the difference between the achievement of climate targets and failure to do so dwells on the viability of institutions. Therefore, climate change response is the inter-flow of institutions on a multilevel scale from the supranational down to the subnational (local) levels.

The outlook of subnational environmental institutions in Lagos and Kwazulu bears the imprint of the national environmental institutions in Nigeria and South Africa respectively. As developing countries, these countries are symptomatic of weak institutions. Their development deficits have been previously blamed on their inability to develop viable institutions to aid the running of governance. In environmental terms, this problematique is palpable as problems of scale and coordination weaken their climate change response drive (Ampaire, 2020). In Nigeria, the crisis of governance bedevilling the country can be directly traced to the weakness and failure of institutions (Yagboyaju & Akinola, 2019). The situation in South Africa is only marginally better

than that of Nigeria. In both nations, as in the rest of the continent, weak institutions has a debilitating effect on the quest for development (Nganje, 2015).

Subnational units inherit the weak institutions and are indeed the products of the weak institutional outlook at the national level. This is why subnational environmental institutions are weak to the extent that they cannot fully capture the scale of climate change risks and vulnerabilities in Lagos and Kwazulu Natal. In the same vein, institutions in the two locations have largely failed to coordinate climate change action plans and strategies and their implementation. The narrow conception of environmental institutions in the two locations ensures that many institutional stakeholders are left out of the purview of climate change response. The fact that climate change is a multistakeholder affair in terms of cause and effect means that institutions must be broad enough to capture the full essence and implications of its risk. This allows for the proper scaling of threats and risks and allows for the right and adequate approaches to responding to the menace.

In Lagos and Kwazulu Natal, the lack of institutional capacity is demonstrated by the lack of manpower with the requisite climate change and environmental knowledge and skills to drive response. This is responsible for the poor inter-institutional linkage to drive climate change response. The paucity of climate change experts to man institutions in critically climate change-relevant institutions like transport, human settlement, lands and agriculture, water management and so on means that the relevant data to engage in vulnerability assessment is lacking. Hence, climate change actions, plans, and strategies fall short in terms of the right outlook of climate change in the state and province. The Ministry of Environment and Water Resources and the EDTEA are weak institutions as they do not possess adequate environmental norms, environmental altruism, networking, governance and manpower. This is responsible for the weak adaptation outlook of climate change response in the specific case of Lagos.

Institutional coordination mechanisms are weak and/or lacking in Lagos and Kwazulu Natal. The existence of the Climate Change and Sustainable Development Council and the Provincial Committee for Environmental Coordination (PCEC) has little or no impact on climate change response coordination in Kwazulu Natal. While this appears impressive and promising on paper, it has not led to the seamless and result-oriented coordination between the KZN EDTEA and other climate change-relevant institutions as very little is known about the climate change situation of the province in the other institutions. The case of Lagos State which is just planning to have a

Climate Change Council speaks of the tenuous nature of environmental institutions coordination in the state. There is a need to develop the political will to ensure institutional coordination among institutions on the subject of climate change. This is because the scope and the required urgency of climate change response are rising.

Climate change response is a political division of labour that is shaped by intergovernmental relations, finance, and institutional dynamics within the multilevel system (Bauer & Steuer, 2014). This means that climate change response in Lagos State and Kwazulu Natal cannot be divorced from the dynamics of the multilevel political environment in which their action plans are developed and implemented. As subnational political units, they are directly affected by the challenges faced by their national governments both internally and externally. The internal dimension to these challenges stems from the nature and character of intergovernmental relations and the viability of national and subnational environmental institutions while climate finance brings the influence of international climate politics into the fray. The effectiveness or otherwise of climate change response in Lagos State and Kwazulu Natal is determined by relations and the circumstantial dynamics shaping national climate change response in their respective countries.

6.3.3 Covid-19 and Climate Change Response in Lagos State and Kwazulu Natal

In the course of this study, the researcher noted in the comments of respondents an emergent but potentially dominant theme in climate change response in Lagos State and Kwazulu Natal as well as other parts of the world in the months and years to come. The outbreak of Covid-19, the flu-like disease from the class of coronavirus in December 2019/January 2020 also has effects on climate change response in both study locations. As another transboundary phenomenon, the spread of Covid-19 to Nigeria and South Africa on February 27 and March 1, 2020, respectively has impacted governance (Ugbodaga, 2020; National Institute of Communicable Diseases, 2020). As noted in national and subnational climate change response actions plans and policies, governance is strategic to reducing emissions and it is the anchor that holds adaption within societies. Hence, Covid-19 attack on governance is an attack on climate change response in Lagos State and Kwazulu Natal.

The two locations had a very high number of cases as of December 2020 while this researcher was rounding off data gathering. It is of note that both Lagos and Kwazulu Natal recorded the first cases of Covid-19 in Nigeria and South Africa respectively (Ugbodaga, 2020; South African

Government, 2020). As of December 2020, there were 28,741 and 194,629 cases in Lagos and Kwazulu Natal respectively. There were also 241 and 4,278 deaths arising from Covid-19 in the two locations respectively (Nigeria Centre for Disease Control, 2020; National Institute for Communicable Diseases, 2020). The two locations are epicentres of the pandemic in Nigeria and South Africa with Lagos having 34% of Nigeria's total number of cases and Kwazulu Natal having 18% of South Africa's total number of cases. As in other parts of the world, the pandemic has wreaked serious socio-economic havoc in the two locations.

In the course of this study, the views of respondents on intergovernmental relations and climate finance were shaped by the pandemic. Intergovernmental relations as an important factor in shaping climate change response is deemed by respondents to be more conflict-ridden due to diminishing resources arising from the impacts of the pandemic on the economy. This is especially noted in the case of Lagos State, given the volatile intergovernmental relations outlook of Nigeria over history. The economy of Nigeria took a dip because of the crash in the price of oil, the country's economic mainstay, in the international market (Olumuyiwa & Ibrahim, 2021). This resulted in low fiscal receipts at the national and subnational levels. This for some respondents is a recipe for a crisis that would consume the noble agenda for climate change response in Lagos State. Internally too, climate change and environmental matters may not enjoy much governance attention as they may not be as pressing as needs and pressures from other sectors. In Kwazulu Natal, respondents raised serious concerns about the dwindling resources to implement climate change action plans and strategies. Respondents note that domestic climate finance is going to be affected by insufficient funds for some time. This is also affecting intergovernmental transfers as government resources have reduced considerably.

The situation is not peculiar to Nigeria and South Africa alone as all the countries of the world are facing economic shocks because of the pandemic. This situation brings international climate finance to the fore. The pandemic is an attack on the climate finance drive of the Paris Agreement. This means that countries face the potential short-term task of revamping their health systems and economies rather than making financial flows for climate change response (Climate-KIC, 2020). As the economies of countries struggle to wriggle out of recessions, green deals are likely to be negatively affected by the inability of actors to muster finance for climate change response. The pandemic will have serious effects on adaptation as the inability of developing countries to access

climate finance wanes. There are already stresses in some of the sources of climate finance. For example, Overseas Development Institute (ODI) notes that Overseas Development Assistance (ODA) flows will wane by 7.1% to 11.8% as the economy of donor nations become more stressed. This situation will arise because the socio-economic impacts of the pandemic are deeper and more widespread than that of the 2008 global recession. Hence, donor nations may look inwards to revamp their economies, leaving financial flows on climate change in danger (Gilder & Rumble, 2021).

This leaves countries such as Nigeria and South Africa and their subnational units in dire financial straits regarding climate change response. As the pandemic exacerbates economic crises in the two countries, climate change response may become secondary governance agenda. Therefore, Lagos State and Kwazulu may not be able to holistically implement their latest climate change action plans. Given their poor performance in the implementation of pre-pandemic action plans which were done in a more clement financial climate, the current socio-economic reality wrought by Covid-19 poses a grave danger to the ambitious climate goals of the two subnational units. Subnational climate change response is likely to be one of the most acutely affected areas by the pandemic and this could last for a very long time.

6.4 Summary of Chapter

This chapter entailed a comparative analysis of subnational climate change response in Lagos State and Kwazulu Natal respectively. This was done by providing answers to research questions one to three as detailed in chapters four and five. This was followed by a synopsis of climate change response in the two locations. The chapters also took a look at Covid-19 as an unenvisioned intervening variable in the course of carrying out the study in Lagos and Kwazulu Natal respectively.

Chapter Seven

Summary, Conclusion and Recommendations

7.1 Introduction

This is the final chapter of this study. The chapter contains sections on the summary of the study. The next section serves as the conclusion of the study, it also itemises the contributions which the study is making to knowledge in the fields of international relations, environmental politics and political science. The final section of the chapter contains the recommendations of the researcher on the improvement of climate change response in Lagos State, Nigeria and Kwazulu Natal, South Africa and also areas of further research that can help to broaden knowledge on climate change response in international relations, environmental politics, and political science.

7.2 Summary

Climate change is producing gory development outcomes in Lagos State and Kwazulu Natal. Despite their location in non-historically high carbon-emitting nations, the social, economic, and political outcomes of climate change are staring their citizens in the face. The recent environmental history of the two study locations shows that the impacts of climate change are palpable. As coastal locations, the vast majority of their citizens are vulnerable to climate change impacts such as flooding, coastal erosion and inundation, drought, and land degradation, among others. This means that they have to develop policies and programmes on mitigation and adaptation to ensure that they reduce emissions and assuage the impacts of climate change on their citizens. Due to the nature of subnational climate change response as a major method of implementing the commitments of state parties to international climate regime, climate change response in Lagos State and Kwazulu are important contributions in Nigeria and South Africa respectively.

The central aim of this study is to investigate the contributions of sub-national entities in Africa towards combating the climate change debacle with emphasis on Lagos State, Nigeria and Kwazulu Natal Province of South Africa. This is done through the prism of challenges posed by the political dynamics of intergovernmental relations, finance and institutions. This is because climate change response is a political activity and that of subnational units within countries happen within a multilevel political system in which the political dynamics shape how they respond to climate within the localities. Climate change response starts through the international climate regime such as the UNFCCC and other multilateral platforms. It is from this level that national

governments that are signatories to the international climate regime determine the contributions to the global climate agenda. The importance of subnational units is that they are the sources of data on emissions and provide the critical platforms for the implementation of the national climate agenda (Climate Group, 2021). Hence, Lagos State and Kwazulu Natal are important to the climate change response of Nigeria and South Africa within the multilevel political system.

This study notes that Lagos State and Kwazulu Natal are affected by climate change. This is confirmed by the climate scenarios in the two locations. As coastal spaces, the impacts of climate change on the people and their livelihood are worsening. The weather events of climate change such as floodings, coastal erosion, water, and soil pollution, drought, and their socio-economic outcomes are threatening to stifle their development drive. In the same vein, as high carbon-emitting units within their respective countries, Lagos and Kwazulu Natal emissions reduction efforts place Nigeria and South Africa in good stead to contribute to the reduction of global warming. The two subnational units attest to the utility of sub-state entities and cities in climate change response.

The foregoing dwells on the contributions of the two locations to their respective national climate change response. This is coupled with the combination of the multilevel theory of environmental governance and structural-functionalist theory. The three mutually functional systems are impacted by the climate change/environmental-based demands and support which form the inputs made by citizens, CSOs, and businesses and fed into the political process. The inputs are then processed by the political system in the form of output which is usually seen through environmental legislation, environmental adjudication, and environmental implementation.

In terms of intergovernmental relations, Lagos and Kwazulu Natal operate within different political structures. While Nigeria is a federation, South Africa is a unitary system that operates many federal principles such that the constitution recognises intergovernmental relations as the vehicle for interaction between levels of government (Cramer, 2019). Hence, intergovernmental relations affect climate change response in the two locations, albeit differently. While the 1999 Constitution of Nigeria contains a lot of contradictions, the ones that affect climate change response are palpable. Several areas of possible environmental legislation in Nigeria that have relevance to climate change response fall within the exclusive legislative purview of the Federal Government. These include the environment itself which section 20 of the Constitution places

within the federal purview. This means that in the first place, Lagos State, despite its environmental and climate change pressures, can only legislate residually on environmental matters. Hence, there are a lot of landmines in environmental administration in Lagos State due to the poor devolution of power from the centre to Lagos and other states in Nigeria. Other areas of intergovernmental relations challenge to climate change response include water, waterways, mining, energy and electricity, and meteorology. This situation breeds serious intergovernmental relations impediments to climate change response in Nigeria. It also erodes the little areas of cooperation between the state and the Federal Government on climate change response.

Obversely, there is better alignment in intergovernmental relations between levels of government in South Africa. This is because of the constitutional mandate that outlawed intergovernmental feuds between levels of government in South Africa. This is to be achieved by the constitutional recognition of the distinctiveness, interdependence, and interrelatedness of levels of government in the country. They are further mandated to relate in a cooperative manner such that policies and legislations across levels of government align and without contradictions (Zulu, 2014). This is brought to bear in the climate change response in Kwazulu Natal. The national government is the main policy purveyor in the country while the provincial level provides coordination to local governments which are in turn the level that implements climate change action plans and strategies of the country. Hence, climate change response in Kwazulu comes from a more pacific and cooperative political milieu than in Lagos State.

Climate finance is inadequate in both Lagos and Kwazulu Natal. This is due to poor receipt of international climate funds and the inadequate nature of domestic finance. Their climate finance is dependent on the ability of their national governments to leverage climate finance from international sources. Nigeria is particularly poor in this compared to South Africa climate finance, which is leveraging international climate finance (Olajide, Tshidzumba & Ojkorotu, 2020; Cassim, Radmore, Dinham & McCallum, 2021). Despite this, Kwazulu Natal has a huge financial deficit in mitigation of carbon emissions and addressing its vulnerabilities. Nigeria's situation is caused by poor climate finance readiness and perception of corruption for which the country is known in the world. Domestic climate finance is highly underdeveloped in the two locations. This is to the extent that, once the international finance is flailing, they, like their national governments,

become weak in climate change response. Domestic climate change response is also affected by local budgetary politics in Lagos and Kwazulu.

Environmental institutions are weak and underdeveloped in Lagos and Kwazulu Natal. The main problems of environmental institutions in the two locations are poor institutional scaling of the climate crisis, poor institutional coordination and weak capacity of the institutions to deliver their mandates. In the first place, the idea of an environmental institution is restricted to the Ministry of Environment and the EDTEA, whereas there are many other latent environmental institutions whose activities are strategic to climate change mitigation and adaptation. This situation restricts the scope of the challenge because Lagos State and Kwazulu Natal run the risk of losing important data that emanate from these institutions and are needed to develop their climate change response.

In terms of institutional coordination in these locations, the poor passage of climate change-relevant information from the other environmentally relevant institutions is poor. This is apparent in the two locations and unfortunately, despite the realisation of this challenge, only feeble attempts are being made to address it. While coordinating institutions are existing but only on paper in Lagos, coordinating institutions are being planned. Both locations lack the requisite capacity to plan and implement climate change responses. The apparent reason for the poor contribution of the other institutions is the lack of manpower with the necessary skills and knowledge of environmental and climate change administration. Lack of capacity is the major bane in the implementation of the failing climate change action plans and strategies in Lagos State and Kwazulu.

7.3 Conclusion

Climate change response in Lagos State and Kwazulu Natal is weak. This is based on the negative effects of intergovernmental relations, climate finance and institutional weakness. Climate change response is a webbing of political activities on a multilevel scale from the supranational level to the subnational level. As a function-based outcome, the locations' climate change response is affected by the ability of the three political systems as influenced by intergovernmental relations, finance and institutions. While they note their at-risk status and vulnerabilities to climate change and are making policy and programmatic efforts at responding to it, their responses are weak and ineffective. While intergovernmental relations is less of an issue in Kwazulu Natal, its climate

change response is affected by inadequate finance and weak environmental institutions. Lagos State on the other hand is affected negatively by the three political dynamics.

Climate change response in Lagos State and Kwazulu Natal is essentially an outgrowth of climate change and climate change response at the national levels in Nigeria and South Africa respectively. Flowing from the conceptual base of the study, the inability of the subnational political process in Lagos State and Kwazulu Natal portends a systemic danger to the national and international climate regime. This is because the multilevel climate response system aims to ensure global resilience which is to be contributed by every political unit of the world. As the climate change response of the two locations is overwhelmed by intergovernmental relations issues, inadequate climate finance and weak institutions, their climate resilience becomes weaker as seen in worsening climate scenarios. Hence, the inability of the subnational political system to measure up in climate change response means that they are not able to contribute meaningfully to national climate change response. This, in the final analysis, impedes global climate targets in terms of emissions reduction. It also affects global policy strategies such as the Sustainable Development Goals.

Climate change response is a veritable method of bandwagoning local development to international regimes (Olajide, 2022). Therefore, the tenuous climate change response of Lagos State and Kwazulu Natal would affect the development quest of Nigeria and South Africa respectively. Like most developing countries, they have mainstreamed climate change response into their development agenda and policy processes. Since national development is a combination of developmental strides from subnational levels, their climate change response is critical to national development. It is apposite to note then that the failure of subnational units in climate change response is a recipe for development deficit. Given the environmental pressures on Lagos and Kwazulu Natal, their climate struggles are not just national climate struggles but also national development debacles.

Subnational climate change is an allure in climate politics (Johnson, 2018). They are the actual vanguard for climate change response because while the national government engages in climate diplomacy, they are the main means of implementing the proceeds of the latter. In doing this, subnational political units bring local climate and environmental knowledge to bear. Hence, they bring about the necessary creative action plans to climate change response. Therefore, political

impediments in the form of conflictual intergovernmental relations, poor climate finance receipt and generation and weak environmental institutions combine to rob national and global climate change response local-specific creative inputs. Therefore, these political dynamics in their negative manifestations are stifling the possibilities of creativity in the climate action plans and strategies of Lagos State and Kwazulu Natal. This, in the final analysis, robs Nigeria and South Africa of veritable sources of inputs in mitigation and adaptation as the subnational units are impeded from optimal and wholesome climate change response.

Finally, subnational climate change response is as important as national climate change response. Therefore, Lagos State and Kwazulu Natal are a replica of Nigeria and South Africa respectively in climate change response. While national climate change response is a product of international climate politics, the effectiveness of subnational climate change cannot be separated from the international and national atmosphere within which it occurs. Hence, the contributions of Nigeria and South Africa to the global climate regime such as the NDCs cannot be effectively implemented within a hostile political environment in which the national government only allows subnational governments some residual roles in climate-relevant functions, the international and local climate finance is not forthcoming, and local institutions are weak, incapable and poorly coordinated. With this situation, climate change response in Lagos State and Kwazulu Natal cannot offer effective mitigation and adaptation results.

7.4 Contributions to Knowledge

1. The study engages in a comparative study of subnational climate change response in Lagos State and Kwazulu Natal. This is a novel contribution to the comparative politics of Nigeria and South Africa and the international relations of the two nations;
2. The study is a departure from the science-dominated discourse of climate change and climate change response in Lagos State and Kwazulu Natal. It brought the study of the political dynamics into the discourse by considering the influence and challenges posed by intergovernmental relations, finance, and institutions on climate change response in the two locations.
3. The study demonstrates that poor and conflict-ridden intergovernmental relations make multilevel climate governance difficult. The two case studies fit into the theoretical divide on

intergovernmental relations on climate change in terms of coordinating and competitive policies that determine the nature of the relations between levels of government on the matter.

4. The study demonstrates that Nigeria and South Africa differ in their philosophy of climate change response flowing from their membership in Global Environmental Governance. The study shows that South Africa is more altruistic than Nigeria in ensuring that subnational governments are less encumbered by political problems of climate change response.

5. The study shows that climate change response is not affected by the type of political system but the nature and character of intergovernmental relations flowing from the operation of the political system.

6. The study shows that citizens' climate change awareness is weak and that subnational governments are not doing enough to make climate change a popular discourse.

7.5 Recommendations

1. Lagos State and Kwazulu Natal should engage one another in paradiplomacy as a form of peer-review in climate change response, given their similar vulnerabilities to climate change as coastal societies. Subnational paradiplomacy and climate change diplomacy between Nigeria and South Africa are weak, hence, as important economic and industrial hubs, such paradiplomatic relations would help in knowledge sharing on vulnerabilities and response to climate, especially on sectors in which they are mutually strong and efficient.

2. Lagos State and Kwazulu Natal should establish a State and Provincial Climate Change Trust Fund respectively. This will allow people to contribute financially to the quest for sustainability and resilience in their communities. This recommendation resonates, given the success of Lagos State Security Trust Fund (LSSTF) which has seen the state having the most equipped state police command in Nigeria. With this, the internal source of climate finance would greatly enhance as budgetary and resource allocation barriers to it would be attenuated. The people have proven over time to be able to fund the solutions to their threats if there are well planned and endearing policies by the government.

3. Lagos State and Kwazulu Natal should establish climate change units in climate change-relevant Ministries and Departments. This enhances the access to data from these institutions in the development of climate change response action plans and strategies. This in the final analysis

enhances the scope of climate change response. It has the potential to ensure neither mitigation nor adaptation action plans are downplayed due to a lack of data from the relevant environmental institutions.

4. The Environmental Affairs section of EDTEA should be made a full-fledged KZN Department of Environmental Affairs (KZN DEA). This would allow the new Department to deal with the scaling of climate and environmental risks facing the Province. As a Department, the proposed KZN DEA will have units akin to those of the Lagos State Ministry of Environment to capture the whole ramifications of climate change dynamics in the Province. This will also help in addressing the capacity deficit noted in EDTEA as an environmental institution in Kwazulu Natal. With this, the KZN DEA would have the full institutional and administrative wherewithal to establish climate change units in climate change-relevant Departments and institutions within the Province.

5. While it is understood that the Climate Change Council has been proposed in the Lagos State Climate Change Action Plan 2020-2025, it is necessary to borrow a leaf on institutional coordination from Kwazulu Natal. With the Council acting as the highest authority on climate change and sundry environmental issues within the State, it is necessary to establish a Lagos State Council on Environmental Coordination akin to the Provincial Committee for Environmental Coordination (PCEC) of Kwazulu Natal. The absence of institutional coordination on climate change is palpable and it is one of the barriers to effective climate change response in the State.

6. Nigeria should resolve aspects of constitutional contradictions that are making intergovernmental relations and consequently multilevel governance of climate change response arduous. This would allow Lagos State and other states and even Local Governments to plan and implement climate change responses without problems.

7.6 Suggestion for Further Studies

Further studies should be done on the relationship between the environment and succession politics. This will help to determine the role of environmental politics in the succession controversy in the failed second term quest of Governor Akinwunmi Ambode of Lagos State on the heels of poor environmental performance. The study would enhance the understanding of the level of environmental awareness among the voters and the political class and how that became a factor in the 2015 succession politics in the state.

Further study is also necessary to do a taxonomy of the system of government based on their impact on subnational climate change response. The importance of this is that the political system of Nigeria and South Africa, federal and pseudo-federal systems respectively appear to be a major factor in the climate change response of Lagos and Kwazulu Natal. The taxonomy and the ensuing analysis would help states to ensure necessary behavioural adjustments are made to enhance subnational climate change response, given its utility in overall national and global climate change response, irrespective of the operative system within the countries.

7.6 Summary of Chapter

The chapter engaged in the summary of the main ideas of the study, the conclusions drawn from the study, contributions to knowledge within the main and sub-disciplines of the researcher and recommendations on how to improve climate change response in Lagos State and Kwazulu Natal.

Bibliography

- Abiodun, B. J., Adegoke, J., Abatan, A. A., Ibe, C. A., Egbebiyi, T. S., Engelbrecht, F., & Pinto, I. (2017). Potential impacts of climate change on extreme precipitation over four African coastal cities. *Climatic Change*, 143(3), 399-413.
- Adama, O. (2020). Slum upgrading in the era of World-Class city construction: the case of Lagos, Nigeria. *International Journal of Urban Sustainable Development*, 12(2), 219-235.
- Adams, P. (2016). State(s) of Crisis: Sub-National Governments in Nigeria. African Research Institute. Understanding Africa Today, Briefing Note 1602 March 2016. Retrieved from https://media.africaportal.org/documents/ARI_Nigeria_BN_final.pdf (Accessed May 1, 2020).
- Adegboyega, S. A., Oloukoi, J., Olajuyigbe, A. E., & Ajibade, O. E. (2019). Evaluation of unsustainable land use/land cover change on ecosystem services in coastal area of Lagos state, Nigeria. *Applied Geomatics*, 11(1), 97-110.
- Adekomaya, O., & Ojo, K. (2016). Adaptation of plastic waste to energy development in Lagos: An overview assessment. *Nigerian Journal of Technology*, 35(4), 778-784.
- Adelekan, I. (2021). Adaptation and Social Justice in Lagos, Nigeria. United Nations Research Institute for Social Development. Project. Retrieved from <https://www.unrisd.org/adaptation-lagos> (Accessed May 4, 2021).
- Adelekan, I. O. (2010). Vulnerability of poor urban coastal communities to flooding in Lagos, Nigeria. *Environment and urbanization*, 22(2), 433-450.
- Adelekan, I. O. (2016). Flood risk management in the coastal city of Lagos, Nigeria. *Journal of Flood Risk Management*, 9(3), 255-264.
- Adepoju, A. O., & Akinwale, Y. O. (2019). Factors influencing willingness to adopt renewable energy technologies among micro and small enterprises in Lagos State Nigeria. *International Journal of Sustainable Energy Planning and Management*, 19, 69-82.
- Adetokunbo, I., & Emeka, M. (2015). Urbanization, housing, homelessness and climate change. *Journal of Design and Built Environment*, 15(2).
- Adeyeri, O., Ishola, K., & Okogbue, E. (2017). Climate change and coastal floods: the susceptibility of coastal areas of Nigeria. *J. Coast. Zone Manag*, 20, 443.
- Adigun, O. W. (2019). A Critical Analysis of the Relationship between Climate Change, Land Disputes, and the Patterns of Farmers/Herdsman's Conflicts in Nigeria. *Canadian Social Science*, 15(3), 76-89.

- Adom, D., & Hussein, E. K. (2018). Theoretical and Conceptual Framework: Mandatory Ingredients Engineering. *International Journal of Scientific Research*, 7(1), 438-441.
- Africa Progress Panel (2015). Power, People, Planet: Seizing Africa's Energy and Climate Opportunities. *Africa Progress Report 2015*. Retrieved from http://www.africaprogresspanel.org/wpcontent/uploads/2015/06/APP_REPORT_2015_FINAL_low1.pdf (Accessed August 17, 2017).
- Agada, S., & Nirupama, N. (2015). A serious flooding event in Nigeria in 2012 with specific focus on Benue State: a brief review. *Natural Hazards*, 77(2), 1405-1414.
- Agbola, T., & Jinadu, A. M. (1997). Forced eviction and forced relocation in Nigeria: The experience of those evicted from Maroko in 1990. *Environment and Urbanization*, 9(2), 271-288.
- Agumagu, O., & Todd, M. (2015). Modelling the climatic variability in the Niger Delta region: influence of climate change on hydrology. *Journal of Earth Science & Climatic Change*, 6(6).
- Air Quality Index (2021). Air Quality in Kwazulu Natal. Real-time Air Quality Index (AQI) and Air Pollution Level. Retrieved from <https://www.aqi.in/dashboard/south-africa/kwazulu-natal> (Accessed August 12, 2021).
- Ajala, O. (2020). New drivers of conflict in Nigeria: an analysis of the clashes between farmers and pastoralists. *Third World Quarterly*, 41(12), 2048-2066.
- Ajibade, I., Pelling, M., Agboola, J., & Garschagen, M. (2016). Sustainability transitions: Exploring risk management and the future of adaptation in the megacity of Lagos. *Journal of extreme events*, 3(03), 1650009.
- Ajiboye, A. A. (2017). Effect of Training on Market Women's Level of Awareness and Their Disposition towards Solid Waste Management in Lagos Metropolis. *African Educational Research Journal*, 5(2), 120-125.
- Akande, D. O. (n.d.). The Multifaceted Waste Management Issues in Nigeria: Lagos State as a Case Study. Retrieved from <file:///C:/Users/NEW/Downloads/SSRN-id3235345.pdf> (Accessed January 16, 2021).
- Akanle, O., & Shittu, O. (2018). Value Chain Actors and Recycled Polymer Products in Lagos Metropolis: Toward Ensuring Sustainable Development in Africa's Megacity. *Resources*, 7(3), 55.
- Akanle, O., Ademuson, A.O. and Shittu, O.S. 2020. Scope and Limitation of Study in Social Research. In Jegede, A.S. and Isiugo-Abanihe, U.C. (Eds). *Contemporary Issues in Social Research*. Ibadan: Ibadan University Press, 105-114.

- Akerele, O. (2017). Climate Change Vulnerability and Adaptation in the city of Lagos, Nigeria. Master Dissertation submitted to York University, Toronto, Ontario, Canada November 30, 2017.
- Akinola, A. O., Opoko, A. P., Ibem, E. O., Okagbue, H. I., & Afolabi, A. O. (2020). Climate change adaptation and mitigation strategies in Lagos, Nigeria: built environment professionals' perspective. *Int. J. Eng. Adv. Technol*, 9(3), 1273-1282.
- Akinyemi, T. E. (2016). *Climate change, migration and resource contestations: a case study of north-south migration in Nigeria*. Doctoral Dissertation submitted to the University Of Kwazulu Natal South Africa.
- Akinyemi, T. E., & Olaniyan, A. (2017). Nigeria: Climate War. Migratory Adaptation and Farmer-Herder Conflicts. *Conflict Studies Quarterly*, (21).
- Akpomi, M. E., & Vipene, J. (2016). Promoting Knowledge of Climate Change (CC) amongst Nigerians: Implications for Education Managers. *Journal of Education and Practice*, 7(32), 132-138.
- Alao, M. A., Ayodele, T. R., Ogunjuyigbe, A. S. O., & Popoola, O. M. (2020). Multi-criteria decision based waste to energy technology selection using entropy-weighted TOPSIS technique: The case study of Lagos, Nigeria. *Energy*, 201, 117675.
- Alharahsheh, H. H., & Pius, A. (2020). A review of key paradigms: Positivism VS interpretivism. *Global Academic Journal of Humanities and Social Sciences*, 2(3), 39-43.
- Allen, A., Lampis, A., & Swilling, M. (2016). *Untamed urbanisms*. Taylor & Francis.
- Allen, M. R., Babiker, M., Chen, Y., Coninck, H. D., Connors, S., Diemen, R. V., Dube, O. P., Ebi, K. L., Engelbrecht, F., Ferrat, M., Ford, J., Forster, P., Fuss, S., Guillén, B. T., Harold, J., Hoegh-Guldberg, O., Hourcade, J.-C., Huppmann, D., Jacob, D., ... Zickfeld, K. (2018). Summary for Policymakers. In *Global Warming of 1.5: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* IPCC. <https://www.ipcc.ch/sr15/chapter/spm/>.
- Almond, G. A. & Powell, B. G. (1966). *Comparative politics: A developmental Approach*. Boston: Little, Brown and Company.
- Ampaire, E. (2020). Challenges ahead: climate change in the context of weak institutions. Paper prepared for the UN Inter-Agency Expert Group Meeting on Implementation of the Third United Nations Decade for the Eradication of Poverty (2018-2027), 4-6 March 2020, Rome. Retrieved from <https://www.un.org/development/desa/dspd/wp-content/uploads/sites/22/2020/03/Ampaire-paper.pdf> (Accessed Marc 4, 2021).

- Amusan, L., & Olutola, O. (2016). Addressing climate change in southern Africa: any role for South Africa in the post-Paris Agreement? *India Quarterly*, 72(4), 395-409.
- Amusan, L., & Olutola, O. (2017). Paris Agreement (PA) on climate change and South Africa's coal-energy complex: issues at stake. *Africa Review*, 9(1), 43-57.
- Anabaraonye, B., Chukwuma, J., & Eriobu, C. (2019). Green entrepreneurial opportunities in climate change adaptation and mitigation for sustainable development in Nigeria. *J Environ Pollut Manag*, 2(2), 102.
- Anifowose, R. (2011). Violence and politics in Nigeria: the Tiv, Yoruba and Niger Delta experience. *Lagos: Sam Iroanusi Publications*.
- Anton, B., Cambray, A., Dupar, M., Westerlind-Wigstroem and Gogoi, E. (2014). Close to Home: Subnational Strategies for Climate Compactible Development. *The Climate and Development Knowledge Network (CDKN) Working Paper*, April 2009.
- Averchenkova, A., Gannon, K. E., & Curran, P. (2019). Governance of climate change policy: A case study of South Africa. *Grantham Research Institute on Climate Change and the Environment Policy Report*.
- Ayeni, A. O. (2017). Increasing Population, Urbanisation and Climatic Factors in Lagos State, Nigeria: The Nexus and Implications on Water Demand and Supply. *Journal of Global Initiatives: Policy, Pedagogy, Perspective*, 11(2), 69-87.
- Ayers, J. M., & Huq, S. (2009). The value of linking mitigation and adaptation: a case study of Bangladesh. *Environmental Management*, 43(5), 753-764.
- Ayodele, I. (2016, February 4). Confronting climate change doom in Lagos. The Guardian: Features - Science. Retrieved from <https://guardian.ng/features/science/confronting-climate-change-doom-in-lagos/> (Accessed January 12, 2018).
- Babugura, A., Mtshali, N., & Mtshali, M. (2010). Gender and Climate change: South Africa case study. *Heinrich Böll Stiftung Southern*.
- Bai, X., Dawson, R. J., Ürge-Vorsatz, D., Delgado, G. C., Barau, A. S., Dhakal, S. ... & Schultz, S. (2018, march 1). Six research priorities for cities and climate change. *Nature: Comment*, 23-25.
- Barman, D., Mandal, S. C., Bhattacharjee, P., & Ray, N. (2013). Land degradation: Its control, management and environmental benefits of management in reference to agriculture and aquaculture. *Environmental Ecology*, 31(2C), 1095-1103.
- Basdew, M., Jiri, O., & Mafongoya, P. L. (2017). Integration of indigenous and scientific knowledge in climate adaptation in KwaZulu-Natal, South Africa. *Change and Adaptation in Socio-Ecological Systems*, 3(1), 56-67.

- Baudoin, M. A., Vogel, C., Nortje, K., & Naik, M. (2017). Living with drought in South Africa: lessons learnt from the recent El Niño drought period. *International journal of disaster risk reduction*, 23, 128-137.
- Bauer, A., & Steurer, R. (2014). Multi-level governance of climate change adaptation through regional partnerships in Canada and England. *Geoforum*, 51, 121-129.
- Bega, S. (2020, November 10). South Africa's coastal cities may lose their beaches. Mail & Guardian: Environment. Retrieved from <https://mg.co.za/environment/2020-11-10-south-africas-coastal-cities-may-lose-their-beaches/> (Accessed January 5, 2021).
- Bell, F. G. (1994). Floods and landslides in Natal and notably the Greater Durban Region, September 1987: A Retrospective View. *Bulletin of the Association of Engineering Geologists*, 31(1), 59-74.
- Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open*, 2, 8-14.
- Benz A. (2006). Governance in Mehrebenensystemen. In Governance-Forschung. Vergewisserung über Stand und Entwicklungslinien. 2. Auflage, Schuppert GF (ed.). Baden-Baden: Nomos; 95–120.
- Benz, A., & Eberlein, B. (1999). The Europeanization of regional policies: patterns of multi-level governance. *Journal of European public policy*, 6(2), 329-348.
- Bird, N., Beloe, T., Corfee-Morlot, J., & Zou, S. (2012). Understanding climate change finance flows and effectiveness—mapping of recent initiatives.
- Bloor, M., & Wood, F. (2006). *Keywords in qualitative methods: A vocabulary of research concepts*. Sage.
- Bogott, N., & van Wyk, L. An (n.d.). Zooming in on Africa in the International Climate Negotiations. Retrieved from https://www.hss.de/download/publications/AMEZ_16_Klimawandel_07.pdf. (Accessed December 16, 2017).
- Bola-Popoola, A. G., Fakinle, B. S., Abosede Odunlami, O., Sonibare, J. A., & Odekanle, E. L. (2019). Investigation and Quantification of Carbon Footprint in Lagos Megacity. *Cogent Engineering*, 6(1), 1703470.
- Boon, R., Cockburn, J., Govender, N., Ground, L., Slotow, R., Mclean, C. ... & Roberts, D. (2016). Managing a threatened savanna ecosystem (KwaZulu-Natal Sandstone Sourveld) in an urban biodiversity hotspot: Durban, South Africa. *Bothalia-African Biodiversity & Conservation*, 46(2), 1-12.

- Bosello, F., Carraro, C., & De Cian, E. (2012). *CLIMATE CHANGE, ADAPTATION*. Copenhagen Consensus Center.
- Botai, C. M., Botai, J. O., De Wit, J. P., Ncongwane, K. P., & Adeola, A. M. (2017). Drought characteristics over the Western Cape province, South Africa. *Water*, 9(11), 876.
- Broto, V. C. (2017). Urban governance and the politics of climate change. *World development*, 93, 1-15.
- Budgit (2019). Lagos State Budget 2019. Retrieved from <https://yourbudgit.com/wp-content/uploads/2019/11/Lagos-State-Budget-2019-Budget.pdf> (Accessed March 14, 2020).
- Bulkeley, H. (2005) 'Reconfiguring Environmental Governance: Towards a Politics of Scales and Networks.' *Political Geography*, 24 (8). pp. 875-902.
- Buthelezi, N. N., Rawlins, B. K., Ilesanmi, K. D. & Oladejo, A. O. (2020). Economic Impacts of Drought on Water Users of uMhlathuze Municipality of South Africa. *Journal of Human Ecology*, 69(1-3), 127-133.
- Butler, C. D. (2018). Climate change, health and existential risks to civilization: a comprehensive review (1989–2013). *International journal of environmental research and public health*, 15(10), 2266.
- Butt, N., Shanahan, D. F., Shumway, N., Bekessy, S. A., Fuller, R. A., Watson, J. E., ... & Hole, D. G. (2018). Opportunities for biodiversity conservation as cities adapt to climate change. *Geo: Geography and Environment*, 5(1), e00052.
- Cairncross, E., Dalvie, A., Euripidou, R., Irlam, J., & Naidoo, R. N. (2018). Climate change, air pollution and health in South Africa. In Akhtar, R. & Palagiano, C. (eds). *Climate Change and Air Pollution* (pp. 327-347). Springer, Cham.
- Calitz, E., & Essop, H. (2013). Fiscal Centralisation in a Federal State: The South African Case. *Southern African Business Review*, 17(3), 131-155.
- Cameron, D. (2001). The Structures of Intergovernmental Relations. *International Social Science Journal*, (167), 121-127.
- Capizzi, P., Castro, E., Gonzalez, I., Kehew, R., Linderman, J., Lizarazo, P., Marmon, T. & van Staden, M. (2017). Enabling Subnational Climate Action through Multi-level Governance. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Bonn, Germany.
- Cassim, A., Radmore, J., Dinham, N. & McCallum (2020). South African Climate Finance Landscape 2020. Climate Policy Initiative, Bertha Centre and GreenCape, January 2021.

- Centres for Disease Control (2021, March 2). Climate Effects on Health. Climate and Health. Retrieved from <https://www.cdc.gov/climateandhealth/effects/default.htm> (Accessed May 8, 2021).
- Chersich, M. F., Wright, C. Y., Venter, F., Rees, H., Scorgie, F. & Erasmus, B. (2018). Impacts of Climate Change on Health and Wellbeing in South Africa. *International Journal of Environmental Research and Public Health*, 2018, (15) 1884; doi:10.3390/ijerph15091884.
- Chikulo, B.C. (2014). An Analysis of Climate Change, Poverty and Human Security in South Africa. *Journal of Human Ecology*, 47 (3), 295-303.
- Christoplos, I., Aben, C., Bashaasha, B., Dhungana, H., Friis-Hansen, E. Funder, M. ... & Sen, L. T. H. (2016). Understanding Subnational Climate Governance: Findings from Nepal, Uganda, Vietnam and Zambia. *Danish Institute for International Studies*, 2016 (5). Retrieved from http://pure.diiis.dk/ws/files/614369/DIIS_RP_2016_5_WEB.pdf (Accessed December 17, 2017).
- Chu, E. K., Hughes, S., & Mason, S. G. (2018). Conclusion: Multilevel governance and climate change innovations in Cities. In Chu, E. K., Hughes, S., & Mason, S. G. (eds). *Climate Change in Cities* (pp. 361-378). Springer, Cham.
- Climate Group (2021). About Us. Retrieved from <https://www.theclimategroup.org/about-us> (Accessed March 3, 2021).
- Climate Policy Watcher (2021, April 14). Cities and Global Environmental Governance. *Developing Countries*. Retrieved from <https://www.climate-policy-watcher.org/developing-countries/cities-and-global-environmental-governance.html> (Accessed June 9, 2021).
- Climate-KIC (2020, April 17). Will Covid-19 Derail Climate Finance? Opinion. Retrieved from <https://www.climate-kic.org/opinion/what-covid-19-could-mean-for-climate-finance/> (Accessed May 2, 2021).
- Coan, S. (2012, September 20). KZN Takes on Climate Change. *The Citizens* <https://www.news24.com/Archives/Witness/KZN-takes-on-climate-change-20150430> (Accessed December 12, 2017).
- Columbia Public Health (2021). Content Analysis. Population Health Methods. Retrieved from <https://www.publichealth.columbia.edu/research/population-health-methods/content-analysis> (Accessed November 4, 2021).
- Collumb, J. D. (2014). The Ideology of Climate Change Denial in the United States. *The European Journal of American Studies*. <https://doi.org/10.4000/ejas.10305>

- Cramer, F. E. (2019). South Africa's Quest for Power Sharing. *50 Shades of Federalism*. Retrieved from <http://50shadesoffederalism.com/case-studies/south-africas-quest-for-power-sharing/> (Accessed June 4, 2021).
- Croitoru, L., Chang, J. C., & Kelly, A. (2020). The cost of air pollution in Lagos. *World Bank, Washington, DC*. © *World Bank*. <https://openknowledge.worldbank.org/handle/10986/33038> License: CC BY 3.0 IGO.
- Danladi, I. B., Gül, M., & Ateş, E. (2020). Response of the barrier island coastal region of southwestern Nigeria to climate and non-climate forcing. *African Journal of Marine Science*, 42(1), 43-51.
- Danladi, I. B., Kore, B. M., & Gül, M. (2017). Vulnerability of the Nigerian coast: An insight into sea level rise owing to climate change and anthropogenic activities. *Journal of African Earth Sciences*, 134, 493-503.
- de Oliveira, J. A. P. (2019). Intergovernmental relations for environmental governance: Cases of solid waste management and climate change in two Malaysian States. *Journal of environmental management*, 233, 481-488.
- Death, C. (2012). A predictable disaster for the climate—but who else won and lost in Durban at COP17? *Environmental Politics*, 21(6), 980-986.
- Department of Environmental Affairs (2011). National Climate Change Response White Paper. Pretoria.
- Department of Environmental Affairs (2012). 2nd South Africa Environmental Outlook: A Report on the State of Environment. Air Quality. Department of Environmental Affairs, Pretoria, pp. 181-207.
- Department of Environmental Affairs (2013). Long-Term Adaptation Scenarios Flagship Research Programme (LTAS) for South Africa. Summary for Policy-Makers. Pretoria, South Africa.
- Department of Environmental Affairs (2016). Towards the development of a GHG emissions baseline for the agriculture, forestry and other land use (AFOLU) sector in South Africa. Pretoria, South Africa.
- Diego, L. A. (2020). Scope and Delimitation & Benefits and Beneficiaries of Research. Department of Education. Retrieved from <https://philpapers.org/archive/DIESAD.pdf> (Accessed March 18, 2020).
- Dipeolu, A. A., & Ibem, E. O. (2020). Green infrastructure quality and environmental sustainability in residential neighbourhoods in Lagos, Nigeria. *International Journal of Urban Sustainable Development*, 12(3), 267-282.

- Dlamini, S. (2021, May 12). KwaZulu-Natal announces Climate Change and Sustainable Development Council. Retrieved from <https://www.engineeringnews.co.za/article/kzn-announces-climate-change-and-sustainable-development-council-2021-05-12> (Accessed June 8, 2021).
- Donkor, F. K., & Mearns, K. (2020). The nexus of climate change and urban tourism in South Africa: Triaging challenges and optimising opportunities. In Leonard, L., Musavengane, R. & Siakwah, P. (Eds). *Sustainable Urban Tourism in Sub-Saharan Africa: Risks and Resilience*. (pp. 167-181). Routledge.
- Drysdale, R. E., Bob, U., & Moshabela, M. (2021). Coping through a drought: the association between child nutritional status and household food insecurity in the district of iLembe, South Africa. *Public health nutrition*, 24(5), 1052-1065.
- Drysdale, R. E., Moshabela, M., & Bob, U. (2019). Adapting the Coping Strategies Index to measure food insecurity in the rural district of iLembe, South Africa. *Food, Culture & Society*, 22(1), 95-110.
- Dube, L. T., & Jury, M. R. (2000). The nature of climate variability and impacts of drought over KwaZulu-Natal, South Africa. *South African Geographical Journal*, 82(2), 44-53.
- Duggan, J. (2019). The Role of Sub-state and Non-state Actors in International Climate Processes: Subnational Governments. *Chatham House*.
- Duguma, L. A., Wambugu, S. W., Minang, P. A. & Van Noordwijk, M. (2014). A Systematic Analysis of of Enabling Conditions for Synergy between Climate Change Mitigation and Adaptation Measures in Developing Countries. *Environmental Science & Policy*, 42, 138-148.
- Dumanoski, D. (2011, June). The Ultimate Stakes: Climate Change and the Fate of Civilization. *Viewpoints on Sustainability from Second Nature*. Retrieved from <https://mxcc.edu/wp-content/uploads/2013/10/climate-science.pdf> (Accessed January 12, 2018).
- Dunlap R. E. & McCright, A. M. (2011). Organised Climate Change Denial. In Dryzek J. S., Norgaard, R. B. & Schlosberg, D. (Eds). *The Oxford Handbook of Climate and Society*. India: Oxford University Press
- Durban Adaptation Charter (2015). Central Kwazulu Natal Climate Change Compact Meeting. Retrieved from <http://www.durbanadaptationcharter.org/adaptive/the-central-kwazulu-natal-climate-change-compact-meeting> (Accessed August 6, 2020).
- Eeley, H. A., Lawes, M. J., & Piper, S. E. (1999). The influence of climate change on the distribution of indigenous forest in KwaZulu-Natal, South Africa. *Journal of Biogeography*, 26(3), 595-617.
- Eko Atlantic (2018). History of the Great Wall of Lagos. Retrieved from <https://www.ekoatlantic.com/education/sea-wall/> (Accessed May 13, 2020).

- Elias, P. (2018). The Challenges of Climate Change Communication for Lagos Coastal Communities. In Filho, W.L., Manolas, E., Azul, A. M., Azietiro, U. M., McGhie, H. (Eds) *Handbook of Climate Change Communication: Vol. 2*. Springer, Cham, 129-145.
- Elias, P. and Omojola, O. (2015). Case Study: The Challenges of Climate Change for Lagos, Nigeria. *Current Opinion in Environmental Sustainability* 13, 74–78.
- Elum, Z. A., & Mjimba, V. (2016). Green economy transition and the sustainability of the Nigerian aquaculture industry: Policy perspectives and the way forward. *African Journal of Science, Technology, Innovation and Development*, 8(3), 309-319.
- Elum, Z. A., Modise, D. M., & Nhamo, G. (2017). Climate change mitigation: the potential of agriculture as a renewable energy source in Nigeria. *Environmental Science and Pollution Research*, 24(4), 3260-3273.
- Enemuo, F. C. (1999). Approaches and Methods to the Study of Politics. In Anifowose, R. and Enemuo, F. (Eds). *Elements of Politics*. Lagos: Sam Iroanusi Publications.
- Enongene, K. E., Abanda, F. H., Otene, I. J. J., Obi, S. I., & Okafor, C. (2019). The potential of solar photovoltaic systems for residential homes in Lagos city of Nigeria. *Journal of environmental management*, 244, 247-256.
- Esan, W., Akinola, J., Onakoya, D., & Monnou, G. (2021). Renewable Energy in Nigeria: Law, Regulation, Trends and Opportunities. International Bar Association. Retrieved from <https://www.ibanet.org/renewable-energy-nigeria>. (Accessed May 14, 2021).
- eThekwini Municipality (2010). State of Biodiversity Report 2008/2009, Durban, Republic of South Africa: eThekwini Municipality, Environmental Planning and Climate Protection Department.
- eThekwini Municipality (2019). Durban Climate Action Plan 2019. Towards Climate Resilience and Climate Neutrality. eThekwini Municipality.
- Ezema, I. C., Opoko, P. A., & Oluwatayo, A. A. (2016). De-carbonizing the Nigerian housing sector: the role of life cycle CO₂ assessment. *International Journal of Applied Environmental Sciences*, 11(1), 325-349.
- Falkner, R. (2016). The Paris Agreement and the new logic of international climate politics. *International Affairs*, 92(5), 1107-1125.
- Fankhauser, S., & Sternab, N. (2016). Climate Change, Development, Poverty and Economics.. Grantham Research Institute on Climate Change and the Environment. Retrieved from <https://thedocs.worldbank.org/en/doc/728181464700790149-0050022016/original/NickSternPAPER.pdf> (Accessed March 13, 2020).

- Fasona, M. J., Muiyolu, S. K., Soneye, A. S., Ogundipe, O. T., Otusanya, O. O., Adekanmbi, O. H., ... & Onuminya, T. (2019). Temporal analysis of the present and future climate of the Lagos coastal environment. *UNILAG Journal of Medicine, Science and Technology*, 7(1), 113-128.
- Fatoki, O. I. & Sasona, S. J. (2016). Financing Climate Change in Nigeria. *Uniosun International Journal of Accounting and Finance*, 1, 75-89.
- Feulner, G. (2017). Global challenges: Climate change. *Global Challenges*, 1(1), 5.
- Filani, M. O. (2012). The changing face of Lagos: From vision to reform and transformation. *Report funded by Foundation for Development and Environmental Initiatives (Nigeria), and Cities Alliance*. Retrieved from <https://www.citiesalliance.org/sites/default/files/Lagos-reform-report-lowres.pdf> (Accessed May 12, 2019).
- Fitchett, J. & Hoogendoorn, G. (2017). Climate change could leave South African tourism high and dry. In *International Trade Forum* (No. 1, pp. 24-25). International Trade Centre UNCTAD/WTO.
- Folarin, S. (2010). The Spatial Economy of Abjection: The Evacuation of Maroko Slum in Nigeria. In Adebani, W. & Obadare, E. (Eds). *Encountering the Nigerian State*. Palgrave Macmillan, New York, 55-78.
- Gao, Y., Gao, X., & Zhang, X. (2017). The 2 C global temperature target and the evolution of the long-term goal of addressing climate change—from the United Nations framework convention on climate change to the Paris agreement. *Engineering*, 3(2), 272-278.
- Garland, R. M. (2014). National policy response to climate change in South Africa. *South African Medical Journal*, 104(8), 584-584.
- Gauga, O. P. (2003). *An introduction to political theory*. Macmillan.
- Georgeson, L., Maslin, M., Poessinouw, M., & Howard, S. (2016). Adaptation responses to climate change differ between global megacities. *Nature Climate Change*, 6(6), 584-588.
- Gilder, A. & Rumble, O. (2021). Implications of COVID-19 for Climate Finance in Africa. South African Institute of International Affairs. African Perspectives Global Affairs. Occasional Paper 320, May 21, 2021.
- Glick, D. (n.d.). The Big Thaw: As the climate warms, how much, and how quickly, will Earth's glaciers melt? National Geographic: Article. Retrieved <https://www.nationalgeographic.com/environment/article/big-thaw> (Accessed June 16, 2021).

- Goble, B. J., Hill, T. R. and Philips, M. R. (2017). An Assessment of Integrated Coastal Management Governance and Implementation Using DPSIR Framework: Kwazulu Natal, South Africa. *Coastal Management*, 45 (2), 107-124.
- Goodwin, D., Pope, C., Mort, M., & Smith, A. (2003). Ethics and ethnography: An experiential account. *Qualitative health research*, 13(4), 567-577.
- Greyling, J. C., Vink, N., & Mabaya, E. (2015). South Africa's agricultural sector twenty years after democracy (1994 to 2013). *Professional Agricultural Workers Journal*, 3(1), 10.
- Gruzd, S. (2014). African Peer Review Mechanism: Development Lessons from Africa's Remarkable Governance Assessment System. South African Institute of International Affairs. Good Governance and APRM Research Report 15, January 2014.
- Guest, G., Namey, E., & Chen, M. (2020). A simple method to assess and report thematic saturation in qualitative research. *PLoS One*, 15(5), e0232076.
- Gupte, E. (2020, December 1). Nigeria to push CNG as alternative transport fuel, reduce reliance on gasoline. S&P Global Platts. Energy Transition: Natural Gas: Oil. Retrieved from <https://www.spglobal.com/platts/en/market-insights/latest-news/oil/120120-nigeria-to-push-cng-as-alternative-transport-fuel-reduce-reliance-on-gasoline> (Accessed May 14, 2021).
- Hakkinen, K. & Akrami, N. (2014). Ideology and Climate Change Denial. *Personality and Individual Differences*, 70(2014), 52-65.
- Hannaford, M. J. and Nash, D. J. (2016). Climate, History, Society over the Last Millennium in Southeast Africa. *WIREs Clim Change* 2016, 7, 370–392.
- Haug, R. (2018). Food security indicators: how to measure and communicate results. *Noragric Report*, (83).
- Health Policy Project (2020). Geohealth Mapping GIS Training for Monitoring and Evaluating of Strategic Information Officers and Data Analysts for HIV. Retrieved from <https://www.healthpolicyproject.com/geoHealth/index.cfm?page=52> (Accessed August 30, 2020).
- Healy, A., Upton, K., Capstick, S., Bristow, G., Tijani, M., MacDonald, A. ... & Allan, S. (2020). Domestic groundwater abstraction in Lagos, Nigeria: a disjuncture in the science-policy-practice interface? *Environmental Research Letters*, 15(4), 045006.
- Heft-Neal, S., Burney, J., Bendavid, E., & Burke, M. (2018). Robust relationship between air quality and infant mortality in Africa. *Nature*, 559(7713), 254-258.
- Heider, H., 2019. Climate Change in Nigeria, Impacts and Responses, [pdf] Help Desk Report: Knowledge, Evidence and Learning for Development [K4D].

- Hendriks, C. J. (2017). The Effect of South Africa's Intergovernmental Fiscal Relations Policies on Accountability in Provincial Governments—An Empirical Case Study. *Politikon*, 44(2), 305-326.
- Hlahla, S. (2017). *Climate change responses in urban low-income groups, Pietermaritzburg, KwaZulu-Natal, South Africa*. Doctoral Dissertation submitted to the University Of Kwazulu Natal South Africa.
- Hlahla, S., & Hill, T. R. (2018). Responses to climate variability in urban poor communities in Pietermaritzburg, KwaZulu-Natal, South Africa. *Sage Open*, 8(3), 2158244018800914.
- Homsy, G. C., Liu, Z. & Warner, M. E. (2018). Multilevel Governance: Framing the Integration of Top-Down and Bottom-Up Policymaking. Public Administration Faculty Scholarship. 45. Retrieved from https://orb.binghamton.edu/public_admin_fac/45 (Accessed April 6, 2020).
- Hoogendoorn, G., & Fitchett, J. M. (2018). Tourism and climate change: A review of threats and adaptation strategies for Africa. *Current Issues in Tourism*, 21(7), 742-759.
- Hunter, N. B., North, M. A., Roberts, D. C., & Slotow, R. (2020). A systematic map of responses to climate impacts in urban Africa. *Environmental Research Letters*, 15(10), 103005.
- Ibbih, J. M., & Idiagi, C. I. (2015). Fiscal Federalism and Framework for Fiscal Policy in Nigeria. *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)*, 6(2), 110-121.
- Ibekwe, C. C., Oli, N. P., Nwankwo, I. U., & Ikezue, C. E. (2018). Perceptions of the Social Consequences of Rape in Ezinihitte-Mbaise, Imo State, Nigeria. *American Journal of Humanities and Social Sciences Research (AJHSSR)*.
- Ike, C.C., Ezeibe, C.C., Anijiofor, S.C., Nik-Daud, N.N. (2018). Solid Waste Management in Nigeria: Problems, Prospects and Policies. *Journal of Solid Waste Management* 44(2) 163-172.
- Ikpeze, O. V. (2015). Non-justiciability of Chapter II of the Nigerian constitution as an impediment to Economic Rights and Development. *Developing Country Studies*, 5(18), 48-56.
- Ile, I. U. (2010). Strengthening intergovernmental relations for improved service delivery in South Africa: Issues for consideration. *Journal of US-China Public Administration*, 7 (1), 51-57.
- Ilevbare, M. F. (2019). Investigating Effects of Climate Change on Health Risks in Nigeria. In Uher, I. (Eds). *Environmental Factors Affecting Human Health*. IntechOpen.

- International Institute for Environment and Development (2014). Climate Change Financing in Kenya. *Policy and Planning Briefing*, April 2014.
- International Labour Organisation (2011). Local Investments for Climate Change Adaptation: Green Jobs through Green Works / ILO Regional Office for Asia and the Pacific. - Bangkok: ILO.
- International Labour Organisation (2018). The employment impact of climate change adaptation. Input Document for the G20 Climate Sustainability Working Group. Geneva, ILO.
- IPCC (2001). Climate Change 2001: Synthesis Report. Retrieved from <https://archive.ipcc.ch/ipccreports/tar/vol4/index.php?idp=204> (Accessed May 2, 2020).
- IPCC (2021). Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.
- IPCC (2018). Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.
- Jagarnath, M., & Thambiran, T. (2018). Greenhouse gas emissions profiles of neighbourhoods in Durban, South Africa—an initial investigation. *Environment and Urbanization*, 30(1), 191-214.
- Jaggernath, J. (2010). Environmental conflicts in the South Durban Basin: Integrating residents' perceptions and concerns resulting from air pollution. *African Journal on conflict resolution*, 10(2).
- Jewitt, D. (2017). *Land cover and climate change threats to savanna and grassland habitats in KwaZulu-Natal*. Doctoral Dissertation submitted to the University of the Witwatersrand, Johannesburg, South Africa.
- Jewitt, D., Goodman, P. S., Erasmus, B. F., O'Connor, T. G., & Witkowski, E. T. (2017). Planning for the maintenance of floristic diversity in the face of land cover and climate change. *Environmental Management*, 59(5), 792-806.

- Jewitt, D., Goodman, P. S., Erasmus, B. F., O'Connor, T. G., & Witkowski, E. T. (2015). Systematic land-cover change in KwaZulu-Natal, South Africa: Implications for biodiversity. *South African Journal of Science*, 111(9-10), 01-09.
- Johnson, C. A. (2018). *The Power of Cities in Global Climate Politics: Saviour, Supplicants or Agents of Change?* London: Palgrave MacMillan.
- Kataneksza, J., Mehta, R. A. & Weingarten, G. A. (2012). Confronting Food Insecurity: addressing Food Access and Availability in Kwazulu Natal. Graduate Program in International Affairs at The Milano School of International Affairs, Management and Urban Policy. Retrieved from <https://milanoschool.org/wp-content/uploads/2013/11/RWMPIA2012-FinalReport.pdf> (Accessed June 3, 2020).
- Kellow, A., & Murphy-Gregory, H. (2018). NGOs and multi-level, multi-arena governance. In *Handbook of Research on NGOs*. Edward Elgar Publishing.
- Khumalo, S. A. (2016). Environmental impact of household solid waste disposal practices on plant growth in rural areas of KwaZulu-Natal: A case study of UThukela District Municipality. Master Dissertation submitted to the *University of South Africa, South Africa*.
- Klein, N. (2015). *This changes everything: Capitalism vs. the climate*. Simon and Schuster.
- Klein, R. J., Huq, S., Denton, F., Downing, T. E., Richels, R. G., Robinson, J. B., & Toth, F. L. (2007). Inter-relationships between adaptation and mitigation. In *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Cambridge University Press, Cambridge, 2007, p. 745-777.
- Kleinheksel, A. J., Rockich-Winston, N., Tawfik, H., & Wyatt, T. R. (2020). Demystifying content analysis. *American journal of pharmaceutical education*, 84(1).
- Koehn, P. H. (2008). Underneath Kyoto: emerging subnational government initiatives and incipient issue-bundling opportunities in China and the United States. *Global Environmental Politics*, 8(1), 53-77.
- Kolade, O. and Ibrahim, G. (2017) A new framework for understanding and resolving farmers-herdsmen conflict in Nigeria. Paper presented at the Development Studies Association 2017 Annual Conference, Bradford, England. 6-8 September 2017.
- Komolafe, A. A., Adegboyega, S. A. A., & Akinluyi, F. O. (2015). A review of flood risk analysis in Nigeria. *American journal of environmental sciences*, 11(3), 157.
- Kumar, R. (2018). *Research methodology: A step-by-step guide for beginners*. Sage.

- KZN DARD (2021). Natural Resources: Nqutu Veld Report. Retrieved from <https://www.kzndard.gov.za/natural-resources> (Accessed on June 15, 2021).
- KZN EDTEA (2014). Kwazulu Natal Environmental Strategic Plan 2014/2019. Retrieved from <https://www.kznedtea.gov.za/documents/Environmental%20Management%20Strategic%20Plan%202014-2019.pdf> (Accessed August 10, 2020).
- KZN EDTEA (2018). Budget Policy Speech for 2018/2019 Delivered to the Kwazulu-Natal Provincial Legislature By MEC for Economic Development, Tourism & Environmental Affairs, Mr Sihle Zikalala, On The 15th Of May 2018. Pietermaritzburg, South Africa.
- KZN EDTEA (2019). KZN EDTEA Annual Report 2018/2019. Retrieved from <https://www.kznedtea.gov.za/documents/Annual%20Report%202018-2019.pdf> (Accessed August 10, 2020).
- KZN EDTEA (2020). Five Year Strategic Plan (2020-2025). <https://www.kznedtea.gov.za/documents/EDTEA%20Final%20Draft%20Strategic%20Plan%20for%202020%20to%202025%20-%20Not%20Approved.pdf> (Accessed August 10, 2020).
- KZN Provincial Planning Commission (2014). 2030 Provincial Growth and Development Plan: Building a Better Together. Retrieved from <https://www.kznedtea.gov.za/documents/Provincial%20Growth%20%20Development%20Plan%20KZN%202030%20-%20August%202014.pdf> (Accessed August 10, 2020).
- Lagos State Government (2016). The Ambode Administration: The Torch Bearers of Excellence. Lagos State Ministry of Information and Strategy.
- Lagos State Government (2021). Second Five Year Climate Action Plan 2020 – 2025. Ministry of Environment and Water Resources.
- Lawanson, T. (2016). Potentials of the urban poor in shaping a sustainable Lagos metropolis. In Allen, A., Lampis, A., & Swilling, M. (2016). *Untamed urbanisms*. Taylor & Francis.
- Lawanson, T., Orelaja, O., & Simire, M. (2014). Effects of climate change on a peri-urban farming community in Lagos, Nigeria. *African Journal of Science, Technology, Innovation and Development*, 6(6), 511-517.
- Le, T. H., Somerville, R., Cubash, U., Ding, Y., Mauritzen, C., Mokssit, A., Peterson, T & Prather, M. (2007). Historical overview of climate change science. In Solomon, S., Qin, D., Manning, M., Chen, Z., Marquis, M. Averyt, K. B., Tignor, M & Miller, H. L. (eds.), *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press (2007).
- Leal Filho, W., Balogun, A. L., Ayal, D. Y., Bethurem, E. M., Murambadoro, M., Mambo, J., ... & Mugabe, P. (2018). Strengthening climate change adaptation capacity in Africa-case

- studies from six major African cities and policy implications. *Environmental Science & Policy*, 86, 29-37.
- Leck, H., & Simon, D. (2018). Local authority responses to climate change in South Africa: the challenges of transboundary governance. *Sustainability*, 10(7), 2542.
- Lervik, M., & Sutherland, C. (2017). Local climate governance in the Global South: The case of eThekweni Municipality and the Responsible Accommodation Campaign. *Environmental Policy and Governance*, 27(4), 325-335.
- Lesnikowski, A., Ford, J., Biesbroek, R., Berrang-Ford, L., Maillet, M., Araos, M., & Austin, S. E. (2017). What does the Paris Agreement mean for adaptation?. *Climate Policy*, 17(7), 825-831.
- Local Government Climate Change Support Programme (n.d.). A Toolkit to Integrating Climate Change Risks and Opportunities into Municipal Planning: Kwazulu Natal. Retrieved from <http://www.letsrespondtoolkit.org/municipalities/kwazulu-natal> (Accessed June 6, 2017).
- Mahlalela, P. T., Blamey, R. C., Hart, N. C. G., & Reason, C. J. C. (2020). Drought in the Eastern Cape region of South Africa and trends in rainfall characteristics. *Climate Dynamics*, 55(9), 2743-2759.
- Mani, S., Osborne, C. P., & Cleaver, F. (2021). Land degradation in South Africa: Justice and climate change in tension. *People and Nature*, 3(5), 978-989.
- Marks, G., & Hooghe, L. (2003). *National identity and support for European integration* (No. SP IV 2003-202). WZB Discussion Paper.
- Marquardt, J. (2017). Conceptualizing power in multi-level climate governance. *Journal of Cleaner Production*, 154, 167-175.
- Marsh, D., Ercan, S. A., & Furlong, P. (2017). A skin not a pullover: Ontology and epistemology in political science. In Lowndes, V., Marsh D. & Stoker, G. (eds). *Theory and Methods in Political Science*, 177-198.
- Mash, R. (2009). Climate change and the health profession in South Africa. *South African Family Practice*, 51(5), 404-407.
- Masinga, F. N., Maharaj, P., & Nzima, D. (2021). Adapting to changing climatic conditions: perspectives and experiences of women in rural KwaZulu-Natal, South Africa. *Development in Practice*, 31(8), 1002-1013.
- Maslin, M. (2019). The Five Corrupt Pillars of Climate Change Denial. *The Conversation: Africa* Retrieved from <https://theconversation.com/the-five-corrupt-pillars-of-climate-change-denial-122893> (Accessed May 8, 2022).

- Mather, A. A., & Roberts, D. C. (2015). Climate change and the coasts of Africa. Retrieved from https://www.researchgate.net/profile/Debra-Roberts/publication/311257870_Climate_change_and_the_coasts_of_Africa_Durban_case_study/links/58653f1108ae6eb871adb3ce/Climate-change-and-the-coasts-of-Africa-Durban-case-study.pdf (Accessed December 10, 2018).
- Mather, A. A., & Stretch, D. D. (2012). A perspective on sea level rise and coastal storm surge from Southern and Eastern Africa: A case study near Durban, South Africa. *Water*, 4(1), 237-259.
- Mather, A. & Theron, A. (n.d.). Recent Extreme Events along the Coast of South Africa. Retrieved from <http://www.cfoo.co.za/docs/stormsurge/Item%203%20Extreme%20events%20AM%20et%20al%20revised.pdf> (Accessed January 10, 2018).
- McMichael AJ. (2019). Climate change and human health. In: Commonwealth Secretariat, editor. Commonwealth Health Minister`s Update 2009. Woodbridge, UK: Pro-Brook Publishing Ltd.
- Meerow, S., & Mitchell, C. L. (2017). Weathering the storm: The politics of urban climate change adaptation planning. *Environment and Planning A: Economy and Space*, 49(11), 2619-2627.
- Mehrotra, S., Natenzon, C. E., Omojola, A., Folorunsho, R., Gilbride, J., & Rosenzweig, C. (2009, June). Framework for city climate risk assessment. In *Fifth Urban Research Symposium, Marseille, France* (pp. 28-30).
- Mélières, M. A., & Maréchal, C. (2015). *Climate Change: Past, Present, and Future*. John Wiley & Sons.
- Mentzel, Clive & Fick, J. (1996). Transformation Perspectives on Policy Management: Dynamics of Intergovernmental Relations with Specific Reference to the Eastern Cape. *Africanus*, 26(2), 96-149.
- Merriam, S. B., & Tisdell, E. J. (2016). Designing your study and selecting a sample. *Qualitative research: A guide to design and implementation*, 67(1), 73-104.
- Mgbemene, C. A., Nnaji, C. C., & Nwozor, C. (2016). Industrialization and its backlash: focus on climate change and its consequences. *Journal of Environmental Science and Technology*, 9(4), 301-316.
- Mikulewicz, M., & Taylor, M. (2020). Getting the resilience right: climate change and development policy in the ‘African Age’. *New Political Economy*, 25(4), 626-641.
- Montmasson-Clair, G. (2013). Tracking Climate Finance Inflows to South Africa. Available at SSRN 2748010.

- Montmasson-Clair, G., & Zwane, M. (2016). Climate change adaptation and agriculture in South Africa: a policy assessment. *Report compiled for WWF-SA. South Africa.*
- Moodley, Y., Tanser, F. & Tomita, A. (2021). Temperature at conception and pregnancy loss in rural KwaZulu-Natal Province, South Africa: Implications for climate change policy in sub-Saharan African settings. doi: <https://doi.org/10.1101/2021.03.18.21253882>.
- Moon, K., & Blackman, D. (2014). A guide to understanding social science research for natural scientists. *Conservation Biology*, 28(5), 1167-1177.
- Moran, A. (2011). *Climate Change Adaptation in Nigeria: Key Considerations for Decision Makers*. Working Paper. KONRAD Adenauer Stifting Nigeria Office.
- Moran, D., Kanemoto, K., Jiborn, M., Wood, R., Többen, J., & Seto, K. C. (2018). Carbon footprints of 13 000 cities. *Environmental Research Letters*, 13(6), 064041.
- Mubangizi, J. C. (2006). The Constitutional Protection of Socio-Economic Rights in selected African countries: a comparative evaluation. *African Journal of Legal Studies*, 2(1), 1-19.
- Murray, C., & Simeon, R. (2011). Promises Unmet: Multi-level Government in South Africa. In R. Saxena (Ed.), *Varieties of Federal Governance: Major Contemporary Models*. Foundation Books, 232-260.
- Myers, J. E., & Rother, H. A. (2012). Public health impact of and response to climate change in South Africa. *South African health review*, 2012(1), 127-138.
- Mzimela, J., & Ahmed, F. (2018). An intersectional lens on the food-energy-water Nexus; on rural women's livelihood vulnerability reflection from Ndwedwe-Cibane, KwaZulu-Natal. *Africa Insight*, 48(3), 73-87.
- Naidu, L. (n.d.). Climate Change in South Durban. Retrieved from <https://yorkspace.library.yorku.ca/xmlui/bitstream/handle/10315/27508/CHAPTER%205.pdf?sequence=5&isAllowed=y> (Accessed February 8, 2019).
- Nakhooda, S., Caravani, A., Bird, N., & Schalatek, L. (2011). Climate Finance Policy Brief: Climate Finance in Sub-Saharan Africa. Overseas Development Institute.
- National Academy of Sciences & The Royal Society (2020). Climate Change: Evidences and Causes. Retrieved from https://royalsociety.org/~media/royal_society_content/policy/projects/climate-evidence-causes/climate-change-evidence-causes.pdf (Accessed December 12, 2020).
- National Aeronautics and Space Administration (NASA) (2021). Responding to Climate Change. Retrieved from <https://climate.nasa.gov/solutions/adaptation-mitigation/> (Accessed July 18, 2021).

- National Institute of Communicable Diseases (2020, December 30). Latest Confirmed Cases of Covid-19 in South Africa (December 30, 2020). Media Statement. Retrieved from <https://www.nicd.ac.za/latest-confirmed-cases-of-covid-19-in-south-africa-30-dec-2020/> (Accessed March 17, 2021).
- National Institute of Communicable Diseases (2020, March 5). First Case of Covid-19 Coronavirus Reported in SA. Retrieved from <https://www.nicd.ac.za/first-case-of-covid-19-coronavirus-reported-in-sa/> (Accessed June 14, 2021).
- Ndimande, P.S.M (2001). Gender Inequality: Still a critical issue in the development of rural KwaZulu-Natal. Ndimande, P. S. M. (2001). *African Sociological Review / Revue Africaine de Sociologie*, 5(2). doi:10.4314/asr.v5i2.23196.
- Ndlovu, M. S., & Demlie, M. (2020). Assessment of meteorological drought and wet conditions using two drought indices across KwaZulu-Natal Province, South Africa. *Atmosphere*, 11(6), 623.
- Ndlovu, M., Clulow, A. D., Savage, M. J., Nhamo, L., Magidi, J., & Mabhaudhi, T. (2021). An Assessment of the Impacts of Climate Variability and Change in KwaZulu-Natal Province, South Africa. *Atmosphere*, 12(4), 427.
- Nelson, H. T., Rose, A., Wei, D., Peterson, T., & Wennberg, J. (2015). Intergovernmental climate change mitigation policies: theory and outcomes. *Journal of Public Policy*, 35(1), 97-136.
- Neumann, B., Vafeidis, A. T., Zimmermann, J., & Nicholls, R. J. (2015). Future coastal population growth and exposure to sea-level rise and coastal flooding-a global assessment. *PloS one*, 10(3), e0118571.
- New World Encyclopaedia (2018). Lagos. Retrieved from <https://www.newworldencyclopedia.org/entry/Lagos> (Accessed August 14, 2018).
- Newcastle University (2021). Content Analysis. Institute for Social Sciences. Retrieved from <https://www.ncl.ac.uk/social-science/research/methods-hub/research-methods/content-analysis/> (Accessed June 10, 2021).
- Newig, J. and Fritsch, O. (2008). Environmental Governance: Participatory, Multilevel and Effective? *UFZ Diskussionspapiere*, No. 15/2008.
- Nganje, F. (2015). Moving Beyond Africa's Crisis of Institutions. South African Institute of International Affairs. Occasional Paper 222, Governance and APRM, September 2015.
- Nhamo, G., & Nhamo, S. (2016). Paris (COP21) Agreement: Loss and damage, adaptation and climate finance issues. *International Journal of African Renaissance Studies-Multi-, Inter-and Transdisciplinarity*, 11(2), 118-138.

- Nhemachena, C., Nhamo, L., Matchaya, G., Nhemachena, C. R., Muchara, B., Karuaihe, S. T., & Mpandeli, S. (2020). Climate change impacts on water and agriculture sectors in Southern Africa: threats and opportunities for sustainable development. *Water*, 12(10), 2673.
- Niang, I., Ruppel, O., Abdrabo, M., Essel, A., Lennard, C., Padgham, J., & Urquhart, P. (2014). Africa: Impacts, adaptation and vulnerability, regional aspects, contribution of working group II to the fifth assessment report of the Intergovernmental Panel on Climate Change.
- Nigeria Centre for Disease Control (2020). Covid-19 Situation Report. Weekly Epidemiological Report, Week 52, December 21 – 27, 2020. Retrieved from [file:///C:/Users/NEW/Downloads/An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria 261220 52.pdf](file:///C:/Users/NEW/Downloads/An%20update%20of%20COVID-19%20outbreak%20in%20Nigeria%202020%2052.pdf) (Accessed March 17, 2021).
- Njoku, K. L., Rumide, T. J., Akinola, M. O., Adesuyi, A. A., & Jolaoso, A. O. (2016). Ambient air quality monitoring in metropolitan city of Lagos, Nigeria. *Journal of Applied Sciences and Environmental Management*, 20(1), 178-185.
- Nkoana, M. A. (2014). *Urban biodiversity management in the face of climate change: livelihood impacts and adaptation strategies in Inanda community of eThekweni Metropolitan Area, KwaZulu-Natal, South Africa* (Doctoral dissertation).
- Nkrumah, B. (2021). Beyond Tokenism: The “Born Frees” and Climate Change in South Africa. *International Journal of Ecology*, 2021, 1-10.
- Nkwunonwo Ugonna, C., Malcolm, W., & Brian, B. Relevance of Social Vulnerability Assessment to Flood Risk Reduction in the Lagos Metropolis of Nigeria. *British Journal of Applied Science & Technology* 8(4): 366-382, 2015.
- Nnaji, F. C., & Samuel, I. O. (2019). Implications of Climate Change and Farmers-Herdsman Conflict on Human Security in South-Eastern Nigeria. *African Journal of Politics and Administrative Studies*, 12, 1.
- Nsubuga, F. N. W., Mearns, K. F., & Adeola, A. M. (2019). Lake Sibayi variations in response to climate variability in northern KwaZulu-Natal, South Africa. *Theoretical and Applied Climatology*, 137(1), 1233-1245.
- Obi, C. (1997). Oil, environmental conflict and national security in Nigeria: ramifications of the ecology-security nexus for sub-regional peace. *ACDIS Occasional Paper*.
- Odigwe, D. A., & Aibieyi, S. (2015). Fiscal Federalism and Development in Nigeria. *African Journal of Governance and Development*, 4(1), 75-92.
- Odogun, A., & Georgakis, P. (2019). Transport pollution: A research of the Nigerian transport sector. *Int. J. Innov. Technol. Explor. Eng.*, 8(11S), 492-497.

- Ogbonna, C., Albrecht, E., & Schönfelder, R. (2017). Adaptation opportunities to climate variability and potential effects on sustainable development. The case of Nigeria's Niger Delta region. In Filho, W. L., Belay, S., Kalangu, J., Menas, W., Munishi, P. & Musiyiwa, K. (Eds). *Climate Change Adaptation in Africa* (pp. 711-726). Springer, Cham.
- Ojakorotu, V., & Olajide, B. (2018). Gendering climate change and human rights in Africa: the case of coastal communities in Lagos State, Nigeria. *African Journal of Peace and Conflict Studies*, 7(Special 1), 11-30.
- Ojakorotu, V., & Olajide, B. (2021). Introduction: Overview of Covid-19 and Gender Dynamics in Africa. In Ojakorotu, V., & Olajide, B. (Eds) *Proceedings on the Conference on the Implications of Covid-19 on Gender and Behaviour in Africa*.
- Ojomo, E., Elliott, M., Amjad, U., & Bartram, J. (2015). Climate change preparedness: A knowledge and attitudes study in southern Nigeria. *Environments*, 2(4), 435-448.
- Oke, Y. (2017, August 23). Conflicting laws keep Nigeria's electricity supply unreliable. The Conversation. Environment+Energy. Retrieved from <https://theconversation.com/conflicting-laws-keep-nigerias-electricity-supply-unreliable-81393> (Accessed June 6, 2022).
- Okoli, A. C., & Ogayi, C. O. (2018). Herdsmen militancy and humanitarian crisis in Nigeria: A theoretical briefing. *African Security Review*, 27(2), 129-143.
- Okpara, U. T., Stringer, L. C., & Dougill, A. J. (2016). Lake drying and livelihood dynamics in Lake Chad: Unravelling the mechanisms, contexts and responses. *Ambio*, 45(7), 781-795.
- Oladipo, E. (2010). Towards enhancing the adaptive capacity of Nigeria: A review of the country's state of preparedness for climate change adaptation. *Abuja, Nigeria: Report Submitted to Heinrich Böll Foundation Nigeria*.
- Oladokun, T. T. (2016). Effects of climate change on commercial properties in Lagos State, Nigeria. *African Journal of built environment research*, 1(1), 15-27.
- Olajide, B. (2020, August 12). Energy State in Nigeria through the NDC Lens. A Tweet Chat Session on #ClimateWednesday #KnowYourNDCs organized by the International Climate Change Development Initiative (ICCDI). @Deleism. Retrieved from <https://medium.com/climatewed/knowyourndcs-energy-state-in-nigeria-through-the-ndc-lens-by-deleism-f22e6cfcd507> (Accessed December 4, 2020).
- Olajide, B. (2022). Environmental Diplomacy and the Fallacy of Climate Bandwagoning in Africa. In Oloruntoba, S. O. & Falola, T. (eds). *The Palgrave Handbook of Africa and the Changing Global Order*. Palgrave Macmillan, Singapore.

- Olajide, B. E. & Ojakorotu, V. (2020). State and Hegemony in Nigeria: Implications for Environmental Politics. *International Journal of Criminology and Sociology*, 2020(9), 518-529.
- Olajide, B. E., Quadri, M. O., & Ojakorotu, V. (2018). Climate Change, Human Security and Good Governance in Nigeria. *African Renaissance*, 15(3), 173-196.
- Olajide, B., Tshidzumba, A. & Ojakorotu, V. (2020). Climate Change and the Politics of Implementation of the Nationally Determined Contributions (NDCs) in Africa. *Journal of Nation Building and Policy Studies*, Special Issue (July 2020), 45-63.
- Olaniyi, O. A., Olutimehin, I. O. & Funmilayo, O. A. (2019). Review of Climate Change and Its effect on Nigeria Ecosystem. *International Journal of Rural Development, Environment and Health Research*, 3(3), 92-100.
- Olukanni, D. O., & Oresanya, O. O. (2018). Progression in waste management processes in Lagos State, Nigeria. *International Journal of Engineering Research in Africa*, 35, 11-23). Trans Tech Publications Ltd.
- Olumuyiwa, A. J. & Ibrahim, S. M. (2021). Effects of Covid-19 on the Economy of an Oil Dependent Nigeria. *Journal of Energy Technologies and Policy*, 11 (1), 11-21.
- Olurode, L., Isola, W., & Adebisi, D. (2018). Urbanization and Energy Crisis: the Case of Lagos State. *Sociology and Anthropology*, 6(11). DOI: 10.13189/sa.2018.061105.
- Olutola, O. (2019). Nigeria-South Africa Relations in the Context of Climate Change: Prospects and Challenges. In Tella, O. (Ed). *Nigeria-South Africa Relations and Regional Hegemonic Competence* (pp. 71-86). Springer, Cham.
- Omitola, B. (2016). The politics of fiscal federalism and the challenges of development in Nigeria. *International Journal of Development and Sustainability*, 5(4), 169-189.
- Omole, D. O., Isiorho, S. A., & Ndambuki, J. M. (2016). Waste management practices in Nigeria: Impacts and mitigation. *Geological Society of America Special Papers*, 520, SPE520-33.
- Onah, E. I. & Olajide, B. E. (2020). Applying Restorative Justice in Resolving the Farmers-Herdsmen conflict in Nigeria. *African Journal on Conflict Resolution*, 20(1), 8-34.
- Onuoha, F. C., & Ezirim, G. E. (2010). Climate change and national security: Exploring the conceptual and empirical connections in Nigeria. *Journal of Sustainable Development in Africa*, 12(4), 255-269.
- Onyebuka, C.F. (2017). Study of Conflict Management and Resolutions: A Case of Marikana in South Africa and Ogoni in Nigeria. Doctoral Thesis submitted to the North West University, South Africa.

- Oruonye, E. D. (2011). An assessment of the level of awareness of the effects of climate change among students of tertiary institutions in Jalingo Metropolis, Taraba State Nigeria. *Journal of Geography and Regional Planning*, 4(9), 513-517.
- Osaghae, E. E. (1998). *Crippled giant: Nigeria since independence*. Indiana University Press.
- Osho, G. S., & Adishi, O. (2019). The effects of macroeconomic variables on Lagos state economy; as Lagos economy goes, so goes the economy of Nigeria. *Journal of Economics and Development Studies*, 7(1), 1-9.
- Otene, I. J., Murray, P., & Enongene, K. E. (2016). The potential reduction of Carbon Dioxide (CO₂) emissions from gas flaring in Nigeria's oil and gas industry through alternative productive use. *Environments*, 3(4), 31.
- Oteri, A. U., & Ayeni, R. A. (2016). The Lagos Megacity. *Water Megacities Glob Change*.
- Ovuyovwiroye, P. A. (2013). Analysis of climate change awareness in Nigeria. *Scientific Research and Essays*, 8(26), 1203-1211.
- Owolabi, H. A., Oyedele, L., Alaka, H., Ebohon, O. J., Ajayi, S., Akinade, O., ... & Olawale, O. (2019). Public private partnerships (PPP) in the developing world: mitigating financiers' risks. *World Journal of Science, Technology and Sustainable Development*.
- Owonikoko, S. B., & Momodu, J. A. (2020). Environmental degradation, livelihood, and the stability of Chad Basin Region. *Small Wars & Insurgencies*, 31(6), 1295-1322.
- Paglia, E. (2021). The Swedish initiative and the 1972 Stockholm Conference: the decisive role of science diplomacy in the emergence of global environmental governance. *Humanities and Social Sciences Communications*, 8(1), 1-10.
- Palmer, B., Van der Elst, R., & Parak, O. (2011). Understanding our Coast: A synopsis of KZN's coastal zone. KwaZulu-Natal Department of Agriculture. *Environmental Affairs and Rural Development, Cedara, Pietermaritzburg*.
- Pandy, W. R., & Rogerson, C. M. (2020). Tourism industry perspectives on climate change in South Africa. In Rogerson, J. & Visser, G. (eds). *New directions in South African tourism geographies* (pp. 93-111). Springer, Cham.
- Pandy, W. R., & Rogerson, C. M. (2021). Climate change risks and tourism in South Africa: Projections and policy. *GeoJournal of Tourism and Geosites*, 35(2), 445-455.
- Parker-Flynn, J. E. (2014). The intersection of mitigation and adaptation in climate law and policy. *Environs: Environmental Law & Policy Journal*, 38, 1.
- Parramon-Gurney, M., & Gilder, A. (2012). South Africa and the Durban Climate Negotiations: Challenges and Opportunities as Hosts of COP 17.

- Partelow, S., Schlüter, A., Armitage, D., Bavinck, M., Carlisle, K., Gruby, R. L., ... & Van Assche, K. (2020). Environmental governance theories: a review and application to coastal systems.
- Patrick, H. O. (2021). Climate change and water insecurity in rural uMkhanyakude District Municipality: an assessment of coping strategies for rural South Africa. *H2Open Journal*, 4(1), 29-46.
- Peltier-Thiberge, N. (2015, December 8). Lagos' Bus Rapid Transit System: Decongesting and Depolluting Mega Cities. *World Bank Transport for Development Blog*. Retrieved from <https://blogs.worldbank.org/transport/lagos-bus-rapid-transit-system-decongesting-and-depolluting-mega-cities-0> (Accessed May 12, 2019).
- Petrie, B., Wolpe, P., Reddy, Y., Adriázola, P., Gerhard, M., Landesman, T., Strauch, L. & Marie, A. (2018). Multi-level climate governance in South Africa: Catalysing finance for local climate action. Berlin/ Cape Town: OneWorld, Sustainable Energy Africa, Adelphi.
- Phillimore, J. (2013). "Understanding Intergovernmental Relations: Key Features and Trends" in *Australian Journal of Public Administration*, 72(3), 228–238.
- Pickering, J., Jotzo, F., & Wood, P. J. (2015). Sharing the global climate finance effort fairly with limited coordination. *Global Environmental Politics*, 15(4), 39-62.
- Pillay, S., & Pahlad, R. (2014). A gendered analysis of community perceptions and attitudes towards green spaces in a Durban Metropolitan residential area: implications for climate change mitigation. *Agenda*, 28(3), 168-178.
- Poirier, J. (2018, November 26). Intergovernmental Relations in Federal Systems: Ubiquitous, Idiosyncratic, Opaque and Essential. *50 Shades of Federalism*. Retrieved from <http://50shadesoffederalism.com/theory/intergovernmental-relations-in-federal-systems-ubiquitous-idiosyncratic-opaque-and-essential/> (Accessed June 3, 2021).
- Popoola, O. O., Yusuf, S. F. G., & Monde, N. (2020). South African National Climate Change Response Policy Sensitization: An Assessment of Smallholder Farmers in Amathole District Municipality, Eastern Cape Province. *Sustainability*, 12(7), 2616.
- Raddon, A. (2010). Early Stage Research Training: Epistemology & Ontology in Social Science Research. College of Social Science Generic Skills Training for Research Students. University of Leicester. Retrieved from <https://www2.le.ac.uk/colleges/ssah/documents/research-training-presentations/EpistFeb10.pdf> (Accessed November 7, 2019).

- Rahmstorf, S. (2004). Climate Sceptics. *The State of Science: Munich Re, Weather Catastrophes and Climate Change*, 76-83. Retrieved from http://www.pik-potsdam.de/~stefan/Publications/Other/rahmstorf_climate_sceptics_2004.pdf (May 8, 2022)
- Ramli, M. F., Aris, A. Z., Jamil, N. R., & Aderemi, A. A. (2019). Evidence of climate variability from rainfall and temperature fluctuations in semi-arid region of the tropics. *Atmospheric Research*, 224, 52-64.
- Ravitch, S. M., & Carl, N. M. (2019). *Qualitative research: Bridging the conceptual, theoretical, and methodological*. Sage Publications.
- Ravitch, S. M., & Riggan, M. (2017). *Reason & rigor: How conceptual frameworks guide research*. Sage Publications.
- Republic of South Africa (1996). Constitution of the Republic of South Africa, 1996.
- Republic of South Africa (2004). National Environmental Management: Biodiversity Act, 2004. Government Gazette.
- Resurrección, B. P., Bee, B. A., Dankelman, I., Park, C. M. Y., Haldar, M., & McMullen, C. P. (2019). Gender-transformative climate change adaptation: advancing social equity. *Paper commissioned by the Global Commission on Adaptation (GCA)*.
- Reuters Staff (2011, August 27). Factbox-Southern Africa's coal rail and port bottlenecks. Reuters: Investing News. Retrieved from <https://www.reuters.com/article/ozabs-safrica-coal-bottlenecks-20110817-idAFJOE77G06O20110817> (Accessed June 4, 2020).
- Riddlle, L. P. (2015). *An analysis of the potential erosional changes in the KwaZulu-Natal coastline due to the effects of sea level rise and associated storm surges*. Doctoral Dissertation submitted to the University of Kwazulu Natal, South Africa.
- Riedy, C. (2016). Climate Change. In Ritzer, G (ed). Blackwell Encyclopedia of Sociology Publisher: Blackwell.
- Roberts, J. T., Weikmans, R., Robinson, S. A., Ciplet, D., Khan, M., & Falzon, D. (2021). Rebooting a failed promise of climate finance. *Nature Climate Change*, 11(3), 180-182.
- Roberts, T. J., Stadelmann, M., & Huq, S. (2010). Copenhagen's climate finance promise: six key questions. *IIED Briefing Papers*, 1-4.
- Roe, C. and Awosemusi, T. (2016). From Commitments to Action: Implementing Nigeria's Intended Nationally Determined Contributions (INDCs). *Nigeria Infrastructure Advisory Facility, NIAF Knowledge*, 29, November 7, 2016. Retrieved from <http://niafng.org/wp-content/uploads/2016/11/INDC-Nigeria-implementation.pdf>.

- Rogerson, C. M. (2016). Climate change, tourism and local economic development in South Africa. *Local Economy*, 31(1-2), 322-331.
- Ryan, S. (2016, May 9). Chatsworth, Umlazi & Isipingo Worst-Hit Flooded Areas. East Coast Radio: News. Retrieved from <https://www.ecr.co.za/news/news/chatsworth-umlazi-and-isipingo-worst-hit-flooded-areas/> (Accessed June 2, 2020).
- Sacher, M. (2018). The future of federalism–intergovernmental financial relations in an age of austerity. *Regional and Federal Studies*, 28(1), 102-105.
- Saito-Jensen, M. (2015). *Theories and Methods for the Study of Multi-Level Environmental Governance*. CIFOR.
- Salam-Adeniyi, A. (2021). *Inside Lagos with Adedjoja Salam-Adeniyi*. Lagos: Television Continental.
- Salau, G. & Gbonegun, V. (2019, September 26). Lagos has 9,000 megawatts energy deficiency, say Sanwo-Olu. Guardian: Metro. Retrieved from <https://guardian.ng/news/lagos-has-9000-megawatts-energy-deficiency-says-sanwo-olu/> (Accessed August 13, 2020).
- Salvaire, C. (2019). Recovering Sociology from the Trash Heap: Of Waste Politics and the Spatialization of Local Representation in Lagos. *International Journal of Urban and Regional Research*, 43(2), 354-376.
- Savaresi, A. (2016). The Paris Agreement: A New Beginning? *Journal of Energy & Natural Resources Law*, 34(1), 16-26.
- Sayegh, A. G. (2018). Climate finance: Moral theory and political practice. In Jafry, A., Mikulewicz, M., Helwig, K. (Eds). *Routledge Handbook of Climate Justice*, 153-164, Routledge.
- Schulze, R. E. (2007). Climate change and the agricultural sector in South Africa: An assessment of findings in the new millennium. *ACRUcons Report*, 55.
- Schulze, R., Manakan, K., Schutte, S., McNamara, M., Kunz, R. & Mabhaudhi, T. (2018). Climate Change: A KwaZulu-Natal Agricultural Perspective. uMngeni Resilience Project.
- Scovronick, N., Sera, F., Acquaotta, F., Garzena, D., Fratianni, S., Wright, C. Y., & Gasparrini, A. (2018). The association between ambient temperature and mortality in South Africa: A time-series analysis. *Environmental Research*, 161, 229-235.
- Scranton, R. (2015). *Learning to Die in the Anthropocene: Reflections on the End of a Civilization*. City Lights Publishers.

- Senyolo, M. P., Long, T. B., Blok, V., Omta, O., & van der Velde, G. (2021). Smallholder adoption of technology: Evidence from the context of climate smart agriculture in South Africa. *Journal of Development and Agricultural Economics*, 13(2), 156-173.
- Serdeczny, O., Adams, S., Baarsch, F., Coumou, D., Robinson, A., Hare, W., ... & Reinhardt, J. (2017). Climate change impacts in Sub-Saharan Africa: from physical changes to their social repercussions. *Regional Environmental Change*, 17(6), 1585-1600.
- Setzer, J. (2017). How Subnational Governments are Rescaling Environmental Governance: The Case of the Brazilian State of São Paulo. *Journal of Environmental Policy & Planning*, 19(5), 503-519.
- Sgqolana, T. (2021). South Africa: Worst in 100 Years - Drought in All Three Cape Provinces Declared a National Disaster. *Daily Maverick*. Retrieved from <https://allafrica.com/stories/202107220210.html> (Accessed September 3, 2021).
- Shahzad, U. (2015). Global warming: Causes, effects and solutions. *Durreesamin Journal*, 1(4), 1-7.
- Shanganlall, A., Ferentinou, M., Karymbalis, E., & Smith, A. (2019). A Coastal Susceptibility Index Assessment of KwaZulu-Natal, East Coast of South Africa. In Shakoor, A. & Cato, K. (eds) *IAEG/AEG Annual Meeting Proceedings: Geologic Hazards: Earthquakes, Land Subsidence, Coastal Hazards, and Emergency Response, San Francisco, California, 2018-Volume 5*, pp. 93-100. Springer, Cham.
- Shearman D. and Smith W. J. (2007). *The Climate Change Challenge and the Failure of Democracy*. Westport: Praeger.
- Shiru, M. S., Shahid, S., Shiru, S., Chung, E. S., Alias, N., Ahmed, K., ... & Sediqi, M. N. (2020). Challenges in water resources of Lagos mega city of Nigeria in the context of climate change. *Journal of Water and Climate Change*, 11(4), 1067-1083.
- Shisanya, S., & Mafongoya, P. (2017). Assessing rural farmers' perceptions and vulnerability to climate change in uMzinyathi District of Kwazulu-Natal, South Africa. *African Journal of Agricultural Research*, 12(10), 815-828.
- Sim, V., Sutherland, C., & Scott, D. (2016). Pushing the boundaries-Urban Edge challenges in eThekweni Municipality. *South African Geographical Journal= Suid-Afrikaanse Geografiese Tydskrif*, 98(1), 37-60.
- Sintayehu, D. W. (2018). Impact of climate change on biodiversity and associated key ecosystem services in Africa: a systematic review. *Ecosystem health and sustainability*, 4(9), 225-239.
- Sithole, B. B. (2016). *Investigating possible impact of climate change on sugarcane production in KwaZulu-Natal, South Africa*. Dissertation Submitted to the University of Kwazulu Natal, Pietermaritzburg, South Africa.

- Smit, B., & Pilifosova, O. (2003). Adaptation to climate change in the context of sustainable development and equity. *Sustainable Development*, 8(9), 9.
- Smith, A., Guastella, L. A., Mather, A. A., Bundy, S. C., & Haigh, I. D. (2012). KwaZulu-Natal coastal erosion events of 2006/2007 and 2011: A predictive tool?. *South African Journal of Science*, 109(3), 1-4.
- SOAS University of London (n.d.). Unit I: The Earth and Its Components: The Environmental Crisis. Retrieved from https://www.soas.ac.uk/cedep-demos/000_P500_ESM_K3736-Demo/unit1/page_11.htm# (Accessed July 8, 2021).
- Sojobi, A. O., Balogun, I. I., & Salami, A. W. (2016). Climate change in Lagos State, Nigeria: what really changed?. *Environmental monitoring and assessment*, 188(10), 1-42.
- Solomon, S., Manning, M., Marquis, M., & Qin, D. (2007). *Climate change 2007-the physical science basis: Working group I contribution to the fourth assessment report of the IPCC* (Vol. 4). Cambridge university press.
- South African Government (2020, March 5). Minister Zweli Mkhize reports first case of Coronavirus Covid-19. Newsroom: Media Statement. Retrieved from <https://www.gov.za/speeches/health-reports-first-case-covid-19-coronavirus-5-mar-2020-0000> (Accessed June 8, 2021).
- South African Local Government Association (2017). About Us: Provincial Overviews – Kwazulu Natal. Retrieved from <https://www.salga.org.za/About%20Us%20KNO.html> (Accessed July 28, 2018).
- South African Market Insights (2020, July 27). South Africa's Population Density Map. Socio-Economics. Retrieved from <https://www.southafricanmi.com/population-density-map.html> (Accessed June 12, 2020).
- Sridhar, M. K. C., & Hammed, T. B. (2017). Climate Change Mitigation and Adaptation through Strategic Waste Management Options. *International Journal of Science and Engineering Investigations*, 6(69).
- Statista (2019). Total population of South Africa in 2019, by province (in 1,000s). Retrieved from <https://www.statista.com/statistics/1112169/total-population-of-south-africa-by-province/> (Accessed February 12, 2019).
- Statistics South Africa (2012). Census 2011 Census in brief. Report No. 03-01-41. Retrieved from http://www.statssa.gov.za/census/census_2011/census_products/Census_2011_Census_in_brief.pdf (Accessed September 4, 2018).

- Statistics South Africa (2019). Four Facts about Our Provincial Economies. Data Stories: Economic Growth. Retrieved from statssa.gov.za/?p=12056&gclid=CjwKCAjw9aiBhA1EiwAJ_GTSjOxNxIfNNH0nA4Kr1GCxlCS_sGVJtRRcQwsH2hXGcZrcYAVIWlcihoCx9wQAvD_BwE (Accessed June 12, 2020).
- Statistics South Africa (2019). Four Facts about Our Provincial Economies. Retrieved from <http://www.statssa.gov.za/?p=12056> (Accessed November 4, 2021).
- Stephenson, P. (2013). Twenty years of multi-level governance: ‘Where does it come from? What is it? Where is it going?’ *Journal of European public policy*, 20(6), 817-837.
- Streck, C., Keenlyside, P., & Von Unger, M. (2016). The Paris Agreement: a new beginning. *Journal for European Environmental & Planning Law*, 13(1), 3-29.
- Strydom, S., & Savage, M. J. (2017). Potential impacts of climate change on wildfire dynamics in the midlands of KwaZulu-Natal, South Africa. *Climatic Change*, 143(3), 385-397.
- Sutherland, C., Hordijk, M., Lewis, B., Meyer, C., & Buthelezi, S. (2014). Water and sanitation provision in eThekweni Municipality: a spatially differentiated approach. *Environment and Urbanization*, 26(2), 469-488.
- Taiwo, O. E., Venter, C., & Oso, K. A. (2016). Treating Waste as Resource in the Cities of Lagos and Johannesburg. In *Proceedings of the 23rd Waste Conference 17-21 October 2016, Emperors Palace, Johannesburg, South Africa* (pp. 466-475).
- Tapscott, C. (2000). Intergovernmental Relations in South Africa: The Challenges of Co-operative Government. *Public Administration and Development*, 20 (2), 119-127.
- Technical Assistance Unit and Western Cape Government (2013). Increasing Investment in Climate Change Related Projects at the Sub National Level. *Project Number 662, Phase 2: Towards a Financing Framework for Implementing Climate Change Projects*. National Treasury Republic of South Africa.
- The Climate Footprint Project (2021). The Plan for Kwazulu-Natal’s First Emissions Inventory: Finding Opportunities, Setting Targets and Informing Strategy.
- The Climate Group (2010). Subnational Governments at the Forefront of Climate Change. COP16/CMP6. Retrieved from https://seors.unfccc.int/applications/seors/attachments/get_attachment?code=6DTDMM8OJPR1X4Q3ILP6CAZZB3HTGI32 (Accessed August 5, 2020).
- The Royal Society (2005). Joint Science Academies Statement: Global Response to Climate Change. Retrieved from https://royalsociety.org/-/media/Royal_Society_Content/policy/publications/2005/9649.pdf (Accessed February, 19, 2019).

- Tibesigwa, B., Visser, M., Hunter, L., Collinson, M., & Twine, W. (2015). Gender differences in climate change risk, food security, and adaptation: a study of rural households' reliance on agriculture and natural resources to sustain livelihoods.
- Timilsina, G. R. (2021). Financing Climate Change Adaptation: International Initiatives. *Sustainability*, 13(12), 6515.
- Transparency International (2017, April 22). How Corruption Affects Climate Change. News. Retrieved from <https://www.transparency.org/en/news/how-corruption-affects-climate-change#> (Accessed June 8, 2021).
- Trollip H. & Boulle M. (2017) Challenges associated with implementing climate change mitigation policy in South Africa. Energy Research Centre, University of Cape Town.
- Tsega, A. H. (2016). Africa in Global Climate Change Governance: Analyzing Its Position and Challenges. *International Journal of African Development*, 4(1), 3.
- Tsega, A. H. (2016). Africa in Global Climate Change Governance: Analyzing Its Position and Challenges. *International Journal of African Development*, 4(1), 5-18.
- Tsvuura, S. M. (2020). *A gendered analysis on the role and potential of goat production to improve income and food security in semi-arid areas of South Africa* (Doctoral dissertation).
- Tuli, F. (2010). The basis of distinction between qualitative and quantitative research in social science: Reflection on ontological, epistemological and methodological perspectives. *Ethiopian Journal of Education and Sciences*, 6(1).
- Udodaga, K. (2020, February 27). Deadly Coronavirus Confirmed in Nigeria. *PM News: Daily Headline News*. Retrieved from <https://www.pmnewsnigeria.com/2020/02/28/breaking-deadly-coronavirus-confirmed-in-lagos-nigeria-at-last/> (Accessed July 27, 2020).
- Udomiaye, E., & Chukwuali, C. B. (2018). Climate change mitigation strategies in the Nigerian housing sector: The role of life cycle CO₂eq assessment. *International Journal of Architecture, Engineering and Construction*, 7(4), 54-69.
- UNFCCC (2018). UNFCCC Standing Committee on Finance 2018 Biennial Assessment and Overview of Climate Finance Flows Technical Report. Retrieved from <https://unfccc.int/sites/default/files/resource/2018%20BA%20Technical%20Report%20Final.pdf> (Accessed September 5, 2020).
- UNFCCC (2021). Introduction to Climate Finance. Retrieved from <https://unfccc.int/topics/climate-finance/the-big-picture/introduction-to-climate-finance> (Accessed August 9, 2021).

- UN-Habitat Regional Office for Asia and the Pacific (n.d.). Climate Finance. Retrieved from https://www.fukuoka.unhabitat.org/projects/asian_subregion/pdf/Climate_Finance_Tool_CF.pdf (Accessed March 3, 2021).
- United Nations (2001). World Public Sector Report: Globalisation and the State. Department of Public Administration, United Nations.
- United Nations (2001). World Public Sector Report: Globalization and the State. United Nations Public Administration Department.
- United Nations (2020). The Climate Crisis: A Race We Can Win. UN75 2020 and Above – Shaping Our Future Together. Retrieved from <https://www.un.org/en/un75/climate-crisis-race-we-can-win> (Accessed July 8, 2021).
- United Nations Framework Convention for Climate Change (2011). Fact sheet: Climate change science - the status of climate change science today. Retrieved from https://unfccc.int/files/press/backgrounders/application/pdf/press_factsh_science.pdf (Accessed April 8, 2020).
- United Nations World Tourism Organisation (2018). UNWTO Tourism Highlights. 2018 Edition. Retrieved from <https://www.e-unwto.org/doi/pdf/10.18111/9789284419876> (Accessed June 3, 2020).
- Urban Low Emissions Development Strategy (2020). Multilevel Governance for Climate Change in South Africa. Retrieved from <https://unhabitat.org/sites/default/files/2021/01/urban-leds-country-factsheet-south-africa.pdf> (Accessed April 14, 2021).
- USAID (2013). Climate Change and Conflict in West African Cities: A Policy Brief on Findings from Lagos, Nigeria and Accra, Ghana. African and Latin American Resilience to Climate Change Project. Retrieved from https://www.climatelinks.org/sites/default/files/asset/document/FESS_Policy_Brief_CITIES.pdf (Accessed May 6, 2020).
- Uwadiogwu, I., & Chigozie, N. P. (2020). Mapping Flood High Priority Areas in Southern Nigeria. *International Journal of Satellite Communication & Remote Sensing*, 6(1), 35-38.
- Uwaegbulam, C. (2019, November 6). How rising seas may wipe off Lagos, others by 2050. The Guardian: Metro. Retrieved from <https://guardian.ng/news/how-rising-seas-may-wipe-off-lagos-others-by-2050/> (Accessed March 16, 2020).

- Uwauzi, L. O. & Amadi, F. C. (2019). Protection of Environment in Nigeria Under the 1999 Constitution. Retrieved from https://www.researchgate.net/publication/339352181_PROTECTION_OF_ENVIRONMENT_IN_NIGERIA_UNDER_THE_1999_CONSTITUTION_By (Accessed April 23, 2020).
- Vaismoradi, M., Turunen, H., & Bondas, T. (2013). Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & health sciences*, 15(3), 398-405.
- Veiga, L. G., & Kurian, M. (2015). Intergovernmental fiscal relations: Questions of accountability and autonomy. In Kurian, M. & Ardakanian, R. (eds). *Governing the Nexus* (pp. 63-81). Springer, Cham.
- Verma, S. P. (1975). *Modern Political Theory*, New Delhi, Vikas Pub. House Ltd.
- Vetter, S., Goodall, V. L., & Alcock, R. (2020). Effect of drought on communal livestock farmers in KwaZulu-Natal, South Africa. *African Journal of Range & Forage Science*, 37(1), 93-106.
- Watson, C. & Schalatek, L. (2021, February). The Global Climate Finance Architecture. Climate Finance Fundamentals. Heinrich Boll Stiftung Washington DC.
- Watson, R.T., Gitay, H., Suarez, A., Dokken, D.J. & Leemans, R. (2006). Climate Change and Biodiversity. Intergovernmental Panel on Climate Change: Technical Paper V. IPCC.
- Wehner, J. (2000). Fiscal Federalism in South Africa. *Publius: The Journal of Federalism* 30(1), 47-72.
- Wikipedia Commons (2016, February 26). File: Map of the Local Government Areas of Lagos. Retrieved from https://commons.wikimedia.org/wiki/File:Map_of_the_Local_Government_Areas_of_Lagos.png (Accessed August 30, 2020).
- Willems, S. & Baumert, K. (2003). Institutional Capacity and Climate Actions. OECD Environment Directorate International Energy Agency, COM/ENV/EPOC/IEA/SLT (2003)5.
- Williams, D. S., Máñez Costa, M., Celliers, L., & Sutherland, C. (2018). Informal settlements and flooding: Identifying strengths and weaknesses in local governance for water management. *Water*, 10(7), 871.
- Wise, C., & O'Leary, R. (1997). Intergovernmental relations and federalism in environmental management and policy: the role of the courts. *Public Administration Review*, 150-159.

- World Bank (2005). *National Environmental Strategies: Learning from Experience*. Washington D. C.: Land, Water and Natural Habitat Division (Environmentally Sustainable Development).
- World Commission on Environment and Development (1987). Report of the World Commission on Environment and Development: Our Common Future. United Nations.
- World Economic and Social Survey (2016). *Climate Change Resilience: An Opportunity for Reducing Inequalities*. Department of Economic and Social Affairs E/2016/50/Rev.1ST/ESA/363.
- Yagboyaju, D. A., & Akinola, A. O. (2019). Nigerian state and the crisis of governance: A critical exposition. *Sage Open*, 9(3), 2158244019865810.
- Yale Centre for Environmental Law and Policy (2015). Building toward Breakthrough: Energizing the Paris Action Agenda through Broader Engagement. *Yale Climate Change Dialogue White Paper*, July 2015.
- Yeo, S. (2019). Where climate cash is flowing and why it's not enough. *Nature*, 573(7774), 328-332.
- Yi, H., Huang, C., Chen, T., Xu, X., & Liu, W. (2019). Multilevel environmental governance: Vertical and horizontal influences in local policy networks. *Sustainability*, 11(8), 2390.
- Zhenmin, L., & Espinosa, P. (2019). Tackling climate change to accelerate sustainable development. *Nature Climate Change*, 9(7), 494-496.
- Ziervogel, G., New, M., Archer van Garderen, E., Midgley, G., Taylor, A., Hamann, R. ... & Warburton, M. (2014). Climate change impacts and adaptation in South Africa. *Wiley Interdisciplinary Reviews: Climate Change*, 5(5), 605-620.
- Zulu, T. S. S. (2014). Cooperative Governance in South Africa: A Case Study of Intergovernmental Relations in the Provision of Housing. A Masters Dissertation Submitted to the School of Social Sciences, College of Humanities at the University of KwaZulu-Natal, Pietermaritzburg, South Africa.
- Zwane, E., & Mthembu, N. (2017). The adaptive capacity of smallholder mixed-farming systems to the impact of climate change: The case of KwaZulu-Natal in South Africa. *Jàmbá: Journal of Disaster Risk Studies*, 9(1), 1-9.

Appendix I

I A. Interview Guide of Respondents in Lagos State, Nigeria

Section A: Socio-demographic characteristics

- i. Sex:
- ii. Age:
- iii. Level of education:
- iv. Organisation:
- v. Current position in the organisation:
- vi. For how many years have you worked with your organisation:
- vii. How many years of experience do you have in environmental research/journalism/advocacy/ administration?

Section B Interview Questions

- i. What is your understanding of climate change? Do you think Lagos State is at risk of climate change?
- ii. Mention the climate change impacts you are aware of in Lagos State.
- iii. What are the roles played by the government in climate change response?
- iv. What are some of the climate change response policies and programmes you are aware of in the State?
- v. Would you say Lagos State is responding to climate change effectively? What accounts for your position?
- vi. Do you think there is a linkage between intergovernmental relations and climate change? Can poor intergovernmental relations affect climate change response? How does this play out in Lagos State?
- vii. In what ways does finance affect climate change response? Can you relate this to Lagos State?
- viii. In what ways does fiscal allocation affect climate change response in the Province?
- ix. Can you mention some environmental institutions in Lagos State? What challenges do these institutions face in their climate response tasks?
- x. How would you rate their performance in terms of policies and programmes to combat climate change?
- xi. In what ways do you think Lagos State can improve its climate change response?

I B. Interview Guide of Respondents in Kwazulu Natal, South Africa

Section A: Socio-demographic characteristics

- i. Sex:
- viii. Age:
- ix. Level of education:
- x. Organisation:
- xi. Current position in the organisation:
- xii. For how many years have you worked with your organisation:
- xiii. How many years of experience do you have in environmental research/journalism/advocacy/ administration?

Section B Interview Questions

- i. What is your understanding of climate change? Do you think Kwazulu Natal is at risk of climate change?
- ii. Mention the climate change impacts you are aware of in Kwazulu Natal.
- iii. What are the roles played by the government in climate change response?
- iv. What are some of the climate change response policies and programmes you are aware of in the Province?
- v. Would you say Kwazulu Natak is responding to climate change effectively? What accounts for your position?
- vi. Do you think there is a linkage between intergovernmental relations and climate change? Can poor intergovernmental relations affect climate change response? How does this play out in Kwazulu Natal?
- vii. In what ways does finance affect climate change response? Can you relate this to Kwazulu Natal?
- viii. In what ways does fiscal allocation affect climate change response in the Province?
- ix. Can you mention some environmental institutions in Kwazulu Natal? What challenges do these institutions face in their climate response tasks?
- x. How would you rate their performance in terms of policies and programmes to combat climate change?
- xi. In what ways do you think Kwazulu Natal can improve its climate change response?

I C. Focus Group Discussion Guide for Lagos State

Section A: Socio-demographic characteristics

- i. Sex:
- ii. Age:
- iii. Level of education:
- iv. What do you do for a living?
- v. For how many years have you lived in this location?

Section B: FGD questions

- i. What do you understand by climate change?
- ii. Do you think Lagos State is at risk of climate change?
- iii. What is climate change response?
- iv. Do you think the government has a role to play in climate change response?
- v. Would you say Lagos State is responding adequately to climate change? How?
- vi. What are the environmental challenges in your community?
- vii. Do you think they were caused by climate change?
- viii. How would rate Lagos State Province in attending to the problems in your community?
- ix. What do you think Lagos State can do to improve the environmental situation of your community?

I D. Focus Group Discussion Guide for Kwazulu Natal

Section A: Socio-demographic characteristics

- vi. Sex:
- vii. Age:
- viii. Level of education:
- ix. What do you do for a living?
- x. For how many years have you lived in this location?

Section B: FGD questions

- x. What do you understand by climate change?
- xi. Do you think Kwazulu Natal Province is at risk of climate change?
- xii. What is climate change response?
- xiii. Do you think the government has a role to play in climate change response?
- xiv. Would you say Kwazulu Natal Province is responding adequately to climate change? How?
- xv. What are the environmental challenges in your community?
- xvi. Do you think they were caused by climate change?
- xvii. How would rate Kwazulu Natal Province in attending to the problems in your community?
- xviii. What do you think Kwazulu Natal Province can do to improve the environmental situation of your community?

Appendix II

Ethics Clearance Certificate

Private Bag X1290, Potchefstroom

South Africa 2520 Tel: 018 299-1111/2222 Fax: 018 299-4910

Web: <http://www.nwu.ac.za>

Tel: 018 299-4849

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11 September 2019

Senate Committee for Research Ethics



ETHICS APPROVAL LETTER OF STUDY

Based on approval by the **Basic and Social Sciences Research Ethics Committee (BaSSREC)** on 11/09/2019, the Basic and Social Sciences Research Ethics Committee hereby **approves** your study as indicated below. This implies that the North-West University Senate Committee for Research Ethics (NWUSERC) grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the study may be initiated, using the ethics number below.

Study title: An evaluation of subnational climate change reponse in Lagos State, Nigeria and KwaZulu Natal Province, South Africa.

Study Leader/Supervisor (Principal Investigator)/Researcher: Prof. V. Ojakorotu

Student: Mr. B Olajide

Ethics number:

N	W	U	-	H	S	-	2	0	1	9	-	0	0	8
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Status: S = Submission; R = Re-Submission; P = Provisional
Authorisation; A = Authorisation

Application Type: Single Study

Commencement date: 11/09/2019

Expiry date: 10/09/2020

Risk:

Low

Approval of the study is initially provided for a year, after which continuation of the study is dependent on receipt and review of the annual (or as otherwise stipulated) monitoring report and the concomitant issuing of a letter of continuation.

Special in process conditions of the research for approval (if applicable):

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, the following general terms and conditions will apply:

- The study leader/supervisor (principle investigator)/researcher must report in the prescribed format to the BaSSREC:
 - annually (or as otherwise requested) on the monitoring of the study, whereby a letter of continuation will be provided, and upon completion of the study; and
 - without any delay in case of any adverse event or incident (or any matter that interrupts sound ethical principles) during the course of the study.
- The approval applies strictly to the proposal as stipulated in the application form. Should any amendments to the proposal be deemed necessary during the course of the study, the study leader/researcher must apply for approval of these amendments at the BaSSREC, prior to implementation. Should there be any deviations from the study proposal without the necessary approval of such amendments, the ethics approval is immediately and automatically forfeited.
- Annually a number of studies may be randomly selected for an external audit.
- The date of approval indicates the first date that the study may be started.
- In the interest of ethical responsibility, the NWU-SCRE and BaSSREC reserves the right to:
 - request access to any information or data at any time during the course or after completion of the study;
 - to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process; - withdraw or postpone approval if:
 - any unethical principles or practices of the study are revealed or suspected;

1

- *it becomes apparent that any relevant information was withheld from the BaSSREC or that information has been false or misrepresented;*
- *submission of the annual (or otherwise stipulated) monitoring report, the required amendments, or reporting of adverse events or incidents was not done in a timely manner and accurately; and / or*
- *new institutional rules, national legislation or international conventions deem it necessary.*
- BaSSREC can be contacted for further information or any report templates via BaSSREC@nwu.ac.za.

The BaSSREC would like to remain at your service as scientist and researcher, and wishes you well with your study. Please do not hesitate to contact the BaSSREC or the NWU-SCRE for any further enquiries or requests for assistance.

Yours sincerely

A handwritten signature in black ink, reading "C. van Eeden." with a period at the end. The signature is written in a cursive, flowing style.

Prof C. van Eeden

Chairperson NWU Basic and Social Sciences Research Ethics Committee

Original details: (22351930)

C:\Users\22351930\Desktop\ETHICS APPROVAL LETTER
OF STUDY.docm 8 November 2018

File reference: 9.1.5.4.2

Appendix III

Thesis Title Approval



Private Bag X1290,
Mmabatho South Africa 2735

Tel: 018 389 2111

Web: <http://www.nwu.ac.za>

Higher Degree Administration

Tel: 018 389 2699

Email: MC-

HigherDegrees@nwu.ac.za

13 February 2019

Dear Olajide B, 31869890

REGISTRATION OF TITLE FOR PHD IN INTERNATIONAL RELATIONS

This is to confirm that the Faculty of Humanities approved your research proposal and the title of your study will be as follows:

An evaluation of subnational climate change response in Lagos state, Nigeria and Kwazulu Natal province, South Africa

Supervisor / Promoter: Prof V Ojakoruto

Co-Supervisor / Co-Promoter: Dr A KJ Ani

The above-mentioned title may under **no circumstances** be changed without consulting your supervisor and obtaining the approval from the relevant committee in the mentioned faculty, in regard of which the Higher Degrees Administration office must be furnished with the approval of the amendments to the title.

In the instance that you wish to submit for examination, please inform your supervisor/promoter accordingly. *Also ensure absolute adherence to the prescripts of A Rule 4.10 for the submission of a Master's study and of A rule 5.10 for the submission of Doctoral thesis.*

Upon approval of your supervisor/promoter, please ensure that the Notice of Submission form is submitted THREE months in advance to the Higher Degrees Administration office.

Note that the Notice of Submission-form is available at the Higher Degree Administration Officer or the Faculty Administrator responsible for Masters & Doctoral studies.

For ease of reference, your attention is drawn to the following publications / web addresses: Olajide B

- A Rules:
http://www.nwu.ac.za/sites/www.nwu.ac.za/files/files/i-governance-management/policy/7PARules2017_e1.pdf
- Manual for Postgraduate Studies:
<http://www.nwu.ac.za/sites/www.nwu.ac.za/files/files/i-research-support/Manuals/ICRI/2016-0406%20ICRI%20Manual%20for%20M%20and%20D%20students.pdf>

We wish you a pleasant and successful experience on your research.

Yours sincerely



Mr BS Mokgothu **for**
REGISTRAR

Original details: (10812187) M:\HDA Toolbox\Phase 2\1 Title Registration\Title registration letter.docm 13 February 2019 File reference: 7.1.11.1