

**Climate Change in Lagos State, Nigeria: A Polycentric Governance Approach**

**By**

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## **DECLARATION**

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Adekunle Akinola  
September 2021

## **DEDICATION**

I dedicate this thesis to God Almighty, the giver of knowledge, wisdom and understanding and to the memory of my father, Akinola Arikun. Thank you daddy for the solid foundation you gave me.

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## **ACRONYMS/ABBREVIATIONS**

BNRCC- Building Nigeria Response to Climate Change

BRT- Bus Rapid Transport

CAN- Climate Action Network

CBD- Convention on Biological Diversity

CCI- Clinton Climate Initiative

CCP- Cities for Climate Protection CCRR- Centre for Climate

Change and Fresh Water Resources CDM- Clean

Development Mechanism CFCs- Chlorofluorocarbons

CIF- Climate Investment Fund

CLI- Cleaner Lagos Initiative

CNG- Compressed Natural Gas

COP- Conference of the Parties

CPP- Climate Protection Programme

CSO- Civil Society Organisation

EAR- Environmental Audit Report ECOWAS- Economic

Community of West African States EIA- Environmental

Impact Assessment EMP- Environmental Management

Plan

ETS- Emissions Trading System

EPA- Environmental Protection Agency

EU- European Union

FEC- Federal Executive Council

FEPA- Federal Environment Protection Agency

FGN- Federal Government of Nigeria

FME- Federal Ministry of Environment

FNC- First National Communication

G8- Group of 8

G20- Group of 20

GEF- Global Environment Facility

GHG- Greenhouse Gas  
GRI- Global Reporting Initiative  
HCFCs- Hydrochlorofluorocarbons  
HFCs- Hydrofluorocarbons  
IBRD- International Bank for Reconstruction and Development  
ICAO- International Civil Aviation Organisation  
ICLEI- International Council for Local Environmental  
Initiatives IEA- International Energy Agency IFI- International  
Financial Institution  
IGO- Intergovernmental Organisation  
IMF- International Monetary Fund  
IMO- International Maritime Organisation INDC-  
Intended Nationally Determined Contribution IPCC-  
Intergovernmental Panel on Climate Change JI- Joint  
Implementation  
LACVIS- Lagos State Computerised Vehicle Inspection  
Service LAMATA- Lagos State Metropolitan Area Transport  
Authority LAS-CCAS- Lagos State Climate Change Adaptation  
Strategy LAS-CCP- Lagos State Climate Change Policy  
LASEPA- Lagos State Environmental Management Agency  
LASPARK- Lagos State Parks and Garden  
LAWMA- Lagos State Waste Management  
Authority LSG- Lagos State Government LSME-  
Lagos State Ministry of Environment  
LPAA- Lima-Paris Action Agenda  
MLG- Multilevel Governance  
MSE- Micro and Small-scale Enterprise MP-  
Marrakech Partnership for Global Climate Action  
NAMA- Nationally Appropriate Mitigation Action  
NAZCA- Non-state Actor Zone for Climate Action  
NBS- National Bureau of Statistics

NESREA- National Environmental Standards Regulations  
Agency NEMA- National Emergency Management Agency  
NGO- Non-Governmental Organisation  
NIMET- Nigerian Meteorological Agency NIOMR- Nigerian  
Institute for Oceanography and Marine Research NNPC- Nigerian  
National Petroleum Corporation  
OECD- Organisation for Economic Co-operation and  
Development PSP- Private Sector Participant  
REDD+- Reducing Emissions from Deforestation and Forest  
Degradation SADC- Southern Africa Development Commission SDGs-  
Sustainable Development Goals  
SEMA- State Emergency Management Agency  
SME- Small Medium Enterprise  
STMP- Strategic Transport Master Plan  
UK- United Kingdom  
UN- United Nations  
UNEP- United Nations Environment Programme UNFCCC- United  
Nations Framework Convention on Climate Change UNSG- United  
Nations Secretary-General US- United States of America  
WTO- World Trade Organisation

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## **ABSTRACT**

Human-induced activities that cause climate change occur at multiple scales, yet, most climate governance mechanisms are designed at a single level, such as international, national or regional, which do not provide an effective solution. The international climate change governance regime under the United Nations Framework Convention on Climate Change (UNFCCC) has failed to significantly impact the reduction of greenhouse gas emissions and its goal of limiting global mean temperature below 2 degree Celsius. This has led to the emergence of several multilateral, bilateral, subnational, transnational and non-state actors operating outside the UNFCCC. Elinor Ostrom refers to this development as a polycentric approach to climate governance. The literature on polycentric climate governance is growing. Scholars, however, have given significant attention to cities in the global North. This study offered an analysis of the efficacy and effectiveness of polycentrism to climate change governance in Lagos State, Nigeria. The study contributed to the growing body of literature on polycentrism by providing analytical insight into (i) What extent the national and international policies have addressed climate change in Lagos State; (ii) What role has been/can be played by subnational governments in climate change governance; (iii) How polycentrism can be employed to address climate governance in Lagos State; and (iv) How effective polycentric initiatives are in addressing climate change in Lagos State. The study was a single-case endeavour that utilised a concurrent mixed methodology for data collection. The quantitative data are elicited through an open-ended questionnaire while the qualitative data used in-depth interviews and purposive sampling technique to gather empirical data from government officials and community members. The study revealed that a single governance unit could not effectively provide adequate solutions to climate mitigation and adaptation issues in Lagos State. The study further showed that climate change is a polycentric issue that should be dealt with by multiple actors operating at different levels of governance. The study concluded that polycentrism provides an opportunity for experimentation and learning among governance units, and the involvement of different actors in climate change governance has resulted in multiple benefits at diverse levels.

# CHAPTER ONE

## INTRODUCTION

### 1.1 Background and Outline of the Research Problem

Climate change is conceived as a global problem from the international regime's viewpoint that makes it necessary for states to subdue it mainly by negotiating international treaties such as the Kyoto Protocol in 1997, Copenhagen Accord in 2009, the 2011 Durban and the 2015 Paris Agreements. Climate change governance from this perspective can be described as a monocentric form of governance in which rules and regulations on climate change governance are set under the auspices of the United Nations Framework Convention on Climate Change (UNFCCC) and follows a top-down approach to nation-states for implementation (Van Asselt and Zelli, 2018). The 2009 Conference of Parties (COP) in Copenhagen marks a remarkable shift of climate governance from a monocentric top-bottom approach with the centrality of the UNFCCC to a split disperse approach. This new approach involves state and non-state actors operating across international, national, regional, transnational, and subnational networks. Ostrom (2009) refers to this as a polycentric approach to climate governance. A polycentric approach is a system with several decision-making centres, each with the freedom to operate under a set of rules (Ostrom, 2009). Scholars in this school argue that rather than relying on particular governance units, a polycentric approach gives room for different governance units operating in their respective governance domain towards a common goal (Cole, 2011; 2015; Dorsch and Flachslan, 2017). This has paved the way for new research trends on climate governance by investigating how the polycentric approach can solve the collective action problem, such as climate change, distinct from the earlier intellectual works that concentrated on UNFCCC and nation-states' centrality.

Third world countries are vastly exposed to climate change impacts due to their substantial reliance on sectors that are sensitive to climate change impacts, such as agriculture, livestock production, natural resources, and ecosystem services (Wheeler and Von Braun, 2013). For example, erratic rainfall and a high incidence of drought make crop production difficult and constitute a major challenge to food security (Wheeler and Von Braun, 2013). Moreover, in Nigeria, the focus of this study, climate change effects are apparent in the drought experienced in areas already prone to water scarcity and flood in some other areas. For instance, desertification in the Sahel in the Northern part

of Nigeria has led to a consistent loss of farmlands and conflicts between Fulani herdsmen and farmers (Igwe, 2010). According to the National Emergency Management Agency (NEMA, 2018) in Nigeria, floods have become a perennial challenge with ascending intensity each year, causing enormous economic loss and the loss of lives. Based on its report between 2012 and 2017, it is recorded that devastating floods displaced two million, four hundred and forty-two thousand Nigerians; and it caused more than one thousand deaths and destroyed several properties (NEMA, 2018). Furthermore, in the Niger Delta region of Nigeria, gas flaring effects are quite apparent, as they manifest in the rise in temperature, acid rain, retarded crop yield, and different types of respiratory diseases (Igwe, 2010).

However, climate change is dealt with from a global context through United Nations initiatives such as the establishment of UNFCCC in 1992. The Kyoto Protocol was also adopted in 1997 under the principle of common but differentiated responsibilities, in which developed countries are required to reduce their emissions and provide funding for adaptation measures in developing countries. Additionally, regional bodies and regional economic communities in Africa, such as the Southern African Development Commission (SADC), Economic Community of West African States (ECOWAS), have strategies and policies that deal with climate change. At a national level, countries also have their climate change policies. For instance, policies meant to address climate change have been rolled out by the Nigerian Government, such as the Nigeria Climate Change Policy Response and Strategy developed in 2012 and the Intended Nationally Determined Contribution developed in 2015. However, these policies are mostly targeted at the Niger Delta region to curtail the negative impacts of oil and gas exploration, and they do not specifically address the impacts of climate change in other parts of Nigeria (Elias and Omojola, 2015). This study argues that climate change is a polycentric issue that must be dealt with at multiple levels. The foregoing supposition stems from the fact that in Nigeria, the effects of climate change vary, and it is experienced differently in various states. Therefore, a global approach, regional approach and national approach falls short in addressing specific climate change challenges in every state.

Expectedly, a growing and higher level of expectation have been imposed on climate governance scholars who belong to this school on the efficacy of the polycentric governance approach to climate governance. Studies have been conducted on the polycentric approach to climate change,

majorly in Europe and North America. However, there seems to be a dearth of literature on polycentric initiatives from developing countries, particularly in Africa, which makes it difficult to draw empirically verifiable conclusions on the efficacy of a polycentric approach to climate governance. Drawing insights from the roles of international, national, subnational, and local communities in climate governance, this study explores how polycentrism is playing out and its effects on the challenges posed by climate change in local communities in Lagos State.

While it has been argued that polycentrism offers more opportunity for local actions, experimentation, and learning, it is unclear whether the involvements of different actors in climate governance would have an effect on the challenges posed by climate change in Lagos State. Therefore, the study is critical in its attempt to intellectually deepen the debate on climate governance from the standpoint of multiple actors' involvement. From a theoretical position of polycentric governance theory, this study addresses the effectiveness of polycentrism in dealing with climate change by exploring polycentric initiatives and their effects on climate change impacts. The study specifically assesses the impacts of climate change on selected communities and the adaption and mitigation measures taken by the Lagos State government and other community actors in responding to the debilitating impacts of climate change.

The choice of Lagos State, Nigeria, for this study is predicated on many grounds. First, Lagos State is Africa's largest city and most industries in Nigeria are housed in Lagos State. This makes it the highest consumer of energy in West Africa, and the energy is predominantly fossil-based, making it one of the largest contributors of emissions in Nigeria (Komolafe *et al.*, 2014). Furthermore, the peculiar features of Lagos State, such as her rapid population increase, extensive coastal areas, and high water table that is less than 0.15m from the surface, increase her vulnerability to climate change impacts. A clear case of this impact was felt in designated areas of the state between 2015 and 2016, with massive floods in Oworonshoki, Bariga, Ketu, Ikorodu, Lekki and Okokomaiko areas displacing more than one hundred thousand people and property estimated at billions of naira was destroyed (Adelekan and Asiyebi, 2016).

## **1.2 Statement of the Problem: Broader issues to be investigated**

Several studies have examined climate change governance from the perspective of events and developments at the international level. The outcomes and efficacy of UN initiatives which led to the establishment of UNFCCC in 1992, Kyoto Protocol in 1997, the Copenhagen Accord in 2009, Cancun Agreement in 2010, the 2011 Durban and the 2015 Paris Agreements have received significant attention from scholars (Dimitrov, 2013; Stipple and Stephen, 2013; Martinez, 2016). Moreover, early discussions on climate change governance are dominated by literature on regime theory and multilateralism. Most scholars such as Hoffmann, (2013); Gupta, (2014) and Andresen, (2014) have primarily focused on identifying the condition through which international regime can effectively govern climate change. For these authors, the establishment of UNFCCC in 1992 and the Kyoto Protocol in 1997 was a validation of their perspective.

However, there has been a departure from the international regime approach to a local governance approach to climate governance (Engel and Saleska, 2005; Breitmeier *et al.*, 2009; Norgaard, 2012). The interest of scholars to study and document the impacts and reactions to climate change at local levels was instigated by the evidence that despite a plethora of agreements for the past three decades, little has been achieved in terms of emission reduction (Betsill and Bulkeley, 2006). For Kousky and Schneider (2003), the growing attention on local governance of climate change stems from the fact that local or subnational governments have many tools at their disposal that will enhance the implementation of climate change policy. An example of such tools is the power and control that local governments in most federal states have over some of the factors that are responsible for greenhouse gas emissions, such as land use regulations, waste management, housing regulations, public transportation, and drainage system among others which can be used to enhance the implementation of international agreements. (Adger, 1999; Betsill and Bulkeley, 2006). Furthermore, global agreements are implemented at a local level, and these initiatives can also shape international agreements. For instance, Climate Summit for Local Leaders was hosted in parallel to the 2015 Paris and 2016 Marrakech Conference of Parties, which provided local actors with the opportunity to influence international climate change negotiations (Van der Heijden, 2018).

A large proportion of studies such as Lutsey and Sperling, (2008); Rutland and Aylett, (2008) and Lee and Stokes, (2009) on climate change mitigation efforts by subnational governments have been conducted in developed countries such as the USA, Canada, Sweden and Norway. Conversely, mitigation measures taken by subnational governments in developing countries have received little research attention. Elinor Ostrom entered the governance of climate change debate in early 2000 after the Conference of Parties in Copenhagen, in which world leaders did not reach a consensus on a new agreement that would replace the Kyoto Protocol, which ended in 2012. Ostrom contends that scholars and practitioners of climate governance should not be disturbed by the low pace of action on climate change at the international level. This is because several actors and agencies below international and national governments are taking actions to help compensate for the slow pace of action at both the national and international levels, which she describes as a polycentric approach (Ostrom, 2009). Subnational entities and the linkages they form are part of a polycentric system. Subnational governments have been more involved as key actors in international and local governance initiatives, which is an example of polycentric governance. She argues further that it is better to embrace a polycentric approach to climate change, given its enormous benefits (Ostrom, 2010).

Similarly, several authors like Aldy and Stavins, (2012); Zelli and Van Asselt, (2015) have emphasised a change from the supremacy of the UNFCCC to a new split and dispersed international climate strategy framework. Other scholars such as Keohane and Victor, 2011; Paavola, 2011; Schroeder *et al.*, 2013 argue in a similar direction, whether referring to building blocks, polycentric approach, regime complexes or regime fragmentation. These authors are referring to the changing landscape of climate governance in which diverse and multiple actors are engaging in different activities at multiple levels. They all stated that it is essential to pay urgent consideration to subnational initiatives on climate change that may complement the existing United Nations initiatives.

The efficacy of a polycentric approach as a viable alternative to the international regime has been a major concern of international relations and climate governance scholars. Dorsch and Flacshland (2017) highlight the importance of a polycentric system of governance to climate change but insist that rather than being a replacement or antagonistic to the international regime, the polycentric

system should be complementary to the international effort. In a similar vein, Jordan *et al.* (2015) accentuate that polycentric governance offers new prospects for climate governance. Still, based on existing empirical research, it is too early to decide whether expectations about the performance of the new forms are well-founded.

Previous studies like Cole (2015); Dorsch and Flacshland (2017) have focused extensively on polycentric initiatives from the global North, especially North American and Europe. Cities like Canada, California, Norway and London have received enormous scientific attention. However, hardly does any study exist that has investigated the roles of international, national, and subnational climate policies and, more importantly, the effects of each polycentric actors on the challenges posed by climate change in Lagos State (Van der Heijden, 2018). Based on this gap, this study will contribute immensely to the existing literature on the efficacy of the polycentric governance approach to climate governance in Africa, with reference to Lagos State, Nigeria. Therefore, this study is validated and justified in its potential to contribute to the intellectual debate on the efficacy of a polycentric governance approach to climate governance.

### **1.3 Aim of the Study**

The study aims to determine the effectiveness of polycentrism in climate change governance with specific reference to Lagos State, Nigeria. The study examines the value of a polycentric approach as opposed to the monocentric top-down approach that has characterised most climate mitigation interventions.

### **1.4 Research Objectives**

The study seeks to achieve the following objectives:

- i. To examine the impacts of climate change in local communities in Lagos State;
- ii. To investigate how national and international climate change policies have responded to climate change challenges in Lagos State;
- iii. To investigate the role of subnational governments in climate change governance; and
- iv. To critically appraise the effects of polycentrism on climate change governance in Lagos State.

### **1.5. Research Questions: Key questions to be asked**

To properly investigate the problem stated above, this study is guided by the following questions:

- i. What are the impacts of climate change in Lagos State?
- ii. To what extent have the national and international policies addressed climate change impacts in Lagos State?
- iii. What role has been/can be played by subnational government in climate change governance?
- iv. How effective are polycentric initiatives in addressing climate change impacts in Lagos State?

### **1.6. Rationale and Significance of the Study**

This study is motivated by the need to examine an under-researched area – polycentric governance approach to climate change and looking at a bottom-up and local centred approach to resolving some of the climate change impacts that affect Lagos State, one of Africa’s largest cities. This study also brings attention to African experiences with climate mitigation and local initiatives especially as most studies have been conducted on case studies from the West. Given the enormous challenges that climate change poses to Lagos State, it becomes significant and imperative to unravel and interrogate the Lagos State government’s initiatives to mitigate climate change impacts and examine the community’s coping strategies. The study will contribute immensely to the growing polycentric literature. It will be one of the few attempts to investigate the efficacy of a polycentric approach to climate governance from the global South, given the paucity of studies of such initiatives on the region. The study will be of great value to policymakers interested in the best way to solve the challenges posed by climate change.

### **1.7. Chapter Outline**

The study consists of seven chapters, chapter one is the introductory chapter, and it includes the following: background and outline of the research problem, statement of the research problem, aims of the study, research questions, research objectives, the rationale and significance of the study. Chapter two includes the review of literature relevant to the study and the identification of the gap that necessitates the study. Chapter three consists of the theoretical framework; it discusses and analyses the basic theory that the research is built on. Chapter four presents the research methodology; it discusses the research paradigm and the study’s research approach. It also presents

how data were collected and analysed. Chapter five examines the impacts of climate change and how national and international climate policies have responded to the challenges posed by climate change in Lagos State. Chapter six presents subnational initiatives and polycentric climate governance in Lagos State. Chapter seven consists of the summary, conclusion, and recommendations.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Introduction

Climate change is arguably one of the urgent political, environmental, and scientific challenges in recent times following the frequent reports and news of climate-related havocs. Based on the foregoing, globally, in 2018, over 5000 people died and 28.9 million needed emergency assistance due to extreme weather events (CRED, 2018). International dialogues and meetings, scientific findings have placed climate issue at the top of the international agenda and made it of utmost interest to the public. Scholars and practitioners of climate governance have for the past decades witnessed processes of emerging scientific predictions about the causes, consequences, and the increasing concern that climate change presents a difficult challenge for global governance. The latest report of the Intergovernmental Panel on Climate Change (IPCC) predicts that emission of GHGs may increase since the international community seems to be too slow in taking definitive action and conscious attempt in emission reduction (IPCC, 2018).

The difficulty in the governance of climate change arises from three factors. One is the multiple and different levels of political decision-making that are involved. Two is the nature of the many processes that lead to greenhouse gas emissions, such as daily consumption and production activities. Three is the blurred and fragmented roles of state and non-state actors (Betsill and Bulkeley, 2006). Early scholars in climate governance assumed climate change a global problem (Hasenclever *et al.*, 2000; Breitmeier *et al.*, 2011; Andresen, 2014). A critical evaluation of this assumption would stimulate interest in the extent to which climate change could be viewed as a global problem. Scholars such as Hasenclever *et al.* (2000), Young (2000), Andresen (2014) explain that the global nature of the problem stems from its physical nature given that emissions of GHG know no boundaries; that is, emissions in one area will contribute to a rise in global temperature. This means that no country can tackle climate change individually since the processes that lead to emission production is multilevel and diverse and have a global impact irrespective of where the emissions are being produced in large quantity. According to this school of thought, managing climate change requires a global solution, which is in the cooperation among countries by setting emission reduction target and preventing free-riding. The cooperation among nation-states leads to the development of

international treaties that serve as a framework of action for climate change governance (Dingwerth and Pattberg, 2006).

Notable among such agreements are the UNFCCC, Kyoto Protocol and Paris Agreement. Scholars in these areas assume that nation-states are the key primary actors in climate governance. This is due to the state's power to sign and ratify international agreements (Falkner, 2013; Falkner, 2016). Scholars in this school of thought focus on what states are doing, individually and collectively, to combat climate change impacts, given that states have a huge influence and power over some of the processes that contribute to the increase in GHGs. On the one hand, international treaties and national policies on climate change often suggest that states can serve as containers for GHG emissions and reduce the rate of global emissions by setting targets for emission reduction. On the other hand, target setting and managing levels of emissions within the boundaries of a state are affected by actors and processes operating across national boundaries, which is sometimes beyond the state's purview (Okereke *et al.*, 2009). As Geoffrey Heal observes, GHG emissions are produced due to millions of dispersed and autonomous activities and decisions by private individuals for heating and transportation by corporate companies for different needs, all of which are outside the sphere of the state. The state can indirectly influence these decisions by providing incentives or regulations (Heal, 1998).

The above premise on the shrinking roles of nation-states on emission reduction has made the state-centric approach to climate governance orthodox (Bulkeley and Newell, 2015). Scholars such as Cole, 2015; Bodansky *et al.*, 2016; Dorsch and Flachsland have recently offered an alternative view to understanding the nature of climate change. For instance, one approach is to consider how GHG emissions are generated through consumption, production, and trade. From this perspective, one can argue that multinational corporations and consumers have more important roles to play in emission reduction than the state in which goods are being produced. A clear example is given in the study conducted by Greenpeace International, which compares the level of emissions production and burning of fossil fuel by some oil companies in certain countries. The study found out that Mobil emits more than British Petroleum and Australia. Amoco emits more than Canada, Shell more than Saudi Arabia, Texaco, and Exxon more than the Netherlands, Spain, and France (Hamilton, 1998).

If global is thought of as a causal category rather than a spatial one, there will be a direction to a different starting point on who governs climate change and where the governing should occur (Bulkeley and Newell, 2015). This reflects the changing role of nation-states in the era of globalisation and neoliberal economic reform. High emissions generating sectors such as energy, agriculture, and transportation are now difficult for nation-states to control due to privatisation, leaving states with little or no power to control the generation and distribution of energy (Smith, 2009). Furthermore, globalisation has made several states wary of introducing harmful taxation. When businesses are threatened due to their level of emissions or are highly taxed, they can relocate to states with less emissions reduction measures and less taxation (Newell and Paterson, 1998). This means that states need to engage non-state actors in negotiation and cooperation to realise and achieve their objectives. Any framework that seeks to understand climate governance must first recognise the multiple actors involved in the process of governing. The crucial participation of non-state actors in climate governance somewhat reflects the socially-embedded and economically-rooted nature of GHG emissions production. Unlike other environmental problems such as the depletion of the ozone layer, whose causes are reasonably limited to the industrial sector based mainly in North America and Europe, climate change causes are from a multifaceted kind of processes, spreading across scale and place.

The framing of climate change as a global problem often ignores other decision-making levels, shaping the causes of emissions and adaptation to climate change. Instead of considering it as a global problem, studies now suggest that climate change should be viewed as a multilevel problem that involves multiple decision-making levels (Cole, 2015; Bodansky *et al.*, 2016; Dorsch and Flachslund, 2017). This review follows the line of thought that climate change is a multilevel problem that requires initiatives and actions from multiple and different spheres of governance simultaneously. Therefore, there are four sections in this review: the first section conceptualises governance and climate governance; the second section reviews scholarly literature on the international regime approach to climate change and its effectiveness; the third section reviews scholarly articles on the global governance approach to climate change. The last section also appraises the multilevel approach to climate change. Here, scholarly articles on cities and their

government's roles are reviewed. Similarly, polycentrism and its efficacy to climate governance are discussed, and the gaps that necessitate the present study are revealed.

## **2.2 Conceptualising Governance and Climate Governance**

Like any other concept in the social sciences, the concept of governance has largely undergone multi-disciplinary appraisals in a bid to advance its definition. This is due to the differences in scholars' focus and the peculiarities of their disciplines. For instance, definitions in political science are more concerned about governance's formal meaning: how power is spread horizontally or vertically among stakeholders. Sociologists are more concerned about governance processes' power structures (Pohlmann, 2011). However, despite the disciplinary differences, there are fundamental features across the disciplines in defining governance. According to Betsill and Bulkeley (2006), governance involves the process through which collective objectives are pursued, and the state is not necessarily the only important actor. From this definition, governance involves the collaboration among agencies of government, non-state actors and the state.

Furthermore, the governance process can be established with or without a government actor. According to Andonova *et al.* (2009), governance always seeks to achieve public goods, meaning that, in defining governance, the actor, be it private or public, does not matter; the most important thing is the aim and objective of such process. If it aims to create or preserve some public good, it can be referred to as governance. In this review, the common good is related to climate change mitigation and adaptation. Climate governance for this study can be defined as the process that involves state and non-state actors in collective efforts and actions towards climate mitigation and adaptation.

## **2.3 International Regime Approach to Climate Governance: A Review**

As stated earlier in the introduction to this chapter, the international system approach to climate governance starts with the assumption that the atmosphere, unlike nation-states, has no boundary; GHG emissions in one place can have severe impacts in other places. Those with little or no contribution to emissions will also suffer from its negative impact. Governing climate change, from this standpoint, involves dealing with the problem of a resource that is held in common, which no single actor or institution has control over. In a definitive way of outlining the problem, Andrew Hurrell puts it thus: Can a split and often highly antagonising political system that is made up of over

190 sovereign states and many other actors achieve exceptional levels of cooperation and policy direction required to govern environmental problems on a global scale? (Kingsbury and Hurrell, 1992). Scholars in this area have sought to understand and unravel climate governance by deploying a regime approach to explain the establishment, stability, and effectiveness of the international agreements and institutions to the problem that necessitates their establishment (Young, 1999). These viewpoints proved predominantly attractive for understanding international climate change governance because they respond to issues that conventionally relate to a global environmental problem (Newell, 2006). These consist of the need to control the states' behaviour to evade the supposed tragedy of commons and the desire to regulate the propensities to free-riding. An international regime can be defined as:

*Social institutions that are made up of agreed norms, principles, programmes, rules and decision-making procedures that govern the relationship and interaction of actors in a particular issue area (Young, 1999:13).*

Regimes are established because of international agreements on a particular problem. Scholars in this area view climate change as a global problem in which regimes are established to ensure cooperation among nation-states. From this view, regimes are formed through bargaining among interested parties. For climate change, interstate bargaining under the auspices of the UN led to the establishment of several international regimes (Hasenclever *et al.*, 1997). Furthermore, there has been an increasing influence of non-state actors in the climate change regime. However, their significance is being measured by the level at which they facilitate and influence nation-states' behaviour (Agnew, 2004). This position is reasonable since states are important actors in climate governance because of their political authority and territorial integrity (Young, 2003).

The suppositions of regime theorists emphasise “government” and not “governance” viewpoint. They provided two rationales for the emphasis. One, nation-states have a monopoly of power and the use of force which is seen as the most important in global politics. Two, the state remains a homogenous and unitary actor with territorial integrity operating within the geopolitical order (Agnew, 2004; Risse-Kappen, 1995; Young, 2003). For a robust understanding of scholarly literature for understanding regimes, the next section deals with it.

### **2.3.1 Understanding international regimes**

For this review, international regimes can be understood from three major perspectives: regime as power-based, regime as interest-based and regime as knowledge-based. From the power-based approach, according to Okereke and Bulkeley (2007), regimes are established and controlled by a hegemon, the state with the most military and economic power, which either can be used to enhance cooperation or prevent international treaties. Following this argument, powerful states can decide to use their power resources to finance and establish regimes out of their rational self-interest. Also, they may exercise their veto power by withdrawing their backing for a regime (Strange, 1997). From this argument, global institutions' intention is less significant than the hegemon's drives and power distribution in the international system.

Concerning climate governance, some scholars pointed to the United States as a potential hegemon (Paterson, 2013; Stripple *et al.*, 2013). The United States participated in the consultations that resulted in creating the UNFCCC, the Kyoto Protocol, and the Paris Agreement but withdrew from Kyoto in 2001 and the Paris Agreement in 2016. The United States' ability to withdraw from such agreements points to regimes' instability (Victor, 2015). On the other hand, the survival of Kyoto and the Paris Agreements, despite the United States' withdrawal, suggests that international organisations are more than the sum of their powerful members (Rogelj *et al.*, 2016). Fundamentally, scholars and practitioners have questioned the basis upon which power is conceived within the regime approach. The assumption that interests are determined and based on military might and economic strength has been defied in the circumstance of environmental problems that are uncertain and in which interests are hard to determine at the beginning of negotiations. However, the discrepancies in power distribution and configuration influence member states' orientation towards the UNFCCC (Falkner, 2016).

The above illustrations about power also apply to leadership. There are different modes of leadership in international negotiations, especially ideational and instrumental, provided by the president of the conference and the secretariat. For example, the French President's role in COP 21 was applauded by both observers and delegates. According to Victor (2015), the conference's hosts and leadership helped to build goodwill and directed the minds of delegates to the consequences of failure to reach an agreement. Given the failure in reaching a viable agreement at COP15 in Copenhagen,

high-level policymakers and delegates prefer the French approach (Busch, 2009; Michaelowa and Michaelowa, 2017). Powerful ones are always providing leadership in the international regime. The study by Parker *et al.* (2015) observe that the international climate change regime lacks a single influential leader. Meanwhile, in the absence of a single powerful leader, progress in international climate agreements depends on the ability and willingness of few actors to work together as informal co-leaders in the same direction.

The second approach for understanding regimes is concerned with the role of interests in influencing international agreements and cooperation. Unlike the power-based approach, the interest-based approach is concerned with how several institutional frameworks affect and shape a state's behaviour. Scholars in this area argue that regimes are created when states perceive that acting alone in a given issue-area will not promote their interests. Regimes, here, are seen as an avenue used by states to reduce uncertainty and vulnerability while steadying the hopes needed to encourage collective action (Okereke *et al.*, 2009). This approach focuses on the institution's ability to build trust, share information, reduce transaction costs, and provide engagement with long-term benefits.

Similarly, alternative perspectives of regimes emphasise the role of ideas and initiatives in shaping how nation-states conceptualise their interests. This perspective broadens the sphere of regime theory and re-theorises the procedures through which it is formed. Most importantly, the roles can be played by non-state actors such as NGOs, IGOs and scientists in the formation and maintenance of regimes (Betsill and Corell 2001). The third approach views international regimes as science-based, where scientifically-based information enables negotiations and allows interested members to develop robust agreement than the individual state would have done on their own (Haas, 1992; Okereke *et al.*, 2009). The UNFCCC regime's brainbox (IPCC's main task) is to provide robust and elaborate scientific knowledge and the possible socio-economic impacts of climate change.

IPCC's fulfilment of its mandate is not straight forward since politics and science are different activities. IPCC needs to navigate between reacting to policy makers' request for alternative policy and protecting scientific findings' autonomy and integrity. Generally, the difficulty with this type of balancing will increase the political depravity of the problem (Miles *et al.*, 2001). Even though IPCC

is making changes, its capability to perform its responsibilities is inhibited by regulations requiring the government's participation for plenary approval (Miles *et al.*, 2001; Haas *et al.*, 2011; Victor, 2015). Several recommendations for reforming the IPCC have been floated. With much emphasis on the fact that unravelling IPCC from politics is not feasible, Carraro *et al.* (2015) recommend increasing the IPCC's focus on policy assessment. According to the Inter-Academy Council (2010) report, review processes, communication of uncertainty and internal governance, and IPCC management must be revisited to effectively deliver on its mandate of knowledge generation. The following section reviews relevant literature on the efficacy and effectiveness of the international regime on climate governance.

### **2.3.2 Effectiveness of international regime on climate governance: A review**

Most scholars have primarily focused on identifying the condition through which international regime can effectively govern climate change (Gupta, 2014; Andresen, 2014; Carraro *et al.*, 2015). Analysing a regime involves studying the conditions and manner through which regimes are established. Regime effectiveness is determined at the level of cooperation among members in adherence to the regime (Young, 1999). Furthermore, the international regime can serve at least one of the following four functions. Firstly, the international regime set the agenda on the issues by ensuring that the public's attention is on the same problem and facilitates civil society's participation (Stevenson and Dryzek, 2014). Secondly, the international regime organises effort towards building a consensual stand for research-based knowledge. The UN Environment Programme did this before the UNFCCC was enacted. Furthermore, it provides an avenue for policies and best practices; ideas from leading countries always provide delegates from other countries with innovative measures that can be replicated in their home country (Klingler-Vidra and Schleifer, 2014). Lastly, delegates involved in the negotiations with delegates from other countries can establish informal networks of deeply committed people that will press forward the process when a deadlock appears (Underdal, 2017).

The effectiveness of the regime can be determined by three factors which are: the institutional structure, supply of non-coercive leadership by regime members and the distribution of power among actors (Victor, 2011). Hovi *et al.* (2013) argue for three conditions that must be fulfilled before any international agreement can achieve the goal of reducing GHG emissions substantially:

(a) robust and comprehensive contribution by parties, (b) high level of assurances by parties (c)

high rate of compliance. They concluded that any agreement that meets these conditions would be feasible. Aakre (2016) makes a similar argument by emphasising that agreements can be enforceable if the negotiations are done among willing coalitions. Suppose states that do not want to comply fully are not represented; studies in international relations have two models for improving parties' compliance with agreements. The first one accepts that nation-states are interested actors that are driven by their national interest, and a deal will only be honoured by them simply if it is in their interest to do so (Barrett, 2008; Victor, 2011). Immediately compliance is against their interest; states will change their commitments by seeking renegotiation or leaving the regime.

A vivid example was the US's withdrawal from the Paris Agreement by former President Donald Trump. Scholars in the enforcement school believe that the only way to ensure an effective response from states and prevent defection and non-commitment is through coercive enforcement. For those in the managerial school, lack of capacity or priority is the major non-compliance source and not willful disobedience. It becomes important to render assistance such as providing funding and technical assistance interpreting complex texts to ensure parties' compliance. In the studies by Böhmelt *et al.* (2016); Spilker and Koubi (2016), they assume that agreements that are characterised as hard law always deter ratification, especially in a system that requires a supermajority. Breitmeier *et al.* (2011), while studying outcomes rather than outputs, note a negative relationship between the effectiveness of the regime and legally binding rules.

Aakre's (2016) submission buttresses Victor's (2011) observation that a regime can only be effective if the negotiation starts with what parties are able and willing to achieve. Other scholars made a similar submission. For instance, Verweij *et al.* (2006) opine that enforcement can be enhanced by adding various views on what constitutes the issue at hand and how it can be tackled. Barret (2008) suggests the need to negotiate distinct but connected treaties for each sector and significant GHGs by using existing methods that can help deepen enforcement.

However, to ensure that countries agree and have a credible agreement that will ensure deep cuts in GHG emissions, international negotiations face some hurdles. One of them is the power of some countries to veto the decision reached by consensus. The Big Five<sup>1</sup> comes to mind here; they

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<sup>1</sup>The Big Five include USA, China, Russia, France and UK

played a critical role in ensuring any global regime's success. At least two of them must show interest in any discussion before such can be successful. China played a leading role during the Kyoto agreement when the USA backed out of the treaty (Keohane and Victor, 2011). Different principles and worldviews by nation-states can lead to ideological confrontations during negotiations and can lead to deadlock. For instance, the unequal relationship between developed and developing countries is always revealed in the debate on who should be held responsible for climate change and who will prevent further damage and who has the capacity to mitigate or adapt (Ford *et al.*, 2015). Interpretations of these principles by nation-states often differ, leading to conflict of interests. The "nationally intended contribution" method adopted for COP 21 changed the conversation in another dimension by allowing countries to set an achievable target (Underdal, 2017).

Scholars who assessed the effectiveness of UNFCCC from the Kyoto Protocol to the Paris Agreement argue that performance is below expectations of practitioners and climate scientists (Hovi *et al.*, 2003; Barrett, 2008). Some of the reasons for this low performance are well captured by Victor (2011), which includes path dependency, asymmetry and fragmentation. Others include the institutional arrangements established by the UNFCCC, the dynamics of global conference and the distribution of power. Similarly, scholars such as Keohane and Victor (2011); Bäckstrand and Elgström (2013); Jordan and Matt (2014); and many others argue in a common insight on the highly demanding nature of climate change problem that international regime will be insufficient to solve. They accede that climate change is a multidimensional and multilevel problem that should involve different actors operating concurrently at different governance levels. The next section of this review deals with the global governance approach to climate governance.

## **2.4 Global Governance Approach to Climate Governance**

Given the criticism levied against the regime approach, which limits its analytical power for an appropriate understanding of the governance of climate change, scholars and practitioners in the field of international relations have turned to the concept of global governance as a means to examine the landscape and process of governance of climate change (Strange, 1997). Across the discipline in the social sciences, governance has been used to understand the increase in the number of actors and mechanisms involved in governing societies. The kind of literature that is concerned with global

governance owes much to the work of Rosenau. He made a distinction between “government” which is restrained to the world of nation-states, and “governance,” which is conceived as a broader phenomenon. Governance happens at a global level, not only through the direction and dexterity of nation-states but also through the involvement of different non-state actors pursuing goals beyond national jurisdictions (Rosenau, 2000). Therefore, global governance involves several activities that are important both in setting international rules and influencing policy through ‘on-the-ground’ execution, even when some of such activities commence from actors that, technically speaking, are not endowed with formal authority (Rosenau *et al.*, 1992). As observed by Rosenau, the distinction of global governance from other types of international relations is the involvement and participation of non-state actors in global affairs (Rosenau, 2000).

For this review, there are two major approaches for understanding the dynamics and nature of the global governance approach to climate change. The first is the regime theory which defines governance as rethinking international regimes as part of larger governance systems instead of an issue area (Jagers and Striiple, 2003). Studies in this area have examined the important role international regime played in climate governance alongside non-state actors. Most of these studies focused on the roles of NGOs in shaping and influencing climate governance (Betsill, 2015; Bulkeley and Newell, 2015). These organisations adopt “insider” strategies by seeking to shape and influence climate governance by providing knowledge, advice, and the development of policy alternatives and solutions (Hölscher *et al.*, 2019).

In the international system, nongovernmental organisations act as representatives and carry out several functions the same as state delegates; they are involved in information exchange, giving policy advice and representing their constituencies’ interests (Betsill, 2015). For example, in her investigation of the role of NGOs during the development of the Kyoto Protocol, Betsill posits that it was the expert knowledge and the technical know-how of NGOs in the Climate Action Network (CAN) that gave them influence in the negotiations. She notes that the impact of NGOs was not restrained to the technical area only (Betsill, 2015). While there was little indication of direct influence in the form of the acceptance of specific targets made by CAN for the Kyoto Protocol, its attendance made a major difference to the general outcome by holding the European Union (EU) to its assigning position of a 15% cut in emissions by 2010. The then US vice President Al Gore was

pressured to take a flexible approach to target-setting. These were two significant parts in the success of Kyoto's outcome, which may not have been possible without the presence of the NGO community (Betsill and Bulkeley, 2006). In the 2015 Paris Agreement, the pressure mounted by Civil Society Organisations at the entrance of the Blue Zone was one of the factors that made world leaders agree that more bottom-up initiatives on climate change would be supported (Falkner, 2016). In this manner, NGOs performed a role autonomous of individual states, acting with the independent agency's degree in shaping and influencing the international regime.

On the other hand, the second approach to understanding global governance of climate change moves beyond the international system by recognising the development of independent spheres of authority beyond the international and national dichotomy and by concentrating on the complex relationship between different actors and institutions of government (Dingwerth and Pattberg, 2006). Hence, instead of focusing mainly on non-state actors' role in shaping and influencing climate governance institutions such as the UNFCCC, the Kyoto Protocol, and the Paris Agreement, this body of studies on global governance considers global climate governance as comprising all determined and purposeful measures and mechanisms targeted at directing entire system towards mitigating and adaptation to climate change (Jordan *et al.*, 2015, Rogelj *et al.*, 2016). Scholars have examined the roles of actors at different governance levels, such as international, national, subnational, and regional levels, including public-private partnerships. This type of governance is otherwise known as a multilevel approach to climate governance which is discussed in the next section.

## **2.5. Multilevel Approach to Climate Governance**

As noted above, mitigating climate change impacts requires collective action globally. However, the current level of collective action at the global level is insufficient. Also, it is not significant enough to achieve the aim of reducing global warming below two degrees Celsius (UNEP, 2016). The international regime for climate change governance centred on the UNFCCC has been criticised for not achieving significantly in terms of emission reduction despite several meetings and negotiations for the past three decades (Victor, 2011). The argument that the international regime cannot and will not deliver a credible agreement that will lead to emission reduction is not new. Several ideas on the need for reform and others focusing on multilevel and diverse ways of governance have been floated (Rayner, 2010).

Several climate mitigation initiatives can be observed globally, with the UNFCCC as the core, but not the only one of global governance of climate change. Several actors and groups are contributing in different ways at different levels of governance. In mini-lateral and bi-lateral treaties, several countries coordinate and develop climate policies (Falkner, 2016; Jordan *et al.*, 2015). This multilevel level approach to climate change concentrates on bottom-top actions that are being implemented by nation-states, regional, national, subnational and non-state actors at various levels in managing the problem posed by climate change impact. The failure of world leaders to sign an agreement that would replace the Kyoto Protocol at the Copenhagen conference in 2009 marked a shift in climate governance from nation-states centred to one dominated by multiple actors operating at different levels (Backstrand, 2011). While some scholars conceive Copenhagen as a failure given the inability to have a concrete binding agreement, others see it as a success because it marks the beginning of recognising ongoing efforts at other levels of governance (Sabel and Zeitlin, 2012).

The multilevel approach is built on three premises. First, the impacts of human activities on the climate system are from diverse activities from the individual, family, city, subnational, national, regional to international levels. Hence, global governance's focus on international agreements and nation-state emission reduction target will yield little outcomes. Secondly, with a differentiated and multilevel approach, efforts on mitigation will be achieved because of multiple actors' involvement. For example, the use of renewable energy at the family level can be economical and, at the same time, protect the environment (Ostrom, 2009). Lastly, a multilevel approach will use the available institutional framework, even if the institution was meant for other areas. For example, the current level of mitigation policies in Europe would not have been possible save for the administrative expertise and political engineering of the EU. One of the fears of multilevel measures is that they may lead to poor coordination and multiple inefficiencies. However, one of the advantages is that it can engage different sources of GHGs simultaneously. This review discusses the multilevel approach in two basic sections: a polycentric approach to climate governance and cities as a polycentric governance unit.

### **2.5.1. Subnational government and climate change governance**

This section is divided into three: the emergence of cities' responses to climate change, subnational governments' efforts on climate mitigation, and subnational governments' efforts on climate adaptation.

#### **2.5.1.1. The emergence of cities' response to climate change**

Cities' response to climate change was first recognised in climate governance literature in the 1990s as cities in North America and Europe initiated local responses to the problem posed by climate change. For instance, Lambright *et al.* (1996) analyse how climate governance began in Toronto after the "Changing Atmosphere" conference in 1988. The conference was considered a catalyst for nation-states and cities to initiate climate actions. In Europe, majorly in Germany and the United Kingdom, local authorities of Frankfurt, Heidelberg, Munich, Newcastle, Leicester and Kirkless initiated climate policies based on their historical engagement with energy and conservation issues given the growing awareness of sustainable development discourse (Collier, 1997; Bulkeley and Kern, 2006; Bulkeley *et al.*, 2009). Most of their efforts were not noticed by the research community due to their incremental and small-scale nature until their involvement in cities' transnational networks. Three transnational networks were established in the early 1990s after the Rio conference. These include International Council for Local Environmental Initiatives (ICLEI). ICLEI was established by the City of Toronto, the U.S Environmental Protection Agency and several private foundations to develop tools for the reduction of GHGs at the city level (Lambright *et al.*, 1996; Betsill and Bulkeley 2003). ICLEI currently have more than 1000 members globally, which account for closely 15% of global GHGs emissions (Krause *et al.*, 2016).

In 1990, the Climate Alliance was established as a coalition of indigenous people and cities in Europe with a major concentration in the Netherlands, Austria and Germany. Its objective was to ensure the reduction of GHGs emissions to 50% below 1990 levels by 2030 (Kern and Bulkeley, 2009). The third one is Energie-cities, established in 1990 by six sub-national governments with an additional 16 members in 1994. The network was established as a coalition for cities (Bulkeley, 2000). By the close of 1990, Climate Alliance and Energie-cities networks drove many urban responses to climate change in Europe, Australia, and North America (Bulkeley, 2000; Allman *et al.*, 2004; Betsill, 2006; Bulkeley *et al.*, 2009). However, the international regime and national approach

to climate governance displayed insignificant interest in subnational initiatives on climate change (Granberg and Elander, 2007; Sugiyama *et al.*, 2008).

According to Toly (2008) and Hodson *et al.* (2009), the second phase of subnational initiatives on climate change was recognised in the early 2000s, comprising diverse geographical cities and new subnational networks. To Bulkeley (2010), the subnational networks created in recent times are different from the ones before them in three major ways: one, many subnational networks are now nationally recognised. Transnational subnational networks now have established campaigns that are either country-based or regional such as the Energie-cities in Poland or the CCP program in Australia. There are also national networks such as the European Covenant of Mayors (Gore *et al.*, 2009). Secondly, the new generation of subnational climate change networks differs from their predecessors in the way they mobilise and engage private actors and the state (Bulkeley *et al.*, 2009). For instance, the C40 Cities Climate Leadership Group has brought together more than 40 cities to address the menace posed by climate change (Hodson *et al.*, 2009). The C40 network was driven by the Climate Action Group and the Mayor of London; it was established by 18 cities in 2005. In 2007, the network expanded its membership by partnering with Clinton Climate Initiative (CCI) and included 40 of the biggest cities globally (Bulkeley, 2010).

Thirdly, different networks are emerging at the grassroots level with an explicit focus on urban centres (North, 2010). An example is the Transition Towns movement with members from UK, Japan, Australia, Chile, and United States (North, 2010). Subnational networks have a prominent stance on climate change by positioning itself as an important site for addressing climate change (Hodson *et al.*, 2009). This was more evident at the 2007 COP in Bali, where the representative of cities created a coalition and appended their signature on the Local Governments Climate Protection Agreement.

Scholars have identified the diversification and growth of the number of cities involved in climate governance in recent times. A new form of engagement with the climate change issue is prominent among cities. Although the earlier cities that engaged in climate change in the 1990s are medium and small cities, the last decade has witnessed the involvement of large metropolitan cities (Kern and Bulkeley, 2009). There is also a growing involvement of cities from the global South (Satterthwaite,

2008; Bulkeley *et al.*, 2009; Dodman, 2009). The Resilience Network, CCI and the C40 are majorly targeting cities in the global South, and the CCP programme has expanded its membership in regions such as Latin America and Asia.

### **2.5.1.2. Cities and climate change mitigation**

Mitigation refers to undertaken actions and initiatives aimed at reducing the emission of GHGs. The essence of the mitigation plan is not to avert climate change impacts totally but to reduce it to a minimal level (Pohlmann, 2011). As noted above, the mitigation strategy is understood to be a top-down process in which nation-states implement treaties that have been negotiated at the international level. However, there is an increasing awareness among scholars and practitioners of climate policy that international treaties and national policy would be realised at the local level. Moreover, scholars have begun to recognise that policies on mitigation can also be initiated at the local level that can influence the way things are done at both the international and national levels. (Pohlmann, 2011).

Most studies on climate change mitigation governance are single case studies while data are being integrated from diverse cities (Hanak *et al.*, 2008; Gordon, 2016; Roger *et al.*, 2017). These studies analysed the failure or success of climate policies at the local level within a country. Case studies research on selected issue areas has also been done in cities (Hsu *et al.*, 2017; Bernstein *et al.*, 2018; Hsu *et al.*, 2019). Given the growth of research on the response of cities to climate change, they have been recognised as an important site for addressing climate change. For example, the Stern Review (2007) and the International Energy Agency (IEA, 2009) observe that cities are responsible for over 75% of global emissions of GHGs. The high rate of emissions in cities is due to the increasing rate of urban population and the demand for energy to meet the teeming population, and the concentration of industrial activities in the cities (Seto *et al.*, 2010). Cities in the Global North, owing to their huge industrial activities, represent a larger share of emissions. An example is the emission rate of London which was estimated at 11% of the United Kingdom's total in 2015 (Spilker and Koubi, 2016).

Apart from being major polluters, cities also provide a good avenue for mitigation (Pohlmann, 2011). Different authors have suggested that cities and not nation-states should be well equipped to embark on environmental policies (Gordon, 2016; Roger *et al.*, 2017). However, it is important to note that

most researches on environmental policy have been conducted in urban areas while rural areas have received less attention. Rural areas are, in most cases, investigated on theoretical issues (Norgaard 2009; Bieler *et al.*, 2017). A large proportion of studies on climate change mitigation efforts by subnational governments have been conducted in developed countries such as the USA, Canada, Sweden, and Norway (Gordon, 2016; Roger *et al.*, 2017; Bernstein *et al.*, 2018). The reason why so many works have been conducted on cities' climate actions in the United States is that they are responsible for climate action following the withdrawal of the US federal government from the Kyoto Protocol in 2005 and the Paris Agreement in 2016 (Falkner, 2016). Thus, most climate policies in the USA originated from civil society organisations and local governments. In most cases, the implementation of climate initiatives by local governments is to put pressure on the federal government that is more concerned with economic and not ecological issues (Gerber, 2015; Mees *et al.*, 2019). Other studies on climate mitigation have been conducted in the Nordic countries, majorly in Norway, Sweden, Canada, Australia, Japan, United Kingdom, Germany (Lnage and Schimank, 2004; Eversole and Scholfield, 2006; Nakazawa, 2006; Moyano *et al.*, 2008; Olausson, 2009; Norgaard, 2009; McLeman, 2010). These studies are single case studies using data from different locations.

There are several studies on how subnational governments implement climate change policies. The majority of these researches examined the interaction of international, national and local climate policies (Bulkeley and Kern, 2004; Lutsey and Sperling, 2008). They see the interplay as a mutual one and not of suppression. These scholars acknowledged the fact that not only do mitigation policies exist as a top-bottom decision but that policies can also be transferred from the local level to higher levels of government. In Norway, Aall *et al.* (2007) discover that government grant is crucial for the execution of policies at the grassroot level, and the activities taken by the local governments are within the energy sector. They also found that the participation of non-state actors is very weak in relation to integration into the planning process. California is the most studied city in the US because many municipalities in California do undertake climate initiatives at the international level that will enhance local environmental policy (Hanak *et al.*, 2008). Contrary to the role that national government grants played in supporting local environmental policy, in Norway, as revealed by Aall *et al.* (2007), national government grants are not important in California (Pohlmann, 2011). The reason for non-reliance on government grants in California is due to the robust partnership with

non-state actors and the continual denial of climate action by the national government of the United States.

In China, subnational governments do execute the climate plans made by the unitary central authority. Hence, any change or drive in local environmental policy is driven by the national authority (Lo, 2015). In Africa, South Africa is leading in terms of local environmental policies. Municipalities like Cape Town and Durban have differing policies on climate change mitigation (Taylor *et al.*, 2014). Nigeria's government system is federal, but in practice, most of the subnational entities are like an appendage rather than a coordinate of the federal government. The national government is actively involved in different meetings and signatories to different agreements on climate change. The country has several national policies on climate change, but like every other government policy in Nigeria, implementation is the challenge. Subnational governments in Nigeria, due to financial constraints, do not have major policies on the environment. According to Elias and Omoloja (2015), there is no unity of purpose among different levels of government on climate change issues in Nigeria. Due to her peculiar features as a coastal city, the Lagos state government began an active involvement in climate change issues by joining the C40 Cities Climate Leadership Network in 2007 and subsequently developed several policies on climate change. Elias and Omoloja (2015) observe that most efforts of the Lagos state government on climate change are largely uncoordinated, haphazard, and fragmented. They concluded that there is a need for coordination that will enhance the participation of people across different levels (Elias and Omoloja, 2015). The debate on climate change mitigation has increased; scholars now recognise the need to focus on climate adaptation. This informs the following section on cities and climate change adaptation.

### **2.5.1.3. Cities and climate change adaptation**

Adaptation is the preparedness of human beings for the impacts of climate change. It is how prepared people are to cope with the negative impacts of climate change (Pohlmann, 2011). Unlike mitigation, adaptation is generally accepted as a local issue. Research on adaption without a local dimension will be of little significance. While mitigation requires national governments involved in international negotiations, adaption is mainly treated as a local issue that can be approached at best at the local level. Moreover, the peculiarities of local people to the impacts of climate change cannot be captured by international agreements (Engels 2008; Olausson, 2009; Tanner *et al.*, 2009). Adaptation

research is always concerned with two major concepts, which are resilience and vulnerability.

On one level, vulnerability originates from the potential and possible distress of people and places because of the negative effects of climate change. According to Pelling and Uitto (2001: 51) “*Vulnerability is a consequence of exposure to hazard, and human capacity to cope, prepare or recover from impacts of extreme weather events or natural disaster*”. Invariably, vulnerability is determined by socio-economic and environmental assets. On the other level, resilience is the capacity to adapt and persist during extreme weather events and climate stress (Pacifici *et al.*, 2015). The essence of adaptation is to support and consolidate the adaptive capacity of people to the adverse effects of climate change (Pohlmann 2011). There seems to be a consensus among scholars of adaptation research that vulnerability is socially differentiated and that poor communities and individuals will experience the more damaging effect of climate change because they lack the ability to cope and resources needed for adaptation (Adger *et al.*, 2009; Fussel *et al.*, 2006; McLeman, 2010; Thornton *et al.*, 2014). The disadvantaged and poor communities will be most affected by the impacts of climate change due to their social, economic, political, and geographical assets. (Tompkins, 2005; McLeman, 2010; Thornton *et al.*, 2014).

Globally, geographical features and fragile infrastructure will increase the negative impact of climate change in the global South (Norgaard 2009). Nations in coastal areas, due to flooding and the rise in sea level, are majorly affected by the impacts of climate change (Agrawal, 2009). According to Iati (2008), Breitmeier *et al.* (2009), one of the major injustices in the world is the fact that nations that will be deadly affected by the impacts of climate change are the least responsible for GHG emissions. The conditions that make a country not to contribute to the problem of climate change also make such a country susceptible to climate change impacts (Thornton *et al.*, 2014). To McLeman (2010), the consequence of climate change on the urban and rural populace will differ. The rural populace will be affected by the destruction of inadequate and frail infrastructure.

Moreover, agriculture which is the means of livelihood and the economic base of rural communities will also be affected. In urban areas, slum dwellers are mostly at risk (Carmin *et al.*,

2012; Chu *et al.*, 2016). In his study of the vulnerability of coastal communities in Lagos, Adelekan (2009) claimed that over 50 percent of slum dwellers live less than 500 meters below the coastline. Pelling (1999) maintain that high-income households would also likely experience floods, but they can absorb the loss. Slum-dwellers are most vulnerable because they lack the financial and material resources to adapt (Adelekan, 2009).

The inability of poor communities to cope is not only because they are poor but also due to the lackadaisical attitude of subnational governments to the requirements and needs of their people (Winsemius *et al.*, 2015; Hallegate *et al.*, 2018; Barbier *et al.*, 2018). These problems are not peculiar only to subnational governments in the global South. The economic strength of a country is not an assurance for resilience. For instance, McLeman, in his study of a rural community in Canada, a rich country, discovered that people in a certain rural community suffered because they lack government support. They rely on social capital and their social networks to combat the impacts of climate change (McLeman, 2010).

Given the local nature of the impacts of climate change, most adaptation researches have been done as case studies. Some of the studies include but not limited to, Breitmeier *et al.* (2009), Adelekan (2009) and Lazrus (2009). Case studies in developed countries include the United States, Canada, Australia, European nations, and Scandinavian countries (Keskitalo and Kulyasova 2009; McLeman, 2010; Baldwin and Chandler, 2010). Research on adaptation in developing countries is mostly carried out in island states. Their choice of island states is because they are more vulnerable to climate change impacts (Kelman, 2010). In Africa, while some studies have been conducted in Nigeria and Sudan (Engels 2008; Adelekan, 2009), South Africa has received more scientific attention (Roberts, 2008; Koch *et al.*, 2007). While most researches on mitigation have been carried out in the developed country, most studies on adaptation have been done in developing countries. Most of these studies are done in order to investigate how people react to climate change impacts (Breitmeier *et al.*, 2009; Lazrus, 2010, Dulal *et al.*, 2010). Few studies on adaptation in rich developed countries always focus on the problems of adaptation governance (Keskitalo, 2010; Aguiar *et al.*, 2010; McLeman, 2010).

The adaption study conducted in Nigeria emphasised the consequences of climate change on coastal areas communities (Adelekan, 2010; Komolafe *et al.*, 2014). Urama *et al.* (2019) postulate that climate change is the biggest impediment to the fight against poverty, hunger, and malnourishment in Nigeria. Similarly, Idowu *et al.* (2015) accede that climate change has affected the food production capacity of Nigeria, and this will have a huge impact on food security and the living condition of the people. Akpodiogaga and Odjugo (2010) accentuate that temperature is increasing and that there is a significant decrease in rainfall in Nigeria between 1901 and 2005. The temperature increase observed for 105yrs was 1.1 degree Celsius while rainfall dropped by 81mm. Sea level in the coastal region is 3400km square while desert encroachment is reducing arable land in the Northern part of Nigeria by 1-10km a year. Moreover, Ebele and Emodi (2016) affirm that Nigeria lacks the capacity in terms of knowledge, technology, and the resources to cope with climate change impacts. Climate change adaptation is still a major issue in Nigeria owing to the existing governance challenges and insecurity that the country is currently facing; the adverse effect of climate change has added to the suffering of the people majority of who are living in slums and risk-prone areas.

#### **2.5.1.4. Assessing the performance of subnational initiatives on climate governance**

In documenting subnational government responses to climate change, it is important to review the scholarly works that have been done on the performance of initiatives and strategies. Scholars decided to explain and analyse the nature of subnational climate governance initiatives. Although several subnational networks have decided to encourage an organised response to the problem, which is characterised by performance monitoring, target settings and assessment of carbon footprint, studies have shown discovered that several municipalities that set reduction targets failed to track it in a structured and systematic way; as an alternative, they choose to execute it in a no-regret measure (Betsill, 2015; Bulkeley and Newell 2015).

Reviewing the evidence from measures and initiatives that have been implemented, Schreurs (2008: 353) submit that:

*The type of climate initiatives that subnational governments can do easily are activities such as waste management, renewable energy, public transportation policies, educational efforts, public awareness campaign, green procurement standards, tree planting, drainage system and public-private partnership treaties with local businesses.*

The fact that renewable energy is central to several subnational climate measures is due to the long history of engaging the sector by municipalities in Europe and North America (Collier 1997, Bulkeley and Kern, 2006). Similarly, Ruthland and Aylett (2008), in their investigation of the establishment of climate strategy in Portland, explain that green energy is a key mobilising factor as it can pursue different goals in agreement and transform several interests into one and successfully creating new alliances (Ruthland and Aylett, 2008). However, as different cities are engaging reduction of GHGs in the energy sector, evidence abounds that there is a switch from energy usage in commercial buildings to the development of measures that aim at the transportation sector in a bit to address traffic congestion and the quality of air (Bulkeley *et al.*, 2009, Romero Lankao, 2007). Moreover, there has been a shift in the ways cities address climate change issues. For instance, in the 1990s, cities were majorly preoccupied with reducing emissions in their space and developing initiatives that promote emission reduction (Bulkeley and Kern, 2006). Since climate change has become a more environmental and political issue, cities are now providing low carbon infrastructures and services (Bulkeley *et al.*, 2009).

Furthermore, there is a growing engagement and involvement of private and public partners in subnational governance of climate change, and this has led to numerous projects developed to respond to governing climate change beyond the subnational authorities (Bulkeley, 2010). However, most scholars found out that, despite the involvement of local authorities on climate governance, it is still an issue that is always narrowed to the environmental department of subnational governments and not connected with other aspects of policymaking (Kern and Alber, 2008; Bulkeley, 2010). From the review above, the literature has given us meagre evidence to the degree at which the diverse subnational climate initiatives and measures have reduced emission of GHGs and climate vulnerabilities.

## **2.6. Polycentric Approach to Climate Change Governance**

Contrary to both the traditional regime and decentralist approaches to the global governance of climate change, a new and growing area of scholarship shows the new and innovative dynamics of climate governance. It analyses and promotes different conceptualisations of horizontal and vertical types of diversity. Some scholars emphasise a change from the supremacy and dominance of the UNFCCC to the disintegration of climate governance of climate change. This new approach concentrates on the horizontal differences at the global level (Zelli, 2011; Van Asselt, 2014; Van

Asselt and Zelli, 2014). Keohane and Victor (2011) discard the notion of a single and strong climate change regime and emphasise the idea of “*a regime complex for climate change*”, which appeared as the outcome of several options on diverse issues at different moments. On the other hand, Abbot (2014) and Bulkeley *et al.* (2014) emphasise the growth and increase of transnational networks for climate governance. Following this new realm of governance, Held and Hervey (2011:97) consider that “anarchic inefficiency dominates” comprising different actors that are uncoordinated. Scholars such as Hale and Roger (2014) devote their studies to manage and control uncoordinated efforts to reduce inefficiencies. Elinor Ostrom stresses that adopting polycentrism as an analytical approach will help to understand and improve measures to reduce the danger posed by climate change. In 2009, when scholars and practitioners were disturbed by the Copenhagen conference’s failure to reach an agreement that will replace the Kyoto Protocol, which expires in 2012, Elinor Ostrom entered the climate governance debate. She posits that new innovative and dynamic ways for climate governance were already visible alongside the UNFCCC. These new and innovative forms are emerging from the bottom-top and will ensure a dispersed, multiple, and multilevel way of governing which she referred to as polycentric (Ostrom, 2010).

The contribution of Ostrom to these arguments does not set a different theoretic viewpoint – she adopted the concept of polycentrism from old works on the managing of municipal challenges in the United States. She recognises the changing landscape of climate governance and maintains that it might be understood using polycentric concepts and terms (Ostrom, 2009). Ostrom questioned how the challenge of climate change governance had been framed conventionally; for instance, how to ensure a safer and habitable climate by negotiating credible regimes by nation-states. On the contrary, her position was a polycentric system which she characterised as many governing authorities at diverse units. Each domain in a polycentric system enjoys some level of independence to establish rules and norms in their domain (Ostrom, 2010). In her investigation on self-organisation for resource management at the local level, in the instance of management of the global commons, Ostrom view contradicts the dominant view that only a state-established institutional framework could sustain the commons. In the alternative, she maintains that different climate initiatives and policies from individual, local, national, regional, and global levels will create multiple benefits and incentives for climate mitigation. While explaining the relationship among these levels of governance, she submits that multilateral initiatives and policies are important, but they are not

enough to solve the challenges posed by climate change (Ostrom, 2010; Ostrom, 2012). She stresses the efficacy of multilevel governance to the menace of climate change because it will allow learning and experimentation (Ostrom 2010). It will be needless to wait for a binding international treaty before the implementation of policies and initiatives on climate mitigation at subnational levels (Ostrom, 2012).

Some scholars have further examined the efficacy of polycentrism in climate governance. In their studies, while examining the global level, Galaz *et al.* (2012) infer from network studies to give a detailed explanation on polycentrism as an issue of the degree to elaborate the relationship and appraise the differences among network actors. Berman *et al.* (2012) illustrate that public-private partnerships and voluntary types of governance are vital aspects of a polycentric governance framework due to an increase in institutional differences. Sovacool (2011), in his study of energy and climate governance, explains that each polycentric part could effectively address the problem of collective action. Araral (2014) accentuates that a descriptive polycentric approach to climate governance acknowledges the differences of possible beneficial formal structures that are better than state-controlled measures.

Cole (2015), while explaining the merits of polycentrism to climate governance, focus more on the important part that high levels of trust can play in ensuring and bringing up climate mitigation policies between major emitting countries. Jordan *et al.* (2015) examines the different new, dynamic and innovative systems of climate governance and call for more political and scientific determination to enhance the efficacy and efficiency of polycentric order. Interestingly, the international regime can work as a component unit in a polycentric system. This is due to the connections between climate change and a different type of socio-economic and physical issues, which result in institutional overlaps between international institutions such as trade and investment, aviation, maritime, human rights, and the climate change regime. Jordan *et al.* (2018) submits that the international domain itself is polycentric. For instance, they maintain that several international institutions such as International Maritime Organisation, International Human Rights Institutions, International Economic Institutions, and other Environmental Institutions have been involved in climate governance and have a considerable authority level.

According to Keohane and Oppenheimer (2016), new realities in the international climate governance regime show the shift to more polycentrism. For instance, the COP 21 in Paris creates a bottom-top governance system in which nation-states committed to reducing their emissions individually through the Intended Nationally Determined Contribution, which will be assessed and reviewed. Most importantly, the Paris Agreement gave robust reinforcement to the initiatives by subnational governments, therefore emphasising the prominence of overall development to polycentrism. The next section of this chapter reviews existing works on cities as a unit of polycentric governance.

### **2.6.1. Subnational government as a unit of polycentric governance**

To several international relations and climate governance scholars, subnational governments will play an important role in climate mitigation and adaptation governance (Fuhr *et al.*, 2018; Van der Heijden, 2018; Van der Heijden *et al.*, 2019). Cities and subnational governments were acknowledged and overtly recognised as an essential site for climate initiatives and actions for the first time in 1992 through the Local Agenda that was established at Rio Summit. In global policymaking on climate change, cities are only acknowledged as sites for climate action and not recognised as formal actors. There are institutional boundaries to break through before they can be heard at climate negotiations at the international level and be acknowledged in international treaties.

The summits in which they do participate at COPs are side events; they are not formally part of the negotiations. The SDGs that recognised cities as key actors for climate action is not mentioned in the Paris Agreement. Additionally, the Paris Treaty does not mention cities or subnational governments as sites or actors of governing but refers to state-driven initiatives as important for climate action (Hale and Roger, 2014). However, there are several discussions and emphasis at the global level on the significance of subnational governance of climate change which is a clear illustration of polycentric governance, although subnational governments and their networks are units and not a specific domain in a polycentric governance system (Van der Heijden *et al.*, 2019). Subnational governments act as independent actors and organise themselves to address specific climate change challenges in their domain. Subnational governments are doing this either on a national, regional, local or international level, thus, producing multiple and diverse governing authorities at multiple

scales and exercising considerable autonomy in rules-making and implementing and conforming to more polycentrism.

### **2.6.2. High ambitions on climate mitigation at the local level**

Subnational governments have been in a healthy rivalry to lead emission reduction targets since the early 2000s. For instance, New York intends to reduce her emissions by 80% below the 2005 level by 2050, while Sydney targets to reduce her GHG emissions by 70% below the 2006 level by 2030. What makes scholars and practitioners interested in subnational governments' actions are that their target is far more than the target set by their national governments. New York and Sydney's target doubled that of their respective national governments (Van der Heijden, 2018; Van der Heijden *et al.*, 2019). The ambitious emission reduction target by cities raises the question of why the subnational governments are ambitious on mitigation targets. In response to this question, reasons given by studies include the vulnerability of cities to climate change, cities as a major source of emissions, cities as an avenue for innovative climate actions and the support for climate measures by the national government.

Based on the first assumption that cities are both a major contributor to global emissions and victim of climate change, according to Dodman (2009), most carbon-intensive services, like industrial activities are based in cities, this leads to a high volume of industrial wastes generation, making cities the largest and key contributors to climate change. Following the growth in population because of economic activities, cities will be the most hit climate disaster areas (Fuhr *et al.*, 2018). To reduce the distressing impacts of such climate-related disasters, subnational governments, globally, have implemented and are still implementing many controlling measures: introduction of taxes and subsidies to prepare their populace towards more sustainable and resilience to climate change impact. Tokyo's government emergency energy programme of 2011 is an example; it was implemented in reaction to the power outage that led to the closure of all nuclear power plants due to the Fukushima power plant incident. The emergency programme was designed for energy savings, most importantly in large offices. Most of the large offices continued the minimal consumption of energy after lifting the emergency requirements (Trencher *et al.*, 2019).

Secondly, cities host several industrial activities. Out of the emissions production activities, cities can undertake actions through a distinctive application of knowledge and technology to achieve a reduction in emission. For example, in the US, energy saving in the building sector is close to 23% and can be valued at double the costs of initial investments. 1.2 trillion can be saved with a return rate of 10yrs if \$520 billion is invested (Van der Heijden, 2018). Lovins (2018), in his study, observe that a total carbon-neutral built environment is achievable in China and the United States if available technologies are applied at a net economic profit. To benefit from such savings, subnational governments across the world have been encouraging their populaces to adapt to the use of green and cleaner technology.

The third assumption is the opportunity inherent in green technology for cities. It is a common argument that subnational governments compete to become climate-friendly city to seek attention and attract investors for green technology ((Holscher *et al.*, 2019). The fundamental notion is that subnational governments are involved in climate action for the sake of job creation, economic prosperity, and citizens' support during an election (Schragger and Schragger, 2016). Subnational governments tend to attract firms and investors by showing an image of sustainable and environmentally-friendly development and climate initiatives, such as reducing property tax for additional energy-efficient buildings (Van der Heijden, 2018). Another line of thought, which is sometimes not very clear, is that subnational governments set climate ambitions and targets higher than their national government simply because they were supported or mandated by a central authority to do so (Van der Heijden, 2018; Van der Heijden *et al.*, 2019).

In spite of its flaws, credit must be given to Local Agenda 21 for identifying the subnational entity and their governments as a prominent domain for climate initiatives and actions. Resulting from Agenda 21, nation-states began promoting and supporting local actions (Zeppel, 2013; Fuhr *et al.*, 2018). For instance, in 2011, when the government of Australia developed a National Urban Policy, the subnational governments were required to deliver goals that included: environmentally-sensitive buildings, better housing, and urban design and adequate preparation for climate disaster. Hence, although cities can act as independent actors in polycentric governance, we must bear in mind the relationship between them and other actors.

### **2.6.3. Experimentation of innovative measures for climate governance at the local level**

Around the world, subnational entities and their governments have been actively involved in experimenting with new and innovative governance processes to deal with the impact of climate change. Climate governance experiments at subnational levels have brought private actors, civil society, and local government actors together in structured and formal processes of initiating and establishing new forms of governance instruments and authority to deal with climate change challenges at the local level (Kern and Alber, 2009). On the other hand, what motivates cities to experiment with new governance instruments? Scholars have identified several motivations. First is the privatisation of public service delivery at the local level, which started the execution of novel public management practices (Mees and Driessen, 2019). The change from government to governance has been recognised since early 2000 (Fuhr *et al.*, 2018).

Subnational governments can no longer be regarded as an appendage of the central government, which is merely executing national rules and regulations. They are strongly anticipated to provide local amenities themselves efficiently and effectively (Michaelowa and Michaelowa, 2017). Confronting these cumulative expectations and the assumption that their provision will aid economic development, subnational governments do partner with other local actors in search of new governance measures. Jørgensen *et al.* (2015) and Hsu *et al.* (2017) assign more agency to private actors, civil society, and local government actors. Instead of considering altering the structural and institutional measures that bind them, they assume that subnational governments want to be keenly engaged in addressing climate change in joint experiments and processes. The involvement of different stakeholders in developing and designing governance instruments will lead to a more robust and profound knowledge.

Similarly, to Van der Ven *et al.* (2017), involving different stakeholders will allow the governance instruments to be developed through consensus-building. This would have considered the merits and demerits of the instruments to parties involved, and it will help to bridge their differences and competing views, while to Setzer (2015), it will enhance the governance instruments' acceptance and improve compliance. Given the purpose of the innovative governance instruments, scholars have moved away from the old-fashioned hard-law instruments that punish non-compliance to soft-law instruments that incentivise compliance. Such incentives can be in the form of information

sharing, financial compensation or the ability to advertise compliance behaviour (Van der Heijden, 2014). Van der Heijden (2016) further stressed the need to shift away from compulsory governance instruments to voluntary commitments as compliance is more feasible when firms and individuals commit themselves willingly. However, some studies doubt the capacity of subnational entities to meet these expectations. They contend that there is always a wrong supposition in climate governance research that all experiments will be useful and that while there is more emphasis on innovative instruments and experiments, their performance and development are not well understood (Aylett, 2015; Johnson *et al.*, 2015; Van der Heijden, 2018). Scholars in this school note that there are challenges for scaling up an experiment. For example, economic situations and funding may affect scaling up (Aylett, 2015; Johnson *et al.*, 2015; Van der Heijden, 2018).

### **2.7. The Gap in Literature that Necessitates this study**

The efficacy of a polycentric approach as a viable alternative to the international regime has been a major concern of international relations and climate governance scholars. Dorsch and Flashland (2017) emphasise the importance of a polycentric system of governance to climate change but insist that rather than being a replacement or being antagonistic to the international regime, the polycentric system should be complementary to the international effort. In a similar vein, Jordan *et al.* (2015) contend that polycentric governance offers new prospects for climate governance; but based on existing empirical research, it is early to decide whether expectations about the performance of the new forms are well-founded. The literature on polycentric climate governance is growing; scholars, however, have given significant attention to cities in the global North. Essentially, there is a huge knowledge around polycentric governance of climate change in few cities, mainly in Europe and North America. Urbanisation and development are taking place in Africa and Asia; solutions that appear to work in developed countries can produce fewer progressive effects when transmitted to developing countries or have a negative outcome (Van der Heijden, 2018). Based on this gap, this study contributes immensely to the existing literature on the efficacy of the polycentric governance approach to climate governance in Africa, with reference to Lagos State, Nigeria.

## **2.8. Conclusion**

This chapter has delved into a critical review of relevant literature on climate governance and identified the gap that birthed the study. The review was guided by three major schools of thought in the climate governance literature, which are: the international regime approach, global governance approach and multilevel approach. Scholars in the international regime approach assume that the problem of climate change is a global one, hence the need for a global solution. This assumption arises from the nature of the causes of climate change, in that emission being generated in a particular location will contribute to a rise in global temperature, which affects countries disproportionately irrespective of the roles in the generation of GHGs. Hence, no country can tackle climate change in isolation because the processes leading to GHG are global; the solution must also be global. To these scholars in this school, the establishment of UNFCCC and, subsequently, international climate change agreements are critical to robust climate action. The major shortcoming of the international regime approach is the belief that nation-states are the only major actors that can effectively govern climate change.

The chapter found out that the shrinking roles of nation-states on emission reduction have made the argument that climate change can only be dealt with through a global solution become orthodox. For instance, neo-liberal economic reform and globalisation have made it difficult for nation-states to regulate high emission generating sectors such as energy, agriculture, and transportation. The global governance approach has shifted from the emphasis on government by the international regime approach by recognising the development of independent spheres of actors beyond nation-states and concentrates on the complex relationships between different actors and government institutions. However, scholars in the global governance approach still place much emphasis on nation-states in terms of setting agenda for climate governance, thereby ignoring the roles that non-state actors are playing in agenda-setting in their respective sphere of governance.

The chapter observed that the framing of climate change as a global problem often ignores other decision-making levels, which shapes the causes of emissions and the possible ways of adapting to the consequences of climate change. Instead of considering climate change as a global problem, the chapter concludes that it is a multilevel problem that involves multiple decision-making levels. Hence, to understand how to solve the challenges posed by climate change, it becomes important

to understand the governance roles of international, national, regional, subnational and local actors, operating simultaneously within their governance sphere.

## **CHAPTER THREE**

### **THEORETICAL FRAMEWORK**

#### **3.1. Introduction**

This chapter appraises the theoretical framework adopted in this study. Theories are a set of ideas that define the relationships between variables. It gives an outline of the theoretical lens that shapes the objectives of the study and the means of data collection. A theoretical framework aims to discover the prominent variables that apply to the research problem. A proper situation of a study within a theoretical framework will enable the researcher to properly connect and explore the relationship between independent and dependent variables. This study adopts the polycentric governance theory to study the efficacy and effectiveness of a bottom-to-top approach to climate change governance, as different from an international, regional, and national approach to climate governance. This chapter is divided into several sections: a historical overview of the polycentric governance approach, basic assumptions of the theory, critique of the theory, and the application of the theory to the study.

#### **3.2. Historical Development of Polycentric Theory**

The term polycentrism refers to a social system with several decision-making centres or governing units, each with limited and independent liberty to operate under a set of rules. Historically, the concept was first used by Micheal Polanyi (1951) in his book *The Logic of Liberty* to explain a method of social relationship in which individuals are at liberty to pursue their goals within an entire system of actions (Polanyi, 1951). After a decade, Vincent Ostrom, Charles Tiebout and Robert Warren (1961:831) adopted polycentrism in the perspective of municipal governance to refer to a system of several self-governing units formally autonomous of each other; preferring to act in ways that put others into consideration, through collaboration, rivalry, conflict, and conflict resolution. Afterwards, the concept was later used in legal studies by Chayes (1975), Fuller and Winston (1978) and Horowitz (1997). Subsequently, it was used in studies of municipal networks by Davoudi (2002) and more prominently used in governance research by Vincent and Elinor Ostroms (Aligica and Boettke, 2009).

The interest of Micheal Polanyi in a social system that can preserve the independence of thoughts and preserve the rule of law led to the development of polycentrism (Prosch, 1986). His method

was highly noble and novel because he constructed his investigation using an example of the organisation of a scientific community. Polanyi claimed that the accomplishment of science was because of its polycentric organisation. In this type of organisational system, members enjoy the liberty to make personal and individual contributions, and they have the freedom to structure their research work in a way they consider the best (Polanyi, 1951). Research efforts are not always wasteful and unproductive because they have a common idea: the independence to hunt for the end objective. Polanyi's argument here is that such an end goal cannot be enforced on the members by an overall power. Hence, the power arrangement must give room for a multitude and different opinions to exist. Also, it must allow participants to implement their ideas. Any attempt to enforce advancement to a goal will fail because progress can only be achieved through a process of trial-and-error by participants. Polanyi argues that it also applies to law, religion, or art because these actions are polycentric and motivated by different ideas (Aligica and Tarko, 2012). The next section focuses on the dichotomy between the monocentric approach and the polycentric approach.

### **3.3. Monocentrism and Polycentrism: What Distinction?**

Out of the effort to understand the best way to ensure quality delivery of public services in metropolitan areas, there emerged a grounded research agenda that seeks to clarify the dichotomy between monocentrism and polycentrism. One of the major features in defining a monocentric order and a polycentric order is the control over the exercise of the legitimate power of coercion. In a monocentric system, the powers for decisive and imposing rules are exercised by a single centre decision-making system. In contrast, a polycentric system is one in which there are several decision-making structures with a considerable level of independence to exercise and enforce the power in their specific domain with their actions guided by a system of rules (Ostrom, 1972; McGinnis, 1999). Unlike a monocentric system where there is an ultimate monopoly of the use of force by a single central government, a polycentric political system has no monopolisation of authority, and the existing several decision-making centres are limited and constrained by a system of rules. Hence, a polycentric system is a rule of law system. Thus, in defining a polycentric system, the idea of a system of rules is as significant as the ideas of authority and diversity of decision-making centres.

Ostrom *et al.* (1961) consider that several decision-making centres under a system of rules are the only meaningful way to define polycentrism. While several forms of organisation may resemble a polycentric order, they concluded that not all of them have the features of polycentrism as long as they lack a comprehensive system of rules. Moreover, it is essential to note that monocentric and polycentric are interconnected. A study of polycentrism is also a study of monocentrism. The relationship between the two concepts is logical and empirical. For instance, a political system that is predominantly monocentric may not exclude the possibility that polycentric elements may be present in the system. Equally, a political system that is primarily polycentric in structure and organisation need not exclude the possibility of patterns of the monocentric from appearing in it (McGinnis, 1999).

Furthermore, Polanyi used the notion of polycentrism as a prominent well-suited instrument to address the famous socialist problem of calculation (Aligica and Tarko, 2012). According to Polanyi, the market should be viewed as a polycentric system consisting of a network of several actors that always alter their behaviour and approach to the choices given by other actors. Socialism suggests the change of the economic system to a monocentric one; that is, the one controlled by a single central government. To counter this notion, Polanyi gives an illustration between scientists aiming to discover the truth and entrepreneurs seeking to identify the best method to make a profit. The socialist system, in order to reach economic prosperity for all faster than the market uses the control strategy by the central authority to reduce the misallocation of resources. In reality, centralised socialism is unavoidably polycentric because it works within a free market to deliver economic growth. The reason for this is that, in a socialist system, economic ideas cannot be imposed by a central authority alone. The system is always allowed to move towards the idea of the trial-and-error format. Just like scientific progress cannot be guided by a central power, economic growth cannot be achieved through a coercive method (Polanyi, 1951). Self-organisation of autonomous ideas will give room for a collective result that is not premeditated by any of the actors. Their self-organisation is regulated by an unseen force towards a collective discovery of things that are unknown. Since its end-goal is hidden, the type of cooperation can be advanced, and the collective output will be the optimal outcome if each phase is taken by the capable person in the group. Any effort to coordinate the group by a central power would destroy their autonomous creativities and reduce their

collective efficiency, which can destroy cooperation (Polanyi, 1951).

In addition to the foregoing, from the early 1940s to the late 1950s, Michael Polanyi examined “polycentric responsibilities” in several articles; he discussed the challenges of harmonising a huge number of components, extending from statistically quantifiable displacements of various related and mutually dependent points. Additionally, he examined the non-calculated management of difficult social tasks. He argues that by calculating the disarticulations of every single centre to the other and then modifying each unit actions, a polycentric pattern would be realised (Polanyi, 2013). To Polanyi, living creatures do participate in polycentric responsibilities by “*reacting to impulse sent from any part of the body system*” (Polanyi, 1951:21).

The above argument is in tandem with Hayek’s position. However, Polanyi disagrees with Hayek in relation to the issue of social justice. Hayek (1978) emphasises that the idea of social justice is literally insignificant. On the other hand, Polanyi maintains that market systems can conflict with some secular or religious moral values, and it may produce motivations that will work against moral behaviour (Polanyi and Prosch, 1975). This perspective of relabeling market and morality issues concerning individual behaviour circumvents the kind of collectivist opinions Hayek attempted to demystify while placing morality issues on the table. However, the epistemic type of moral relativism by Polanyi means that he strongly believes that a slight effort to enforce morality by a centralised power will fail. Furthermore, the centralisation of authority will limit self-determination. In this sense, Polanyi argues that socialism is, to an extent, a moral system and not an economic theory.

Interestingly, Polanyi’s idea and concept of polycentrism was also a basis of motivation in legal studies. Fuller and Winston (1978) submit that most of the issues referred to judges to reconcile are polycentric in nature, given that disagreements always involve several decision-making centres. Consequently, realising justice can be a remote idea. Fuller and Winston maintain that when issues arise in a polycentric system, members involved are not always invited to court to explain their point of argument. Several parties that are not represented in court are affected by conventional litigation. Huge losses of a contract can be the end of a business. A criminal convicted can cause crises in a

town. A finding of fraud in a business can lead to bankruptcy. Moreover, the reality that judicial pronouncements affect the rights of other people is not only a guaranteed outcome but also an essential task of the judges (King, 2006).

Based on this difficulty, Fuller and Winston (1978) ask several questions: What are the issues that should be resolved in court? Which ones should be resolved through the market? Which issues should be left to political settlement? Fuller and Winston analyse that when an issue affects many parties, the tendency of judicial error is high, considering how difficult it is to avoid generating unplanned consequences. As such, there must be an entry point defined by polycentrism beyond issues that require judicial decisions and issues that should be resolved through the political process or market. Polycentric non-judicial procedures could proffer better results (Fuller and Winston, 1978; King, 2006). Fuller consider the idea of polycentrism as a major element in the justice system. However, the work of Vincent Ostrom and Elinor Ostrom gave the theory a more pragmatic substance.

### **3.4. Vincent and Elinor Ostrom's Standpoint on Polycentric Theory**

According to Ostrom (2010), a polycentric system is one in which several decision-making units are relatively independent and have the right to enforce, determine, and alter relationships with other units in the system. In a polycentric arrangement, no one has the final control over the use of power; each unit has a considerable level of authority in its domain. However, all the governing units are guided by an overarching rule. Similarly, Ostrom *et al.* (1961) consider the idea of a multiplicity of policymaking centres as the most practical principle of polycentrism. They see the existence of different decision-making units as a genuine way of conceptualising polycentrism with a system of overarching rules (Ostrom *et al.*, 1961). Several types of system can be compared with a polycentric system, but if they do not have a system of rules, they are not polycentric. In understanding the conditions and meanings of polycentrism, Ostrom *et al.* 1961 recognise that the study of polycentrism has a substantial history. It was not a historical accident when Alexis de Tocqueville observed the presence of an unseen mechanism of social order while studying America's democracy. For Vincent Ostrom, structuring the constitution of America might be perceived as a polycentric experiment, and federalism may perhaps be viewed as a means to operationalise and understand the reality of an aspect of this system (Aligica and Tarko, 2012).

The study of America's constitution as a polycentric experiment points to some exciting perception. For example, polycentrism can be viewed as an important way of realising governmental purposes such as justice and liberty. The multiplicity of decision-making centres allows for liberty and freedom, which are essential features of democracy (McGinnis, 1999). The normative and historical perspective is significant. Thus, if anyone is interested in preserving and enhancing the governmental objectives in a democracy, it becomes imperative to have a clear understanding of what makes the polycentrism system so special. Hence, Vincent Ostrom's study led to the conclusion that polycentrism is not only about the multiplicity of decision centres and significant independence to make decisions but also about constitutions, rules, cultural, and political values for preserving each decision-making centre. On his own, Polanyi uses the word 'spontaneous' as tantamount to polycentrism and posits that self-organising is a function of spontaneity that occurs under certain conditions at diverse levels.

Ostrom (1972) cites three conditions that are important for understanding a polycentric framework. First is the liberty to enter and exit any governance structure. If the existing governance structure blocks the creation of a new one, it would be difficult for a polycentric system to emerge. Secondly is the existence of a system of rules to serve as the legal basis for the polycentric system. The final condition is that impulsiveness should be evident in the revision and reformulation of guidelines that regulate the polycentric arrangement (Polanyi, 2013). This means that governing units in a polycentric system should not only be free to have the motivation to self-organise and self-implement, but they should also be able to change the guidelines. In this regard, there are two requirements: one is procedural; there must be rules on how to change the existing rules. The second is cognitive, which means knowing the connection between certain guidelines and the effects of those guidelines under a certain situation. If situations are new and the existing guidelines do not provide a suitable response, the rules could be altered to induce the right response (Ostrom, 2010). The next section discusses the approach of governance challenges in urban centres by Ostrom and Ostrom as a polycentric issue.

### **3.5. Ostroms' Polycentric Theory to Urban Governance**

In the late 1960s, Vincent Ostrom, Tiebout and Charles were concerned with the concept of polycentrism in the middle of an intense conversation on the objectives and nature of the reform

of public governance in America's urban centres. The conventional understanding of an urban region in the 1960s was a big municipality, practically connected by social and economic relationships (Ostrom, 1972). Nevertheless, its harmony was synthetically separated administratively by informal governance units. An urban centre had no centralised administrative identity. In its place, there were many states and federal institutions, cities, counties with separate control. The outcome was the difficulty in efficient and effective administration because the different units were acting independently and being unable to discharge the functions accurately. Due to the absence of an overarching centre of coordination, each governance domain acted in its interest without considering the general interest of the urban centre (McGinnis, 1999; Ostrom *et al.*, 1973). Different kinds of literature evolved from the analysis of the view that the challenge of urban governance was the existence of different governing domains, and it made governing in urban centres a difficult task. In other words, there were several governing units that led to a repetition of functions, chaos, an unclear and overlying control. This position was similar to the socialists' belief in the superiority of a centrally planned economy over a free market system.

Ostrom and Ostrom reacted to this view by arguing that the optimal level of goods and services produced was not equal in all urban centres. Some were efficiently produced in large quantity and some in small quantity. Thus, the presence of several governing units connected and interacting was far from being an unhealthy condition; it may be a healthy one. (Oakerson, 1999; Ostrom *et al.*, 1988). The Ostroms clarified that the diversity of interactions among private agencies and governmental units functioning and coexisting could be harmonised by patterns of the inter-organisational system. Inter-organisational arrangements would produce market features and ensure both error-correcting and effective behaviour. Coordinating the public sector is not needed under this situation; the structure of inter-organisational processes will create significant economic opportunities and stir up self-regulating and self-correcting mechanisms (Ostrom *et al.*, 1965).

Subsequently, their studies on police services in Indianapolis and the Chicago Police Department further gave credence to the assumption that public services can be produced efficiently and effectively on a smaller scale than a larger centralised unit. With an investigation of citizens in 109 cities with a population above ten thousand, their findings countered the idea that large

metropolitan administration would often produce greater goods and services. They view that the assumption that the economy of size was prevailing, the assumption that centralised policing was compulsory, and the assumption that autonomous units would not be good enough to discover means of coordinating were wrong. Vincent Ostrom maintains that polycentric arrangements with large, medium, and small departments often performed more than urban areas with only one centralised department (Ostrom, 1972; Ostrom *et al.*, 1973).

However, mainstream political scientists and reformers in the 1970s were going in different ways due to the fact that disintegration of power and overlying of authorities were engendering what they explained as chaotic. Clarifying the challenges of polycentrism and chaos was, as a consequence, central in the effort towards moving forward the agenda and defining the tasks. The main risk is to recognise and map the patterns of command threatening under the obvious disorder inherently linked to polycentrism. If this was the situation, nothing is at stake but a theory of hidden command, a theory of unseen hands coordinating the social mechanism. Polycentrism, as predicted by Polanyi, applies to several social phenomena (Polanyi, 2013). This infers that debate on polycentrism from an administrative and political perspective is a way to approach the challenges with empirical evidence.

Among the trio, Polanyi, Vincent Ostrom, and Elinor Ostrom's perspectives on polycentrism, there are no differences in their conceptualisation of polycentrism. What differs is their applicability of polycentrism to different social phenomena. Polanyi stresses that polycentrism applies to several social events such as the market, law, governance, and science. Flowing from the idea of polycentrism by Polanyi, Vincent Ostrom accentuates that urban governance challenges can be solved by adopting a polycentric governance pattern. He explains this using police services in metropolitan areas in the United States (Ostrom, 1972). Elinor Ostrom adopted polycentrism to climate change governance in the early 2000s. She posits that since the generation of GHGs from multiple and diverse sources, the solution to reducing it must also come from different levels rather than focusing only on the international regime, which has been able to achieve little in terms of emission reduction (Ostrom, 2009). This study agrees with Elinor Ostrom's conceptualisation by viewing climate governance as a polycentric issue that can be dealt with appropriately by adopting a polycentric approach.

### **3.6. Major Assumptions of Polycentric Governance Theory**

#### **3.6.1. Local action**

The first and the most prominent assumption of polycentrism is that it enables local action and initiatives. Local, in this sense, means something that is below the national sphere. For this study, local generally refers to subnational governments, cities, communities, non-state actors, and other actors operating below the national government. Interestingly, initiatives and processes of governance start at the local level from self-organisation. Local action is a major assumption of the polycentric theory. It originates from the study of Polanyi (1951) with emphasis that polycentric arrangements do function at two stages: that of the individual space and the collective units. Each unit's actions within a polycentric system are informed by their preferences and reaction to other actors. Each actor always adjusts his/her actions and behaviour with other actors. This informed the basis why polycentric scholars are not disturbed about the problem of collective action (McGinnis, 2016).

Ostrom emphasised that several common goods can be achieved by a combination of different agencies that are self-organising on multiple scales and that actors will have the right to choose accordingly (McGinnis and Ostrom, 2012). Thus, the best level of delivering common goods is not equal. Some are better at one level, while others on another, rather than eliminating overlapping functions by integrating different governing units into a single central one, polycentric theorists strive to recognise the interaction and relationships among units in a non-hierarchical pattern (Dorsch and Flachslan, 2017). Embedded in the first assumption is the argument that individual actors should have the liberty to discover the best way to deal with a problem in their own specific domain (Ostrom, 2010:5). The first assumption does not mean that self-organisation will always produce the best outcome, but it originates from the bottom to the top (McGinnis, 2016). This does not mean that all actors have the motivation and the capacity to organise on their own; therefore, the importance of policy experts in some situations (McGinnis, 2016). The assumption does not also mean that all challenges of coordination are automatically solved, only that it provides new ways to address coordination challenges.

More importantly, self-organisation is one of the key concepts in polycentric literature. It gives actors the freewill to establish their rules and their own specific domain as opposed to centralised

rulemaking by a nation-state or international regime. It connotes the non-domination of any actor or group of actors in policymaking. Each actor is at liberty to make their own rules in their own space. Elinor Ostrom stressed the efficacy of the first assumption in her first publication on climate change. She emphasised that one of the problems is the framing of climate change a global problem which limits the roles that local communities are playing in climate action (Ostrom, 2009). She alluded to several examples of local actors that have the drive to take action at their level:

*Better health is realised by family members that choose to bike to work instead of driving, expenses on electricity and heating can be cheap if huge investments are made in the installation of solar panels, and several other efforts of a household will yield better result in the long run (Ostrom, 2009:35).*

Fundamentally, she notes that several scholarly attentions had been given to the international regime's activities with its inherent collective action problem that could be achieved at other levels. Instead of focusing exclusively on the international regime, scholars need to be actor-focused and investigate the motivation of each governing units to organise in their domains. On the emergence of polycentric governance of climate change, the first assumption being local action encourages scholars and practitioners to be open-minded concerning the role of states (Hoffmann, 2011).

Finally, the first assumption has some important normative implications for climate governance. One, actors at the local level have the knowledge and capacity to deal with several problems. Thus, problems should be dealt with as close as possible to the local level. Secondly, decision-making at the community level does follow an open and democratic process. In conclusion, not all challenges of coordination will be dealt with by a polycentric structure (McPhail and Tarko, 2017).

### **3.6.2. Mutual adjustment**

In a polycentric system, the manner and way governing units interact and communicate with one another are referred to as mutual adjustment (McGinnis, 2016). According to Ostrom (1972), mutual adjustments are the activities that order the interaction among governing units. Several governing components will possibly collaborate mutually, ensuring more believing interactions and interrelatedness. Within a polycentric structure, when the governing components have

appeared, they must interrelate. McGinnis (1999) explains polycentrism in such a way; he emphasised that polycentric systems have several elements that can create mutual adjustments for coordinating interactions within the entire polycentric structure. This explains why polycentric systems are always compared with a complicated adaptive system (Van Asselt, 2014). Mutual adjustment enables each governing unit to react to the actions of other actors. How governing units in a polycentric system interact with one another is determined by the level of mutual adjustment each actor is allowed (McGinnis, 2016). In describing climate governance, scholars and practitioners must understand the governance's landscape and establish all the governing units and examine their interconnections. Researchers must also seek to comprehend the boundaries of and the relationships between the governing units instead of assuming that a particular actor is the most dominant (Tarko, 2016). This is in line with the ongoing discussion among polycentric theorists concerning the frictions and tensions between monocentric and polycentric systems. Mutual adjustments originated through spontaneous interactions and collaboration among governing units, which is facilitated by the independent connections among units. They emerged spontaneously and are guided by overarching rules after their emergence and not by any superior authorities. In most cases, governing units learn from each other through a mutual adjustment with less level of rivalry.

At the international level, one of the indications of mutual adjustment is the level of consciousness demonstrated by drafters of climate treaties by referring to other agreements. This makes Kim (2013:988) suggest that it is an indication of *“a consistent polycentric legal structure that stands as the pillar of environmental governance at the international level”*. For example, those that drafted the UNFCCC were conscious of the apparent connection with ozone management by limiting the coverage to GHGs not regulated by the Montreal Protocol (Kim, 2013). The drafters of UNFCCC also admitted the connection with international trade guidelines by suggesting that actions taken to tackle climate change should not create a means of disguised restrictions or arbitrary discrimination on international trade (Kim, 2013).

Furthermore, mutual adjustments can be influenced by the choices of the central body of the regime. For instance, members of the Convention on Biological Diversity approved different actions on climate change and biodiversity. Some of these actions were implemented as an answer to conversations on biodiversity preservation, particularly the advancement of guidelines on REDD+

(Van Asselt, 2014). In tune, through the process of bargaining and collaboration among great powers, numerous intergovernmental arrangements assisted in enhancing the legitimacy of UN climate agreements. An instance is the G20 meeting in Germany in 2017 which reiterated the backing of nineteen of its members to the Paris Agreement despite the withdrawal of the US. A mutual adjustment may also be in harmonising scientific findings such as the cooperation among scientific groups on the ozone and climate change (Van Asselt, 2014). Finally, practitioners must seek to free the error-correcting capability that is naturally inbuilt in mutually adjusting, which links in favour of local action (McGinnis, 2016).

### **3.6.3. Experimentation and learning**

This assumption means that a polycentric governance system facilitates enclosed experimentation and ensures mutual learning. Given that a polycentric system allows units to self-organise, it brings about innovation and allows flexible adaption by other units. Ostrom (2010) opines that a major significance of polycentric governance to climate change is that it allows governing units to test several methods, after which similar approaches for measuring benefits can be formed among actors. The significance of learning is what polycentrism shares in common with literature on decentralisation, pluralism, and localisation. In Lindblom's 1959 theory of partisan mutual adjustment. Policymakers were presumed to progress based on experimentation and not due to strategies and plans (Lindblom, 1959).

Some scholars consider that a polycentric system of climate governance involves a large number of separate experiments (Ostrom, 2009; Cole, 2015; Dorsch and Flachsland, 2017). This means that several approaches to problems are tested concurrently. Hence, a polycentric system can be likened to a quasi-experimentation, which gives actors an avenue to know what works and what will not work. In an expressive sense, the importance is on the extent to which such multiplicity of methods subsists, the extent to which the research is based on theory which is evaluated and tested, and the degree to which the findings from the experiments flow through the entire structure (Huitema *et al.*, 2011).

A polycentric approach to climate governance stresses the importance of experimentation and mutual learning as a means to ensure the dynamic improvement of governance over time. Implementation of independent experiments and increased exchange and learning will enhance

cooperation and reduce the cost of mitigation. This can engender innovation and dynamic adaption in the overall climate governance framework and the diffusion and production of informed knowledge. Dealing with the climate change problem, which is a collective-action one, is time-consuming and expensive. Establishing institutions, innovative know-how, and strategies are often with experimentation. Although the top-to-bottom experimentations can have intense values, several state and non-state actors are involved in experimentations at lower levels. The polycentric approach to governance intensifies the advantages and rewards of such interrelated procedures. Successful experimentations and the ones that fail can ensure new ideas and spread out to the entire system (Cole, 2015). For instance, Germany's energy transformation, popularly known as "*German Energiewende*" is not a once-off experimentation but a gradual one that involves several political and technological experiments. Energiewende is Germany's planned transition to environmentally friendly, reliable, affordable, and low carbon energy by completely moving away from nuclear-based energy to renewable energy. The program started in 2010, and it targets greenhouse gas reduction of 80-95% and a renewable energy target of 60% by 2050. Germany shut down major nuclear reactors without posing any danger to power supply security and has made huge progress in its GHGs reduction by achieving a 27% reduction between 1990 and 2014.

The failure of these experiments and the success stories encourage knowledge and innovation, technology and policy transfer, and the adjustment of the governance strategies. A polycentric approach intends to strengthen this learning opportunity through policy learning or orchestration. Similarly, renewable energy technology transfer promotes the adoption and execution of renewable energy policy across the globe (Knopf *et al.*, 2014). A polycentric approach recognises the importance of knowledge production, diffusion, and evolution. Novel knowledge can change societal and individual preferences, and a new standard in climate-related behaviour can diffuse between actors and groups. Ostrom emphasised the importance of changing individual lifestyles and their possible benefits to society. Debates and discussions in academia, public, government institutions also create knowledge that catalyses the debate (Ostrom, 2012).

#### **3.6.4. Trust**

One of the prominent propositions of a polycentric approach is trust. Trust is conceived as an important means of ensuring collaboration, particularly in dealing with collective action problems such as climate change. Trust is better developed on an interpersonal relationship basis, most

specifically at the local level. The polycentric pattern stresses trust as an end product of one-on-one interaction and as a tool to strengthen collaboration even within global deliberations. Cole (2015) accedes that in a polycentric approach, the level at which individuals communicate positively enhances trust levels, which consequently affects cooperation levels.

Furthermore, a good level of cooperation strengthens trust and mutual reputation, leading to greater levels of cooperation. Mainstreaming trust into climate governance framework can ensure rewards within and outside global agreements. Given that trust must be developed intentionally between actors, structures of governance must provide a conducive atmosphere for trust-building. Consequently, Ostrom (2010) and Stern (2011) stress the efficacy of one-on-one interaction and suggest different measures such as sanctioning, monitoring as trust enablers. These enablers practices are playing a major role in the traditional regime governance approach. For instance, the compliance and monitoring procedures for the Kyoto Protocol ensure commitment and trust among parties (Aldy, 2014). In a polycentric system, the catalyst of trust should be strengthened and enhanced across levels and scales.

In the international regime system, nation-states are presumed to be involved in an effort to implement a legally compulsory emission reduction target within a setting of doubt, with each actor having differentiated responsibilities. Generally, the level of trust is low due to the repeated references to the possibility of free-riding by some states. On the contrary, Ostrom (2009) notes that things might be done differently at the local level because of the greater avenue for face-to-face interactions, trust may be in large quantity. Analysts need to broaden their account of reality to include the interactions between different actors operating across multiple units and levels of governance, and that more focus should be given to trust-building processes at all governance domains. Scholars must understand how and whether trust varies between and within different domains (Dorsch and Flachslan, 2017). Trust emerges from repeated and continuous interactions and majorly when promises are kept.

### **3.6.5. A system of overarching rules**

Local initiatives and actions will perform better if guided by overarching rules that stipulate the optimal goals and how disagreement that may arise are to be resolved. Overarching rules provide an opportunity to reconcile conflicts and lower the rate of disagreement among components to a

minimal point. The main aim of overarching rules is to defend differences and ensure shared adaptation. But, their precise function and form have not been agreed upon among theorists (Dorsch and Flachsland, 2017). For instance, are they like informal values and norms? Or they are formal? In reality, the interpretation seems to be compatible with the other four assumptions (McGinnis, 2016). According to polycentric theorists, analysts must consider the functions of different categories of rules (Tosun and Schoenefeld, 2017). Scholars and practitioners must also consider the need to study rules empirically. For instance, where are their sources? Are they from international agreements, or they emerge from local activities?? Are they focused on and allow an opportunity for greater accountability? Oberthür (2016) observes that the 2015 Paris Agreement on climate change gives some rules to the entire climate governance architecture.

Nevertheless, this does not state anything about whether the UNFCCC process drives local actions or local initiatives to steer the UNFCCC process. In practice, the emphasis is on the ability and capacity of the rules to hold powerful actors accountable (Tosun and Schoenefeld, 2017). There is a strong connection between trust-building mechanisms, conflict resolution mechanisms, and the extent to which experimentation is feasible under overarching rules, and to which local action aligns with the upholding of democratic principles.

### **3.7. Relevance of Polycentric Theory to Climate Governance**

Elinor Ostrom adopted the term polycentrism to climate change in the early 2000s by explicitly recognising the efficacy of the polycentric approach in responding to climate change rather than relying only on global efforts led by the UNFCCC (Dietz *et al.*, 2003; Ostrom, 2009; Ostrom, 2012). Based on her research on the importance of self-organisation in managing resources at a local level, for the management of the global commons, Ostrom argues in contradiction of the dominant view that “*only state-created institutional structures can sustain the commons*” (Dietz *et al.*, 2003:1910). In the alternative, she submits that different climate initiatives and policies from individual, local, national, regional, and global levels would create multiple benefits and incentives for climate mitigation. While explaining the relationship among these levels of governance, she notes that multilateral initiatives and policies are essential, but they are not enough to solve the challenges posed by climate change (Ostrom, 2010; Ostrom, 2012). She illustrates the efficacy of a multilevel approach because it creates an opportunity for learning and experiment (Ostrom, 2010). It will be

needless to wait for a binding international treaty before implementing policies and initiatives on climate mitigation at a subnational level (Ostrom, 2012).

The theory of polycentric governance clearly explains the changing landscape of climate governance from one dominated by nation-states under the umbrella of UNFCCC to a one populated by different institutions and actors ranging from CSOs, multinational companies and subnational governments (Cole, 2011; Van Asselt, 2014; Cole, 2015; Van der Heijden, 2018). The defining features of the polycentric political system, according to Ostrom (1990:225)

*A polycentric political system has several autonomous units which are self-governing, acting in ways that consider other actors through processes of collaboration and contest, conflict and conflict resolution.*

This is evident in climate governance at international, national, and subnational levels. At the international level of governance, Van Asselt and Zelli (2018) describe international governance of climate, which is seen as monocentric, has always being polycentric due to the socio-economic and physical connections of climate change with other areas such as trade and investments, human rights, biodiversity loss, aviation, and maritime shipping. Furthermore, global institutions such as IMF, World Bank and International Transport Institutions also play a crucial role in climate governance alongside the UNFCCC, which is a clear example of polycentrism in action (Van Asselt and Zelli, 2018). Climate governance scholars such as Biermann *et al.* (2009) and Zelli (2011) refer to this development at the international level as fragmentation of international institutions. Keohane and Victor (2011) view it as a regime complex, while Sabel and Victor (2017) consider it as experimentalist governance. In essence, they all recognised the growing polycentric nature of climate governance at the global level.

At the national level of governance, the sharing of constitutional power among the three arms of government: which are the legislature, executive, and the judiciary, are polycentric. The three arms' common goal is to ensure that they deliver on the mandate of governance through collaboration, rivalry, conflict, and conflict resolution. In climate governance, the legislature is saddled with the responsibility of making climate laws; the executive has the power to make and implement climate laws. The judiciary plays the role of enforcement of climate policies. These

three branches' domestic governmental functions and their interactions with CSOs and subnational governments at the national level give the national democratic government a polycentric structure (Setzer and Nachmany, 2018).

Furthermore, as a unit in a polycentric governance system, the state performs three significant roles in climate governance. First is the role of regulating, which is “*the deliberate act of trying to influence and regulate the behaviour of others*” (Setzer and Nachmany, 2018). All three arms of government do exercise this regulatory role. For instance, after the adoption of the Kyoto Protocol in 1997, Sabel and Victor (2017) reveal that policymaking and legislation on climate change by nation-states has increased by twentyfold. Similarly, the database of the Climate Change Laws revealed that after the Paris Agreement, there had been an increase in climate legislation, with 1,807 policies and legislations in 177 countries as of 2019. Some of these rules and policies are established by an Act of parliament, while others are established by Decree or policies of the executive branch. This shows that most of the interventions documented by the database are made by the executive branch with legislative support (Setzer and Nachmany, 2018). The reason for this is not far-fetched: legislative action demands strong political will and capacities, Executive action would be favoured due to the centralised decision-making system. For example, in Nigeria, the National Policy on Climate Change adopted in 2013 is developed by the executive arm of government. National policies and laws are significant features of a polycentric system because they function as a central point and constitute overarching rules for actors involved in climate governance at other levels (Michaelowa and Michaelowa, 2017).

The second role of nation-states in climate governance is the role of enforcement. International agreements are expected to be enforced by nation-states in their respective jurisdictions. The branch of government at the state level that performs a key function in the enforcement of climate rules and policies is the judiciary. The judiciary, as an enforcement institution, holds relevant actors accountable in case any of the climate change laws are being flouted. Thirdly, nation-states perform a mobilisation role. This involves the mobilisation of other units, such as subnational governments and non-state actors, to act. According to Kahker (2017), nation-states are important actors that set benchmarks and boundaries and also mobilise different actors at other levels. The role of nation-states in mobilising other actors to take climate initiative is evidently stated in the Paris Agreement.

By considering the polycentric nature of the system, the Paris Agreement stipulates that climate action should not, and cannot, be developed by only nation-states. Article 6 states explicitly that the state shall function in a systemic pattern to increase the public-private partnership in executing the National Determined Contributions. National governments must mobilise non-state actors, most importantly, civil society organisations and businesses. In several countries, non-state actors are involved in policymaking by providing ideas about the policies and contributing ways to achieve policy goals (Gordon, 2016).

In the African context, the continent, due to its low level of technology and its heavy reliance on the climate-sensitive sector, has been the most affected by the climate change impacts (Toulmin, 2009). Moreover, the emission level on the continent is very low compared to other parts of the world. Africa has contributed the least amount of emissions on the regional level, with less than 1% of the world emission. China is the largest emitter accounting for one quarter, while the USA accounts for 15% and EU 10% (Ritche and Roser, 2019). However, given the vulnerability of African countries to climate impacts, several mitigation and adaptation policies have been developed at the local level. In the African Sahel, initiatives, such as the practice of zero tilling, fallow system of farming, natural mulching, the use of organic fertilisers, and agroforestry, are mitigation strategies adopted to reduce the level of emission (Nyong *et al.*, 2007). Such initiatives are polycentric, even though they may appear small, but they will go a long way in reducing the emission escaping into the atmosphere.

Some cities in Africa also have distinctive climate policies, and they are members of several transnational climate networks. For instance, municipalities such as Durban and Cape Town in South Africa have a distinctive climate change policy with the fiscal, legal, and financial capacity to implement it. However, while Cape Town climate initiatives have been more successful, less can be said about Kwazulu-Natal (Taylor *et al.*, 2014). Furthermore, in Nigeria, the Lagos State government has a special climate change unit and a distinctive policy on climate change, which is different from that of the federal government (LSME, 2013). All these are clear examples of polycentrism in action at various levels on the continent.

The choice of polycentrism as an analytical approach to climate governance is predicated on many grounds. Given the features or characteristics of a polycentric approach, Dorsch and Flachsland (2017) submit that the polycentric approach has three important features that are completely different from the international regime approach. The features are governance vision, problem perception and actor focus (Dorsch and Flachsland 2017). In contrast to the regime approach, polycentrism recognises the structural differences of climate change governance and widens the scope examining governance roles of diverse self-governing authorities at multiple scales- from local, national, transnational, regional and international levels (Aligica, 2003). The focus on a specific actor in a particular domain is germane for innovation that will enhance climate governance framework by incorporating actors at individual, family, subnational, national, mini-lateral and bilateral clubs, international institutions, and regimes (Ostrom, 2009). Rather than focusing on the cooperation dilemma at the international level, this approach is more concerned about self-organisation and the coordination of adaptation of these multiple and diverse actors. While the approach does not negate general cooperation dilemma, it stresses that cooperation and individual initiative can be realised through multiple actors in their own policy areas and specific contexts where it will be easy to overcome free-rider incentives than what has been perceived at the international level (Dorsch and Flachsland 2017).

The governance vision of climate change from a polycentric point of view is to establish an adaptive system of diverse and multiple self-organising governance units at different domains relating to one another and realising their sphere of governance capacity of a common objective of climate mitigation. For example, the globally agreed target of reduction below 2 degrees Celsius. In effect, polycentric governance aims to align with the traditional climate governance approach, but from diverse and multiple groups and common contributions in a mutually coordinated manner. As Galaz *et al.* (2012) explain such coordination efforts can differ from mutual adjustment, information sharing, policy experiments, and problem-solving mechanisms of conflict resolution.

### **3.8. Limitations of Polycentric Governance Approach**

One of the major prospects of the polycentric governance approach, as suggested by polycentric theorists, is its ability to reduce, if not eradicate, the central problem of free-riding, which has

continued to foil global efforts on mitigation. For instance, a blocked policy arena can be avoided; the assumed existence of co-benefits in strategic relations establish novel motivations for mitigation, experimentations and learning. However, some actors are likely going to free-ride by not doing anything in their domain while benefiting from the actions of others. The polycentric approach has given more actors to contribute to policy solutions at multiple levels, but the resistance of opposing actors, free-riding incentives and leakage effects will likely exist (Dorsch and Flachsland, 2017).

Secondly, it is difficult to calculate the benefits and costs of an evolving polycentric approach compared to the standard established by a top-down approach. Given the multiple numbers of actors that will contribute to enhancing climate mitigation, it is the risk of largely uncoordinated and sometimes contradictory actions and policies. Moreover, measuring the benefits of polycentric actions can be difficult. However, considering the transfer and spillover effects, including adding up to global knowledge, technology development, and cultural diffusion, the gains derived from the approach will have a huge, combined result, even though the exact degree remains impossible or difficult to quantify. A polycentric approach to climate change should not just be based on “the more, the better” rationality but must strengthen processes that will account for the impacts of each actor mitigation and adaptation initiatives and their overall costs and impact (Cole, 2015).

Finally, avoiding veto players who are not in support of ambitious mitigation policies by taking advantage of the readiness of actors at other governing units to participate in climate policy to avoid deadlock might result in unwanted outcomes. Emphasising the capacity of subnational actors and non-state actors to actively contribute to climate mitigation is a prominent influence of the polycentric approach. Nevertheless, scholars must not ignore the major position of traditional state actors with legitimacy and financial capacity. While the regime approach recognises the important position of the state in climate action, the prominence of polycentric differentiation might increase the risk of leaving the most important action areas to veto players. For instance, California's role as a major player in climate policy in the US is important, but the national government still has unwavering power and resources to initiate and support climate action at a global level; this will have a far-reaching impact and can be easily quantified compared to subnational and transnational actions.

Despite the above criticism of the polycentric approach, it offers a viable alternative for scholars and practitioners of climate governance considering the blame game on who is responsible for what at the international level and the slow rate of action and commitment of nation-state to international agreements. There is an urgent need to consider actions and initiatives that are taking place at other levels of governance in a polycentric manner. This will not only complement the failure of actions at the international level but will also facilitate experimentation and learning. Similarly, it will foster a greater level of trust among actors, which is currently missing in the international system. Hence, this study examines the effects of polycentric initiatives on climate change impacts in Lagos State, Nigeria.

### **3.9. Conclusion**

This chapter positioned the study within a theoretical construct which was used to understand and explain climate governance in Lagos State, Nigeria. It explored and discussed the polycentric governance theory as a framework that is suitable to explain the study. The theory of polycentric governance clearly explains the changing landscape of climate governance from one dominated by nation-states under the umbrella of UNFCCC to the one involving different institutions and actors ranging from CSOs, multinational companies and subnational governments. Rather than focusing on the collaboration dilemma at the global level, this approach is more concerned about self-organisation and the coordination among multiple and diverse actors.

The defining features of the polycentric political system include several autonomous units formally independent of one another, choosing to act in ways that take account of others through processes of collaboration and competition, conflict and conflict resolution. Since the generation of GHGs is from multiple and diverse sources, the solution to reducing it must also come from different levels rather than focusing only on the international regime, which has achieved little in terms of emission reduction over the years. The theory is important in understanding the research questions raised in the study. The chapter observed that a polycentric system allows units to self-organise, and it encourages actors to experiment with several approaches. More so, trust that is always an issue in the implementation of international agreements will be better built on a personal relationship basis, most especially at the local level. The chapter concluded that polycentrism stresses the importance of experimentation and mutual learning to ensure the dynamic

improvement of governance over time. Implementation of independent experiments and increased exchange and learning will enhance cooperation and reduce the cost of mitigation. This can engender innovation and dynamic adaption in the overall governance of climate change and the diffusion and production of knowledge.

## **CHAPTER FOUR**

### **RESEARCH METHODOLOGY**

#### **4.1. Introduction**

This chapter presents a comprehensive discussion of the methodology adopted for this study. The research paradigm, research design, methods of collecting data, and analysis are presented. The methods adopted for this study were chosen to ensure a suitable framework for unravelling the research questions and achieve the stated research objectives. The chapter provides a clear discussion of the methods and methodology used to empirically examine the efficacy of polycentric initiatives on climate governance in Lagos State, Nigeria. Caution was taken in selecting the most appropriate means of methods that will make the validity of the research findings tenable; hence a mixed method was adopted. The chapter is divided into different sections: research paradigm, research approach, research strategy, research design, research methodology, sampling methods and techniques, methods of collecting and analysing data, and the reliability of the findings and ethical issues are discussed in detail.

#### **4.2. Research Paradigm**

Kuhn (1962) was the first person to use the term paradigm to describe a philosophical pattern of reasoning. A research paradigm is a set of common agreements and beliefs shared by researchers on how problems should be comprehended and addressed (Kuhn, 1970). Similarly, a paradigm is a gathering of philosophically related concepts, prepositions, or assumptions that position research reasoning (Bogdan and Biklen 1998). It is the philosophical motivation or intent to undertake any given study. In their definition, Mac Naughton *et al.* (2001) opine that a paradigm consists of three elements: a belief about the true nature of knowledge, a methodology, and a criterion for validity. To Guba (1990), it is the way researchers respond to epistemological, ontological, and methodological questions.

In social science research, a paradigm is used to explain the worldview of a researcher, that is, the thinking, perspective, or the school of thought to which a researcher belongs (Mackenzie and Knipe, 2006). Paradigm reflects the belief of a researcher about the world that he or she lives in.

It is made up of principles and abstract beliefs that determine how a researcher sees and interprets the world. It is the lens through which researchers approach the world. Paradigm serves as a conceptual lens with which researchers examine the methodological part of their work and determine the methods that will be appropriate for data collection and analysis (Kuhn, 1970). In any research, paradigms are essential because they provide belief and dictates for researchers, what should be studied, how it should be investigated, and how the results should be interpreted. It is, therefore, pertinent for any doctoral study to indicate the paradigm in which the research is located. A paradigm consists of four essential elements, which are discussed in the next section.

#### **4.2.1. Essential elements of research paradigm**

A paradigm consists of four essential elements, which include ontology, epistemology, axiology, and methodology. It is imperative to clearly understand these crucial elements because they consist of the underlying assumptions, values, norms, and beliefs that each paradigm represents (Cohen *et al.*, 1994). Therefore, in locating any study within a particular paradigm, it is important that the values and beliefs of the chosen paradigm guide the study.

##### **4.2.1.1. Epistemology of a paradigm**

Epistemology is derived from the Greek word "episteme," meaning knowledge. Simply put, epistemology is the study of knowledge; how do we know reality? It is used to describe how we know what is known. Epistemology is majorly concerned with knowledge: its forms, nature, how it is being developed and transferred to other people. It deals with the basis of human comprehension and knowledge that an investigator can get to have broadened and full grasp of a given research area. Schwandt (1997) explains it as the study of the true basis of knowledge and explanation. To know the epistemology of any study, some questions will come to mind, such as: what is the nature of knowledge? Can knowledge be acquired independent of the researcher, or the researcher must personally experience it? How do we know what research is? How do we know the truth? What counts as knowledge? Each of the paradigms that are discussed later in this chapter responds to the above questions.

#### **4.2.1.2. Ontology of a paradigm**

Ontology is the study of beings. It is the aspect of philosophy that deals with the beliefs we make to agree that something is real. It is the essence of every basis of a social phenomenon that we are investigating (Killam, 2013). It is the philosophical study of the nature of being. It deals with our underlying belief as a researcher concerning the true nature of being. It deals with the notion we make to consider that something is real. It assists a scholar to conceptualise the nature of reality and what can be known about reality (Bogdan *et al.*, 1998). It makes the researcher ask questions like what is reality? Is reality out there in the social world, or is it constructed in the researcher's mind? Is reality objective or subjective? What is the form of the phenomenon under study? Ontology allows researchers to analyse the underlying philosophical assumptions and belief system about the nature of reality. These assumptions will determine the orientation of the researcher about the research problem and how it will be approached to answer the research questions.

#### **4.2.1.3. Methodology of a paradigm**

The paradigm methodology involves the research methods, design, and approaches used in the investigation (Keeves, 1997). Sampling methods and techniques, selection of participants for the study, choice of instrument for data gathering, and data analysis are part of the research methods. The methodology expresses the reasoning and processes of carrying out research work to understand the research problem and achieve the study's objectives (Mac Naughton *et al.*, 2001).

#### **4.2.1.4. Axiology of a paradigm**

Axiology is ethical issues that must be well thought-out when carrying out research. It deals with the ethical stance on making the right decisions (Scotland, 2012). It involves assessing, understanding, and defining the concepts of wrong and right conduct as it relates to the study.

For an in-depth understanding of the research paradigm, the next section discusses the major research philosophies often used in social science research. The rationale for discussing the major research philosophies used in social science research is to demonstrate a clear understanding of each of the paradigms. And to rightly state the ontological, epistemological, methodological, and axiological position of each research philosophy and guide the researcher in selecting the most appropriate paradigm that the current study is situated.

#### **4.2.2. Positivism**

Positivism, as a paradigm, was first proposed by the French philosopher Auguste Comte, who lived between 1798 and 1857. He assumes that observation, experimentation, and reason should be the only basis for making meaning of human behaviour. Positivism as a paradigm is deeply rooted in what is referred to as a scientific method of investigating a phenomenon. This method must involve the process of experimentation, which will be used to answer questions and explore observations. Positivism can be useful to the social world in the belief that the social world can be examined in a similar manner as the natural world. Positivists argue that there is a way for exploring the social world that is objective and that descriptions of a causal nature can be given (Caldwell, 2015). This paradigm can be used as a worldview for any research that aims to construe observations in measurable evidence. Positivists aim to provide explanations and make predictions built on quantifiable results. These measurable results are guided by four significant beliefs: generalisability, parsimony, determinism, and empiricism (Creswell, 2003). The premise of empiricism entails that the researcher must investigate what is being researched adequately. It is vital to collect empirically valid data, which is in agreement with the theoretical construct chosen for the study. Determinism denotes that the observed events are affected by factors that are independent and external to the researcher. Generalisability entails that the findings of the study must be applicable to other circumstances; that is, a positivist researcher must be able to generalise his/her findings in a particular context to anywhere in the world. Parsimony means that the researcher must explain the phenomena under study in the most economical way (Chalmers *et al.*, 2009).

Epistemologically, positivists believe that the subject matter of social science research exists independently of the researcher, and human beings can primarily gain understanding of social reality by the application of reason. This means that knowledge can be acquired through research by revealing the true nature of the phenomenon under study and enables researchers to be more objective in making meaning of the world we live in. Scholars in this school argue and believe that truth and reality are stable and can be observed objectively without interfering with the phenomenon under study. Positivists assume that knowledge is external to the researcher, and it is out there to be discovered by the researcher. They also understand that the results and findings of the research can be measurable and quantified (Mertens, 2005).

The ontology of positivism is realism, which adopts the beliefs that: a world of material objects exists, and knowledge of these objects can only be known through experience. These objects are in existence, whether they are apparent or not; these objects retained the properties of the types that we perceived them to have. We do observe the world through our senses which justify our claims of having knowledge about it. Its axiology is beneficence, which means that any research project must aim at improving the research participants and humanity.

Its methodology is mainly experimental, which connotes that the study shall involve the manipulation of variables to decide the effect of one on the other. They stress that phenomena must be confined though observations can be repeated. Positivists are anxious about the rigidity, replicability, reliability of their research, and generalisability of their findings (Sekaran and Bougie., 2009). A study located within a positivist paradigm can use any of the following methodologies: survey research methodology, randomised control trial methodology, causal-comparative methodology, correlational methodology, experimental methodology and quasi-experimental methodology

In conclusion, the positivists' axiological position shows that the scientific process of research must be value-free, and the researcher must be isolated from what is being researched. Given the objectivity of the positivists, studies that adopt an approach always use a quantitative method.

#### **4.2.3. Interpretivist paradigm**

The dominant aim of interpretivism is to comprehend the subjective world that we live in (Guba and Lincoln, 1998). This paradigm seeks to get into the subjects under study to understand and interpret what the subject is thinking and the meaning the subject is making of the event or phenomenon under study. Efforts are made to know the perspective of the subject being studied and not the perspective of the researcher. There is much emphasis on the need to understand the interpretation that the subjects give to the world around them. The major assumption of this school is that reality is socially constructed; that is why it is often referred to as a constructivist paradigm (Bogdan and Bikem, 1998). According to Morgan (2007), the interpretivism paradigm assumes that the social world is difficult to comprehend from the viewpoint of an individual; he contends that there are several realities and they are socially constructed, there is an unavoidable relationship

among the research participants and the researcher. Context is essential for knowing, knowledge is value-laden, and the values must be exact causes and effects are mutually dependent.

Interpretivism adopts a subjectivist epistemology, which entails that the researcher understands data through interactions with participants and thinking. This is the belief that the researcher and their subjects engage in cooperating procedures, which include listening, questioning, writing, and recording of data (Bogdan *et al.*, 1998). The ontology position of interpretivism is relativist ontology, which connotes that the situation that is being researched has several realities which can be investigated and understood through contacts between the research participants and the researcher (Chalmers *et al.*, 2009). The methodological stance of this paradigm is the naturalist methodology, which involves the collection of data through observation, discourses, reflective sessions, and text messages (Carr and Kemmis, 1986). Interpretivist research can utilise any of the following methods: case study methodology, ethnography, action research, phenomenology, grounded theory, phenomenography, narrative inquiry, and naturalist methodology. The axiology position is balanced axiology, which believes that the research outcomes reflect the ideals of the researcher by presenting an unbiased report of the results.

#### **4.2.4. The critical paradigm**

The critical paradigm gained momentum in the 1990s due to the dissatisfaction with existing research paradigms and the realisation that existing philosophies emanated from a male standpoint and was informed on the study of male subjects (Caldwell, 2015). Scholars in the critical school felt that existing paradigms did not sufficiently address the issues of marginalised people and social justice (Creswell 2003). The critical paradigm is situated in social justice research. It aims to address social, economic, and political issues that lead to conflict, struggle, and oppression. The paradigm also aims to destroy the power structures at any level this might happen. Given that this perspective aims to change politics by improving social justice and confronting oppression, it is sometimes referred to as the transformative paradigm. Critical researchers maintained that inquiry must be intertwined with a political agenda and politics. Also, it must have a goal for reform that will transform the lives of participants and the researcher's experience and the institutions in which the individuals live or work (Creswell, 2003). According to Mertens (2014), the critical paradigm is more concerned with power relationships existing in a social structure; they recognise the effects of privileging versions of

reality. To scholars in this school, research is not seen as an act of discovery but of construction that focuses on finding the agency that is unknown by social practices. Studies situated in this paradigm will lead to emancipation and liberation, exposing conjunctions of ethics, morality, and politics, and will promote social justice and human rights (Mertens, 2014).

This worldview believes in transactional epistemology, which allows the research participants and the researcher to interact, an ontology of historical realism which is related to conflict, struggle, and oppression and method that is dialogic. Researchers in this school can utilise quantitative and qualitative methods. Conversely, mixed methods will provide the critical researcher a structure that will aid the advancement of a more comprehensive and entire view of the social world through the lenses of several perspectives. Hence, enabling more knowledge of the diversity of positions, stances, and values (Scotland, 2012). The research established in a critical paradigm can use any of the following methods: Critical race theory, Feminist theories, neo-Marxist methodology, Cultural studies, Postcolonial methodology, Participatory emancipation, Action research, and Disability theories. The axiology of the critical paradigm is one that values cultural beliefs.

#### **4.2.5. The pragmatic paradigm**

Pragmatism as a research philosophy emanated as a way to end the two opposing strands of interpretivism on the one hand and positivism on the other; hence, an end to what Gage (1989) called “Paradigm Wars.” Pragmatism is not unswerving to any one system of reality or philosophy but focuses on 'how' and 'what' of the problem under investigation (Mackenzie and Knipe, 2006). Pragmatic paradigm developed among scholars who assume that it was neither feasible nor certain to have knowledge and understanding of the real world by relying solely on the scientific method as postulated by positivists, nor to understand reality as submitted by interpretivism. For them, a single paradigm positioning of study is not the best. Instead, these scholars such as Patton (1990), Tashakkori and Teddlie (2003), Biesta (2010), Alise and Teddlie (2010) consider that what was necessary was an approach that would necessitate research methods that are the most appropriate for investigating the phenomenon.

The research established within a pragmatic paradigm must show the following features: emphasis on workability in social inquiry; the adoption of what works to enable the researcher to solve their

research problem without worrying about whether their questions are wholly qualitative or quantitative; adopting research methodologies and design that best suit the purpose of the research; rejecting the idea to either locate the study in either interpretive or positivist paradigm.

The epistemological position of the pragmatic paradigm is a relational epistemology which means the interrelationships in any study can be ascertained by what the researcher should judge suitable to the given research. Its ontological position is a non-singular one, which means there is no particular reality and that researchers have their distinctive interpretations of social phenomenon, its axiological position is value-laden axiology which means that the aim is to conduct research that will benefit the people, its methodological position is a mixed method which involves the combination of qualitative and quantitative methods. Studies situated within pragmatic paradigm can use any of the following methods: casual comparative method, quasi-experimental method, experimental method, phenomenology, naturalist methodology, case study, action research, ethnography, methodology, and narrative inquiry.

The four distinctive research philosophies discussed above have a unique way of conceptualising research problem and offer a distinctive perspective in answering research questions. In other words, each of the paradigms shapes and influences the worldview of researchers who believe it and the approach in which such researcher will adopt in investigating a phenomenon. Table 4.1 shows a comparison of the four research philosophies.

**Table 4.1: The differences of the major research paradigms in social science**

| <b>Element of Research Paradigm</b>  | <b>Positivism</b>  | <b>Interpretivism</b>   | <b>Critical</b>  | <b>Pragmatic</b>  |
|--|--|---|--|---|
| Epistemology: The nature of knowledge and how it can be known                  | It assumes an objective epistemology and the belief that what is being studied is independent of the researcher.   | It assumes a subjectivist epistemology and the argue that researcher understands data through interactions with participants and their thinking.  | This worldview believes in a transactional epistemology in which the research participants and the researcher interact | This assumes a relational epistemology which means that the interrelationships between researcher and what is being studied are best determined by what the researcher judge appropriate to the given study |
| Ontology: The belief about the true nature of being or reality                 | Its ontology is naive realism which assumes that there is world of material objects which can be understand from experience.   | It assumes a relativist ontology, which connotes that the phenomenon under study has multiple realities which can be investigated through interaction between the researcher and the participants | It assumes an ontology of historical realism   | Its ontological position is a non-singular one which means that there is no particular reality and that researchers have unique way for interpreting reality.   |
| Methodology: Methods, design and approaches that can be used for investigation | Its methodology is mainly experimental, which connotes that the study will involve the manipulation of variables to know the effect of one on the other. It is mainly quantitative method. | Its methodology is naturalist methodology, which involves the collection of data through observation, discourses, reflective sessions, and text messages. It is mainly qualitative method.        | Its methodology that is dialogic. It can adopt quantitative or qualitative methods of data collection or both methods. | Its methodological position is a mixed method which involves the combination of qualitative and quantitative research methods.  |
| Axiology: Ethical issues that must be considered                               | The process of the research must be value-free, and the researcher must be isolated from what is being researched  | The axiology position is balanced axiology, which believes that the research outcomes will not show the bias of the researcher, by presenting a balanced result                                   | The axiology of critical paradigm is one that values cultural beliefs.   | Its axiological position is a value-laden axiology which means that the aim is to conduct research that will benefit the people   |

**Source: Author's Compilation See Saunders *et al.*, (2009)**

#### **4.2.6. Research philosophy appropriate for the study**

This study adopted pragmatism as a philosophical position. As enunciated by Creswell (2003:10), pragmatism is a global division of research philosophy that emerges out of actions, circumstances, and magnitudes indifference with other research philosophies. Pragmatism does not take on a specific position on what becomes excellent research (Sekaran & Bougie, 2009:30). Pragmatists assume that a study could be subjective, with observable phenomena, and objective values can create practical knowledge, depending on the research questions of the study. Rather than focusing on data about reality and truth, pragmatism relies on diverse strategies to offer answers to any given phenomenon. It stresses mixed methods to attain credible results. The researcher is at the freedom to choose a suitable approach in light of the need to create better outcomes utilising pragmatic research questions and problems (Creswell, 2009, Sekaran and Bougie., 2009). Pragmatists view the universe as totally mixed, which requires distinctive methods to discover better solutions for its difficulties. This recommends the requirement for multiple methods for data collection and exploration to conquer the inadequacies of choosing a single strategy. However, this does not imply that researchers embracing multiple or mixed approaches should not stipulate substantial rationale for their decisions. Most importantly, pragmatism provides a chance for various approaches, assumptions, and perceptions, resulting in an enhanced collection of data, analysis, and discussion of findings to provide valid, credible, and reliable research results (Creswell, 2009).

This study considers the pragmatic paradigm as the most appropriate and suitable paradigm for the present study because of the need to explore the phenomenon under study –polycentric governance initiatives through multiple dimensions - to determine how polycentrism has been or/ can be employed to tackle the challenges posed by climate change. Consequently, the study adopts a mixed method by incorporating qualitative and quantitative data to adequately answer the research questions posed in the study and achieve the research objectives. Creswell (2009) observes that the pragmatic paradigm provides an avenue to incorporate different methodologies- qualitative and quantitative- that will enhance a robust and more comprehensive collection of data, analysis, and discussion of findings to provide valid, credible, and reliable research results. Similarly, Morgan (2007), argues that the choice of pragmatism in any study is one of the most efficient methods because it allows the mixing of both numerical (quantitative) and non-numerical (qualitative) for better research

outcomes. For Johnson and Onwuegbuzie (2004), the choice of pragmatic paradigm affords researchers to mix qualitative and quantitative data collection and analysis techniques, which enables reliable results rather than relying on one of the approaches.

Furthermore, this study examines the relationship between polycentric initiatives and the effects of climate change. Hence, the choice of pragmatism allows the researcher to view the effectiveness of polycentric efforts from multiple realities such as the lens of the subjects-policy makers or the lens of objects-citizens by integrating both qualitative and quantitative methods for quality research findings. The study uses pragmatism as a philosophical stance by employing concurrent mixed methods approach of data gathering.

### **4.3. Research Approach**

Research approaches can be discussed from two major viewpoints: inductive and deductive. The inductive approach does start from a particular instance to general; on the other hand, the deductive approach does start from a general instance to a particular one. This study incorporates these two approaches to the research methodology of the present study. The choice of both approaches, otherwise known as an integrated approach for the study, is premised on the need to use the strength of one to cover up the weakness of the other. Moreover, the situation of this study within a pragmatic paradigm and the adoption of mixed methodology further justifies the choice of integrating both approaches.

#### **4.3.1. Inductive approach**

In the inductive approach, the first step is data collection, after which the collected data is analysed to determine if any example is discovered that suggests connections among variables. From this observation, it is possible to develop theories, connections, and generalisations. Through the means of the inductive approach, the researcher aims towards finding and developing principles without haste to make conclusions on the premise of collected data (Gray, 2013). This approach is well-grounded in the interpretivist paradigm as a viable alternative to positivist assumptions in scientific research (Thomas, 2006; Sekaran and Bougie, 2009). In the 20<sup>th</sup> century, interpretivism was the dominant paradigm among social scientists. Researchers in the social sciences assumed that it would allow for an in-depth investigation of the cause and effect relationship among variables in a bid to build theories. Scholars that use this approach are always anxious about the method for collecting

data so that they can generate actual data on the research problem. This is the rationale as to why a qualitative method is plausible in inductive research, given that it utilises interviews and observations to generate in-depth data about social phenomena for the aim of contributing inductively to knowledge (Collins *et al.*, 2006, Soiferman, 2010; Woiceshyn and Daellenbach, 2018).

Similarly, Saunders *et al.* 2009, accentuate that if a study aims at having a clear understanding of why and how a phenomenon happened, rather than portraying it, it is better to use an inductive instead of a deductive methodology. Thomas (2006) highlights three primary objectives of the inductive method in social science research: one, the integration of several data in a concise and straightforward arrangement. Two, the creation of perfect connection among the research objectives and the major findings emanating from the collected data; and lastly, the development of a model and theory for the relationship among variables as apparent in the collected data (Saunders *et al.*, 2009; Onwuegbuzie *et al.*, 2009; Kelliher, 2011). At this third objective, the findings of the study are generalised.

To Thomas (2006) and Onwuegbuzie *et al.* (2009), the advantage of the inductive approach is that it highlights comprehensive and thorough means of collecting data through a suitable qualitative method to gain crisp and clear data from the participants. The inductive approach concentrates on a small sample using deep data collection and analysis techniques. The major weakness of this approach is that it is very subjective due to the fact that the views of the researcher on the social phenomenon may reflect in data interpretation and discussion of findings.

#### **4.3.2. Deductive approach**

The deductive approach shifts towards testing of hypothesis after the guidelines have been affirmed and validated (Gray 2013). This hypothesis shows a statement around ideas that intend to clarify the relationship among variables. These ideas are distinctive thoughts that outline the building blocks of hypotheses and theories. The deductive approach is well established in the positivist paradigm, which is dominant in the pure sciences (Reiter, 2017). It relies on an independent and unbiased investigation of current knowledge and theoretical observations with the aim to collect data, define the hypothesis, analyse and interpret results and ensure to admit, dismiss or reconsider the theory (Blanche and Durrheim, 2006).

The first step in utilising this approach is the analytical review of relevant studies and the observation of the probable connections among the variables entrenched in the framework. This is significant to ensure a suitable comprehension of the dynamic that is inherent in the subject matter, and it will encourage a proper definition of the hypothesis (Sekaran and Bougie 2009; Onwuegbuzie *et al.*, 2009; Bryman and Bell, 2011). The second stage requires mental readiness on the shortcomings and strengths of the method for collecting data and analysis and keeping in mind the study objective to avoid mistakes that would make the research findings invalid. This approach depends mainly on quantitative methods and in-depth research questions that generate direct information from the respondents. The third stage involves the clarification of the numerical consequence of the major variables through inferential statistics. This will lead to the fourth step in which the researcher chooses whether to admit the hypothesis or dismiss it (Bryman and Bell, 2011). The fifth stage involves the re-evaluation of the hypothesis under investigation in order to re-examine existing knowledge in light of the results of the study. The sixth step is the review of the theory under investigation to determine whether to reconsider current knowledge based on the results of the scientific research (Saunders *et al.*, 2009; Bryman and Bell, 2011). The research findings may either weaken or fortify the research hypothesis, after which generalisations are made.

The key benefit of this approach is that it is profoundly objective because it uses the rigorous scientific method for collecting and analysing data and deductively contributes to the body of knowledge (Reiter, 2017). The major setback of the approach is that the approach involves a complex scientific method that may be too difficult for social science research, and it does not give room for subjective clarifications of the social phenomenon under study.

#### **4.3.3. The research approach utilised in this study**

This study adopted an integrated approach, which is the combination of both deductive and inductive approaches. Considering the flaws inherent in using either of the approaches, some scholars such as Noor (2008), Creswell and Plano Clark (2011) and Reiter, (2017) suggest a blend of both approaches in order to advance new models or question prevailing assumptions. An integrated approach will be used to examine the efficacy of a polycentric governance approach to

climate change in Lagos State, Nigeria. This is because of the strength of the approach in providing a critical and explanatory analysis of issues and the relationships among variables (Edmonds and Kennedy, 2012; Sekaran and Bougie., 2009).

#### **4.4. Research Strategy**

Research strategy is the strategy that a researcher uses to investigate the research problem by turning the methodology into approaches such as instruments, tools, and techniques. It involves all the approaches that a researcher adopts for data collection with the aim of deducing a pragmatic conclusion (Creswell, 2009; Sekaran, 2003). Research design can be implemented through different types of research strategies which include explanatory, descriptive, and exploratory. This study incorporates both exploratory and descriptive strategies.

##### **4.4.1. Exploratory studies**

A study can be said to be exploratory when it aims to understand the limits of information on social phenomenon (Bryman and Bell 2011). Exploratory studies often seek to explore what is happening about a phenomenon and draw a meaningful and logical conclusion concerning it. Exploratory studies are done when there is no sufficient knowledge/information on a phenomenon under study. It assists researchers in deciding whether it is significant to study a particular phenomenon or not (Gray, 2013). Saunders *et al.* (2007) accede that an exploratory study may be guided through literature review, interviewing experts in the area, or by focus group discussions. They stress further that at the initial stage of exploratory research, the researcher must deal with the phenomenon under study from a comprehensive perspective. As the study progresses, the event gets smaller. Before commencing exploratory research, the researcher must have prior contact with the subject material to have an extra in-depth understanding of the problem before developing research questions. This means that most qualitative research that places importance on opinions and interviews, the means of gathering data on a particular research problem, adopt an exploratory research strategy. At the point when there is insufficient knowledge about a given phenomenon, greater understanding becomes important, hence the justification for an exploratory study.

This study is an exploratory one due to being in tandem with the major suppositions of an exploratory study by first reviewing relevant studies to identify the gap of knowledge on the efficacy and effectiveness of polycentric governance approach to the challenges of climate change.

The study examines the efficacy of polycentrism from an African perspective since; most studies on polycentrism have been conducted from the West. This study provides fresh insight on polycentrism from an African perspective, which hopefully further enriches the growing polycentric governance literature. The qualitative aspect of this study explored local initiatives, policies, and actions towards reducing the impacts of climate change by the Lagos State government and communities through an interview scheduled to extract quality data on the relationship between policies and effects of climate change in Lagos State.

#### **4.4.2. Descriptive research**

The goal of descriptive research is to give a clear picture of an event precisely as it naturally occurs. It always draws a picture of a situation or phenomenon and indicates how things are related to one another (Gray, 2013). Descriptive studies aim to guarantee an adequate description of the various variables in the phenomenon under study. The significance of a descriptive study is because it offers an extensive discussion on the phenomenon. According to Saunders *et al.* (2009), a study can be both descriptive and exploratory. Descriptive studies, at times, build on the foundations given by exploratory studies with the particular goal of presenting detailed discussions. This study is both descriptive and exploratory. It is descriptive because it offers a descriptive analysis of climate change impacts in Lagos State and the effects of polycentric initiatives on climate change mitigation and adaptation.

#### **4.5. Research Design**

This study utilises two research designs: survey and case study design. Yin (1984) posits that two or more strategies can be used in any study because the various research designs are not mutually exclusive. A case study is one of the best designs to be adopted when the study seeks to answer ‘why’ and ‘how’ questions, while a survey is appropriate when the study seeks to answer ‘what’ questions (Yin, 1984). For example, when a study seeks to ask ‘what’ questions, such as: what are the impacts of certain government policies and initiatives? It is better to use a survey, but when a study seeks to identify ‘how’ and ‘why’ the policies and actions were successful, a case study will be the most appropriate. The present study answers ‘what’ are the impacts of national and international policies on climate change in Lagos State. Also, it answers ‘how’ and ‘why’ polycentrism is employed. Hence, the adoption of both survey and case study research design. The next section discusses in detail the survey and case study as a research design.

#### **4.5.1. Survey research design**

This involves the use of a quantitative method for collecting data to provide a numerical description or explanation of a given phenomenon (Creswell, 2009). Studies that make use of this design apply different sampling techniques to determine sample sizes and use a structured questionnaire to elicit information from their respondents on a given phenomenon. The data collected undergoes a rigorous analysis, with the use of inferential and descriptive statistics, after which the results are discussed. A conclusion is inferred, and recommendations are provided. This research utilised this principle by investigating the relationship between polycentric initiatives and climate change impacts using a structured questionnaire in the study area. Survey research design can be divided into two: longitudinal and cross-sectional studies (Edmonds and Kenny, 2012). A longitudinal study is appropriate if a researcher's time plan allows him/her to study improvement and change over time (Gray, 2013). This research is not a longitudinal study based on the need to gather data concurrently.

The second dimension of a survey research design is a cross-sectional study; this allows data collection at a given point in time from research participants (Wilson, 2001). It does not involve the collection of data at more than one instance; it is more cost-effective than a longitudinal study. According to Wilson (2001), most scholarly studies carried out for the purpose of awarding degrees in social sciences often use a cross-sectional approach because it entails less time, and it is cost-effective in terms of data collection. This study employed a cross-sectional dimension of survey research design. Moreover, this study's time frame is also one of the reasons why the study adopted a cross-sectional approach.

#### **4.5.2. Case study design**

A case study design allows a researcher to closely study a phenomenon or an event within a context. Case study design selects a limited number or a small geographical location as the subjects of study. Primarily, it investigates and explores a real-life event or phenomenon through a comprehensive contextual analysis of a small number of conditions or events and their relationships (Zainal, 2007). Similarly, Yin (1984:23) defines a case study research design as

*An empirical enquiry that examines a contemporary phenomenon within its real-life situation; when the boundaries between context and phenomenon are not obviously evident; and in which various sources of evidence are utilised*

The use of multiple sources of data guarantees that the phenomenon is not investigated through one lens but through different lenses, which enables various facets of the phenomenon to be discovered (Rule and John, 2011). In other words, a case study is a unique method of investigating any phenomenon which exists in a set of data. Interestingly, two approaches guide a case study research design: one projected by Stake (1995) and the other by Yin (2016). They both aim to make sure that any study using a case study must be well examined and that the core of the event is discovered and understood (Rule and John, 2011). The two approaches are based on the assumption of the constructivism paradigm, which assumes that truth is relative and dependent on the actor's viewpoint.

This study used a case study as one of the research designs because an aspect of the study answers the questions of 'how' and 'why' polycentrism is effective in managing climate change mitigation and impacts in Lagos State. For instance, according to Yin (2003), a case study should be considered as a research design by any study when: (a) the study aims to answer 'how' and 'why' questions (b) the behaviour of participants of the study cannot be manipulated (c) the study seeks to cover specific conditions that are important to the phenomenon or event under study (d) the boundaries between the context and the phenomenon are not clear. The case in this study is Lagos State, Nigeria, a coastal city that is prone to the negative impacts of climate change. This study investigates the effects of climate change in Lagos and the efficacy of polycentric initiatives as a way to mitigate the adverse effects of climate change.

The choice of two research designs – survey and case study – for the present research is enormous. Firstly, the study seeks to know 'why' and 'how' polycentrism is utilised in the governance of climate change and how effective and efficient polycentric initiatives are in mitigating the impact of climate change. Secondly, the study seeks to know 'what' roles and actions polycentric actors are taking on climate governance and the effects of such policies on climate change management

in Lagos State. Finally, to provide for rich and comprehensive data to compare and corroborate findings.

#### **4.6. Research Methodology**

The methodology is a set of techniques or procedures applied for data collection and analysis of a research topic. It is the way a researcher approaches the research problems and seeks answers. According to Taylor, Bogdan and Devault (2015), there is a close relationship between research problems, research objectives, and research methods. In other words, the research problems and research objectives always determine the types of methodology to be adopted. The methodology provides guidelines to a researcher on the available choices on sampling techniques, methods of collecting data and analysis of data. The methodology allows the reader to evaluate the overall trustworthiness and validity of the study (Taylor *et al.*, 2015).

This study adopted a mixed method approach as the most appropriate approach for this study. A mixed method can be defined as the collection of both qualitative and quantitative data while integrating both for sound, clear, and accurate research outputs. Information collected through the quantitative method was complemented by the qualitative one. Data that may not be supplied through the questionnaire was collected through interviews, thereby increasing the accuracy and validity of the research findings. A quantitative research method is a process of examining social events through measurable evidence. It involves the use of statistical instruments to achieve the research aims and objectives and validate research findings (Odetunde, 2011). On the other hand, the qualitative research method examines the understanding and meanings that individuals give to a social phenomenon (Creswell, 2014). Quantitative research methods are mostly related to studies that involve a large number and give room for generalisation, while in the qualitative method, there is an emphasis on enquiry based on small samples (Blaxer *et al.*, 1996; Hughes, 1997).

Mixed methods allow the researcher to employ the strengths of one method to overcome the weakness of the other (Creswell, 2014). The present study utilised a mixed method approach for this study based on the evidence that the quantitative method is more appropriate to collect data from a large sample: selected local government areas in Lagos State. A qualitative approach, on the other hand, has the advantage of collecting an elaborate and detailed response from a small

sample. The use of mixed method provides a robust understanding and knowledge, which helps in gaining deep and more insight into the research problem. Similarly, it leads to more scientific research rather than relying on either of the approaches (Creswell, 2014).

#### **4.6.1. Mixed Methodology**

Mixed methods incorporate both quantitative and qualitative methods for collecting and analysing data, either consecutively or concurrently (Gray, 2013). In their definition, Creswell *et al.*, (2003:212) define a mixed method as the collection and analysis of quantitative and qualitative concurrently or sequentially in a given study. According to Teddlie and Tashakkori (2009), adopting mixed methods approach assists the researcher to generalise from a sample to a large population and achieve richer and contextual knowledge of the phenomenon under study. Creswell (2009:14) acknowledges three forms of mixed methods:

1. Transformative mixed method
2. Concurrent mixed method
3. Sequential mixed method

##### **4.6.1.1. Transformative mixed method**

This is an approach that addresses issues of inequality and injustice in society using a mixed method approach. The data in this type of research can be congregated or ordered consecutively, with one expanding to the other (Creswell, 2014). In this type of research, quantitative and qualitative data are gathered and analysed either chronologically or simultaneously, depending on the objectives of the study. Biased importance can be given to one of the techniques for data gathering over the other, while they might also be used in the same measure (Creswell, 2009). Analysis of data is done differently yet incorporated at the stage of interpretation, thereby allowing for data triangulation. This method gives access to information from different perspectives, and it empowers participants to have more insight into the phenomenon under study.

##### **4.6.1.2. Sequential mixed method**

According to Cameron (2009), a sequential mixed method is when the researcher uses the different methodology- qualitative and quantitative- on a one-after-the-other basis. This depends on the nature of the research. A researcher may choose to start with the collection of qualitative data,

analyse it and use the outcome to set questions for the collection of quantitative data. According to Creswell (2009), deciding on which method -qualitative or quantitative- to start with solely depends on the nature of the study. The most vital requirement for a mixed method research to be called sequential mixed method is that each of the methods must be used on a one-after-the-other basis (Hasson *et al.*, 2005).

#### **4.6.1.3. Concurrent mixed method**

This method is when the researcher collects and analyses both quantitative and qualitative data concurrently (Cameron, 2009). This is germane, bearing in mind that the end goal is to gather sufficient responses to the research questions and a robust and comprehensive interpretation of results.

This study used a concurrent mixed method because using a cross-sectional survey with open and closed-ended questions adequately fits into the concurrent mixed method. This allows for collecting and analysing data for this study to be concurrent. The choice of a concurrent mixed method for this research is because it enables collecting quantitative and qualitative data simultaneously. It also gives equal opportunity for the collection of either quantitative or qualitative data.

#### **4.7. Study Population**

A study population is the entire group of people, things, or events that a researcher intends to investigate (Sekaran and Bougie, 2013). Ritchie *et al.* (2013) provide a straight, brief and modest definition of the population as the total group from which the sample is drawn. The population of this study is the six local government areas in Lagos State and the officials of the Lagos State Ministry of Environment. These local governments are Alimosho local government, Ojo local government, Surulere local government, Ajegunle-Ifelodun local government, Ikorodu local government and Eti-Osa local government. These local governments were selected for the study due to the high rate of flooding incidences and their proximity to the coast (Adelekan and Asiyebi, 2016).

#### **4.7.1. Sampling techniques**

Sampling refers to the statistical procedure of selecting a fraction of units, people, or organisation from a population under study so that by studying the sample, the results will be generalised to the entire populace from which the sample was drawn. In research methodology, sampling techniques are divided into two: non-probability and probability sampling (Sekaran and Bougie, 2013). Probability sampling includes cluster and multi-stage sampling, systematic sampling, simple random sampling and stratified random sampling. Convenience and purposive sampling are non-probability samplings (Taylor *et al.*, 2015). A researcher depends on the probability sampling technique if components in the group have a non-zero opportunity of being selected as subjects (Sekaran and Bougie, 2014). Probability sampling is adopted when the representativeness of the population is important in the light of a valid concern for generalisability (Sekaran and Bougie, 2014).

Non-probability sampling involves the use of various systems that rely on a non-numerical method for choosing a sample (Taylor *et al.*, 2015). Qualitative research and case studies use non-probability technique to draw participants, and they rely on the small size to investigate event (Bryman and Bell, 2011). This study adopted one of the variants of probability sampling; simple random sampling for the quantitative section of this study, and the qualitative aspect of the study used non-probability sampling, being-purposive sampling.

**Table 4.2: Study population**

| <b>S/N</b> | <b>Name of Local Government</b> | <b>Total Population</b> |
|------------|---------------------------------|-------------------------|
| 1.         | Alimosho                        | 2,047,026               |
| 2.         | Ajegunle-Ifelodun               | 1,435,295               |
| 3.         | Surulere                        | 1,274,362               |
| 4.         | Eti Osa                         | 983,515                 |
| 5.         | Ikorodu                         | 689,045                 |
| 6.         | Ojo                             | 941,523                 |
|            | <b>Total</b>                    | <b>7,370,766</b>        |

**Source:** (National Bureau of Statistics, 2016).

#### **4.7.2. Simple random sampling**

Simple random sampling is a type of probability sampling in which each member in the study group has an equal opportunity of being chosen as a participant. It provides an optimal level of reliability and validity when making generalisation in connection to the larger population of the study (Sekaran and Bougie 2013). Simple random sampling was used for the quantitative section of this study because it provides the same opportunity for the respondents of the study. Four hundred questionnaires were randomly distributed in the study area. The participating local governments were selected using purposive sampling.

#### **4.7.3. Purposive sampling technique**

Purposive sampling is a technique that enables the researcher to choose the sample for the study based on who he/she thinks would have robust knowledge about the phenomenon or event under study (Taherdoost, 2016). The purposive selection is appropriate because it ensures precision. The purposive sampling technique is particularly suitable for mixed methods because it guarantees freedom for the researcher to focus on the best suitable sample for the study. This study adopted a purposive sampling technique for the qualitative section because it allowed the researcher to choose participants based on their knowledge of the phenomenon (Ishak *et al.*, 2014). The Lagos State Ministry of Environment is saddled with the formulation and execution of environmental policies in the state, hence the purposive selection of a government agency responsible for policymaking and implementation of climate change and environmental policies as participants for the qualitative section of the study.

Furthermore, there are different types of purposive sampling, which include: criterion sampling; theory-guided sampling (this is a situation where the researcher will be looking for certain individuals who fit into certain theoretical constructs); negative case sampling (it is also called disconfirming sampling, and it entails a situation where the researcher will be looking for cases that will disconfirm or contradict his/her findings); maximum variation sampling (it involves searching for the individuals or cases who cover the spectrum of positions and perspectives concerning the phenomenon one is studying (Yin, 2016).

Out of all the purposive sampling types briefly discussed, this study utilised stakeholder sampling, which involves choosing stakeholders responsible for policymaking and implementation. Directors

at the Lagos State Ministry of Environment were purposively selected for the study. This is because directors at the Ministry of Environment in Lagos State constitute the major stakeholders on the phenomenon under investigation.

#### **4.7.4. Sample size**

The study investigated six local government areas in Lagos State, Nigeria. For the qualitative data, fifteen participants were selected for the study. Six participants were selected from the Lagos State Ministry of Environment, Lagos State Special Climate Change Unit, Lagos State Environment Protection Agency (LASEPA), Lagos State Waste Management Authority (LAWMA), Lagos State Emergency Management Agency (LASEMA). The choice of these agencies of government was based on the major roles in designing and implementing environmental and climate change policies. Six participants were also selected in the six local governments, with one in each local government. The choice of the community members was based on the roles of the coping strategies of community members to adverse impacts of climate change. Three Non-Governmental Organisations (NGOs) working in the area of climate change were also selected for the study. The selection of these NGOs was based on their role and engagement on climate change issues at international, national, and subnational levels. Interviews are one way a study result can reach data saturation; data saturation was considered during the selection of sample size for the qualitative study. According to Fusch and Ness (2015), the number of interviews required for qualitative research to achieve data saturation was a number that could not be quantified but that the researcher should take what he can get.

On the other hand, the sample size,  $n$ , was calculated using the Yamane (1967) formula for the quantitative section.

The formula is  $n = \frac{N}{1+N(e^2)}$

Where:

$n$  signifies the sample size

$N$  signifies the total population i.e., 7,370,766 (see Table 4.2.)

$e$  signifies the limit of sampling error = 0.05

In applying this formula to this study:

$$n = \frac{7370766}{1 + 7370766 (0.05^2)} = \frac{7370766}{18426.91} = 400$$

Given the calculation above, 400 was the sample size for the quantitative data. For equivalent allocation in each of the local governments selected for the study, Bowley (1926) formula for proportional allocation was used. The formula is stated as:

$$n_i = n \frac{N_i}{N}$$

Where:

$n_i$  signifies sample size per local government

$n$  signifies total sample size which is 400

$N_i$  signifies the population in each local government

$N$  signifies the entire population given as 7370766

$n_1$  = Alimsoho local government

$$\frac{400 * 2047026}{7370766} = 111$$

$n_2$  = Ajegunle-Ifelodun

$$\frac{400 * 1435295}{7370766} = 78$$

$n_3$  = Surulere local government

$$\frac{400 * 1274362}{7370766} = 69$$

$n_4$  = Eti-Osa local government

$$\frac{400 * 983515}{7370766} = 53$$

$n_5$  = Ikorodu local government

$$\frac{400 * 689045}{7370766} = 38$$

$n_6 =$  Ojo local government

$$\frac{400 * 941523}{7370766} = 51$$

#### **4.8. Method of Data Collection**

The study utilised both primary and secondary sources of data collection. Secondary data was sourced from journal articles, books, newspaper articles, conference papers, government publications, internet sources, and archival documents. Primary data used both quantitative and qualitative data. The quantitative data were collected with the aid of an open and close-ended questionnaire to gather data on the impacts of climate change and the coping strategies in the study area. The qualitative data was collected through in-depth interviews.

##### **4.8.1. Primary Sources of Data Collection**

###### **4.8.1.1. Qualitative section**

The qualitative section of the study conducted interviews with fifteen participants. Fifteen in-depth interviews were conducted. The fifteen consisted of six government officials of the Lagos State Ministry of Environment, Lagos State Environmental Protection Agency and Lagos State Waste Management Authority, and six community leaders in each local government and three non-governmental organisations. These interviews aimed to acquire in-depth information and knowledge about the policies and initiatives to reduce the impacts of climate change, coping strategies of community members, and the effect of government policies on climate change impacts.

###### **4.8.1.2. Quantitative section**

The quantitative section of this study used an open-ended and closed-ended questionnaire to gather primary data from participants. It was used to elicit necessary data on climate change impacts in Lagos State, the effects of government policies on climate change impacts, and community

members' coping strategies. Four hundred questionnaires were administered, out of which 391 representing 97% were fully completed and returned. The analysis of the quantitative data was done using 391 questionnaires. The gaps identified in the research problem were aligned in designing the questionnaire to answer the research questions and meet the study's objectives.

#### **4.8.2. Secondary sources of data collection**

Secondary sources were used to complement the primary data, these included journal articles, books, newspaper articles, conference papers, government publications, and internet sources. Policy documents from the Lagos State Ministry of Environment, Lagos State Environmental Protection Agency also served as secondary data sources.

#### **4.9. Research Instrument**

The research instruments used for this study were questionnaires and in-depth interviews. The purpose was to realise the objectives of the study.

##### **4.9.1. Questionnaires**

A questionnaire is an instrument consisting of a series of questions to gather information from respondents, often designed for numerical analysis (Foddy and Foddy, 1994). Questionnaires have advantages over some other types of surveys in that they do not require as much effort from the questioner as verbal or telephone surveys; they are cheap and often have standardised answers that make it simple to compile (Fusch and Ness, 2015). There are different types of questionnaires, but broadly speaking, the research will be limited to mention open-ended and closed-ended questions (Foddy and Foddy, 1994). For this study, four hundred questionnaires were administered in the study area. 391, representing 97%, were completed and returned; the analysis was done using the 391 questionnaires.

##### **4.9.2. In-depth interview**

An in-depth interview is a technique that involves conducting intensive interviews with respondents to explore their views on a particular phenomenon (Foddy and Foddy, 1994). For example, participants, staff, and others associated with a programme were asked about their experiences and expectations related to the policy. In-depth interviews were conducted in three government departments, namely: Lagos State Ministry of Environment, Lagos State Environmental Protection Agency, and Lagos State Waste Management Authority. In-depth

interviews were also conducted in six local governments, namely: Alimosho local government, Ojo local government, Surulere local government, Ajegunle-Ifelodun local government, Ikorodu local government, and Eti-Osa local government. Themes that were derived from the literature review and the researcher questions informed the interview guide.

#### **4.10. Method of Data Analysis**

The data were analysed concurrently. Due to the nature of the study being pragmatic and the adoption of a concurrent mixed method, data gathering, and analysis of both qualitative and quantitative data were done concurrently.

##### **4.10.1. Quantitative section**

The questionnaire is divided into two sections: section A, which comprises personal data, was analysed with descriptive statistics. Descriptive statistics include the use of frequency and percentage distribution to analyse the demographic characteristics of respondents. Version 21 of Statistical Package for the Social Sciences (SPSS) was used. Inferential statistics involves the use of Multiple Regression Analysis to test the effect of polycentric initiatives on climate change impacts

###### **4.10.1.1. Descriptive statistics**

According to Wilson (2014), descriptive statistics is a statistical tool designed to describe or abbreviate arithmetical data. The essence of starting the analysis of data with descriptive data is to provide a summary of the data before a comprehensive report (Sekaran and Bougie, 2014). The study adopted this style by presenting the demographic characteristics of respondents using descriptive statistics.

###### **4.10.1.2. Inferential statistics**

Inferential statistics are used to make inferences about a specific population from a sample size. It is the appraisal of a population figure and statistical relationship among the research hypotheses. There are two major statistical significance tests: parametric and non-parametric tests (Wilson, 2014). Multiple regression analysis is a type of inferential statistics that helps in determining the effects of independent variables on dependent variables (Sekaran and Bougie, 2009). Multiple regression analysis was used to determine the effect of polycentric initiatives on climate change impacts in Lagos State.

#### **4.10.2. Qualitative section**

The data collected from in-depth interviews were non-numerical. These interviews were transcribed, coded, and analysed using content analysis where themes and sub-themes were generated and analysed.

##### **4.10.2.1. Content analysis**

The interviews collected for this study were analysed using content analysis. According to Philipp (2000), content analysis is a process in which information is outlined in a systematic way. There are three distinguishing features of content analysis: it reduces data, it is systematic, and it is flexible. This study adopted content analysis for the qualitative section of the study; data were coded and categorised. Categorisation of the data into themes and sub-themes was essential to ensure a credible interpretation and analysis of non-numerical data. The process of transcribing the interviews allowed the researcher to recognise and identify codes from the data. The coding process was significant in building themes that answered the research questions. The “What”, “Why” and “How” questions from the interviews were used to build themes and sub-themes that guided chapter five and six of this study.

#### **4.11. Reliability, Validity and Trustworthiness**

The validity and reliability of the research must be given the necessary attention in research because it is the basis upon which any rigorous study is conducted. Reliability is linked with validity; when the data is reliable, it increases its level of validity (Golafshani, 2003).

##### **4.11.1. Reliability**

Reliability simply means replicability, which presumes the degree to which another researcher can reach the same conclusions if the same research procedures were followed (Taylor *et al.*, 2015). Reliability, in this case, means the stability of research findings. For Drost (2011), reliability is the degree to which the instrument results in a regular and constant outcome. It is the capacity of measurement to yield similar results under similar circumstances over time. Reliability is associated with the firmness, constancy, and trustworthiness of the measuring tool used for the study. This data used Cronbach’s alpha coefficient to judge the reliability of the research instruments. This is a numerical tool to measure the consistency level of a data set. Cronbach’s alpha coefficient is a test

of reliability coefficient on the extent to which items in research tools are correlated (Taylor *et al.*, 2014). The nearer the Cronbach's alpha coefficient is to 1, the higher the internal reliability of the research tool.

#### **4.11.2. Validity**

Validity is the degree to which the research tool evaluates what it aims to measure. This study takes two types of validity into consideration. They are construct and content validity. Content validity was attained by assessing the facial validity of the research tools through the opinions of professionals in the study area. The opinion of the academic supervisor of this study was also considered before the administration of the research tool. Construct validity was achieved by fine-tuning the research tools with the support of experts in the field of methodology.

#### **4.11.3. Trustworthiness**

The trustworthiness of qualitative research is always addressed by positivists, probably because their concepts of validity and reliability cannot be dealt with in the same way as in naturalistic study (Shenton, 2004). Experts in research methodology such as Silverman, Albano and Siebelik and Treffers (2001) contend that qualitative researchers could integrate measures that addressed these problems. Different naturalistic researchers have used different terminologies to separate themselves from the positivist perspective. One of such is Guba (1981), who maintain that a qualitative researcher must consider four criteria in search of trustworthiness in research. Guba's constructs are in line with the principles being used by positivist scholars. The principles are transferability, credibility, confirmability, and dependability. In their work on qualitative data analysis, Lincoln and Guba (1985) use the principles of trustworthiness to corroborate the argument that a study's results that guarantee trustworthiness are worth paying significant attention to. Thus, it replaces the positivistic perception of validity, reliability, and generalisability for qualitative researchers working within the constructivist paradigm. However, scholars such as Silverman and Marvasti, 2008 and Silverman, 2015 disagree with Lincoln and Guba's trustworthiness principles. On the other hand, they agree with Seale (1999) in evaluating credibility in qualitative studies by referring to it as an incredible general treatment of the issues assessed in the quality of a qualitative study. While there is some disagreement with Lincoln and Guba's trustworthiness criteria by some scholars, the larger qualitative research community such as Trochim and Donnelly (2007); Kvale and Brinkmann

(2009) agree with Lincoln and Guba's qualitative analysis in terms of evaluating data validity rigour, trustworthiness, and reliability.

For the quantitative data, consideration was not only given to the results of the study but also the procedure of data collection and rigour of the research. This was achieved through the measurement of validity and reliability. To ensure that the qualitative data are credible, transferable, dependable, and confirmable, the researcher ensured that data drove the research process. The interviews were recorded and transcribed objectively without reflecting the view of the researcher but that of the respondents. The respondents were also engaged in a modest manner, ensuring that they have the freedom to share their views and that the answers provided are in line with the objectives of the study by asking leading questions.

#### **4.12. Limitations of the Study**

The major challenge encountered in the study is the shortage of literature on polycentric governance in the African continent. Most of the secondary literature on polycentrism were derived from literature outside Africa. The researcher also experienced resistance from some of the participants to participate in the study due to fear of being victimised afterwards. Some documents were not given to the researcher by government officials because these documents may be tagged as "classified" documents. However, these shortcomings did not disprove the objectives of the study. All the research questions were responded to, and the objectives were achieved. Secondary sources of data complemented some answers that were not sourced through interviews and questionnaires.

#### **4.13. Ethical Consideration**

The researcher followed the research ethics procedures of the University of KwaZulu-Natal. An ethical clearance application was submitted to the ethics committee. Approval was given by the University of KwaZulu-Natal Humanities and Social Science Research Ethics Committee (HSSREC) to embark on the fieldwork with a letter of approval with protocol reference number: HSSREC/00000438/2019 dated 8th October 2019. The fieldwork was done between November 2019 and February 2020. The researcher observed all the ethical issues in the process of data collection through the following ways:

1. Consent was given by the participating government ministry, as evident in the issuance of gate Keepers' Letter;
2. An informed consent form and consent declaration was given to the participants; the consent declaration form was duly signed before the commencement of the interviews;
3. The researcher clearly explained the research objectives to respondents before giving them the questionnaire to fill;
4. Participants were aware that their participation was voluntary and not compulsory;
5. Anonymity was guaranteed throughout the process of reporting; the name of each participant was not mentioned;
6. All collected data will be securely stored by the School of Social Sciences, University of KwaZulu-Natal for a period not less than five years; and
7. Secondary sources are properly referenced to avoid plagiarism.

#### **4.14. Conclusion**

This chapter provided detailed information on the research methodology adopted to achieve the objectives of the study. It discussed the different types of research paradigms that can be used in social science research, identified the strength and weaknesses of each paradigm, and then provided justifications for adopting a pragmatic paradigm for this study. This study considers the pragmatic paradigm as the most appropriate and suitable paradigm for the present study because of the need to explore the phenomenon under study –polycentric governance initiatives through multiple dimensions - to determine how polycentrism has been or/ can be employed in climate governance. Consequently, this study adopts a concurrent mixed method because using a cross-sectional survey with open and closed-ended questions adequately fits into the concurrent mixed method. This allows collecting and analyzing data to be done concurrently. This necessitates the choice of two research designs; case study and survey. While the former was used to collect information for the qualitative aspect of the study, the latter was adopted to survey quantitative data in the six selected local governments in Lagos State.

The sample size was calculated using Yamane (1967) formula, and for equivalent allocation in each of the local government selected for the study, Bowley (1926) formula for proportional allocation was used. Simple random sampling was adopted for the quantitative section of this study

because it provides an opportunity of being selected equally for the respondents in the study. Four hundred questionnaires were randomly distributed in the study area. The study adopted a purposive sampling technique for the qualitative section because it allowed the researcher to choose participants based on the observation of the study population and the objectives of the study.

Quantitative data were gathered with the use of an open and close-ended questionnaire, while the qualitative data was gathered through in-depth interviews. The quantitative data were analysed with inferential statistics capsulated in version 21 of the Statistical Package for the Social Sciences (SPSS), and qualitative data were analysed using content analysis.

## CHAPTER FIVE

### CLIMATE CHANGE IN LAGOS STATE, NIGERIA: NATIONAL AND INTERNATIONAL POLICY RESPONSES.

#### 5.1. Introduction

The dominant view on climate governance is the perspective of the international climate governance regime which views climate change as a global problem that requires a global solution (Andresen, 2014; Hasenclever *et al.*, 2000). This assumption is from the fact that the atmosphere has no boundary and that GHGs emissions in a particular location would have significant impacts on other places. GHGs emissions are from the activities of man in a different part of the world. At the same time, some countries, due to their level of industrialisation, have a high level of carbon footprint; others, with a low level of manufacturing, have a low level of carbon footprint. However, the negative impact of GHGs on the environment is no respecter of location; countries are affected disproportionately depending on each nation's capacities and capabilities to cope. This necessitated the international governance framework in the establishment of the UNFCCC in 1992; and, subsequently, the Kyoto Protocol in 1995 as an international regime perspective of tackling climate change. Scholars in this school of thought submit that a robust global agreement among nation-states is the best way to mitigate climate change impacts (Andresen, 2014; Breitmeier *et al.*, 2011).

In truth, since 1992 till date, the UNFCCC secretariat has organised twenty-five Conferences of Parties which have led to the development of several international treaties; most importantly, the Kyoto Protocol of 1995 and the 2015 Paris Agreements (Falkner, 2016). Nation-states that are signatories to these agreements also design and formulate national policies that will aid the actualisation of the targets set by the international climate agreement. In other words, a country's commitment towards the implementation of any international treaty is known in the national adaptation and mitigation plans of such a country. Meanwhile, the efficacy of international agreement in solving the climate crisis remains an endless conversation among climate governance scholars, experts and practitioners. On one level, the international treaties and national policies on climate change often suggest that states can serve as containers for GHG emissions and reduce the rate of global emissions by setting targets for emission reduction. On the other level, target setting and managing levels of emissions within the boundaries of a state are affected by actors and processes

operating across national boundaries, which sometimes go beyond the purview of the state (Okereke *et al.*, 2009). However, the position of UNFCCC in coordinating and providing guidance and direction in tackling the collective action problem remains paramount to climate governance experts and practitioners.

The efficacy of the international and national approaches in addressing the challenges posed by climate change remains an issue for scholarly investigation due to the limited evidence on its effectiveness on global emission reduction for the past twenty-eight years of the international regime approach. As a way of contributing to the scholarly conversation on the efficacy of international and national approaches to climate governance, especially from the global South perspective, this chapter unearths the impacts of climate change and its effects on local communities in Lagos State, Nigeria. More importantly, it investigates how international and national policies have addressed climate change impacts in the state. In essence, this chapter addresses research questions one and two which include:

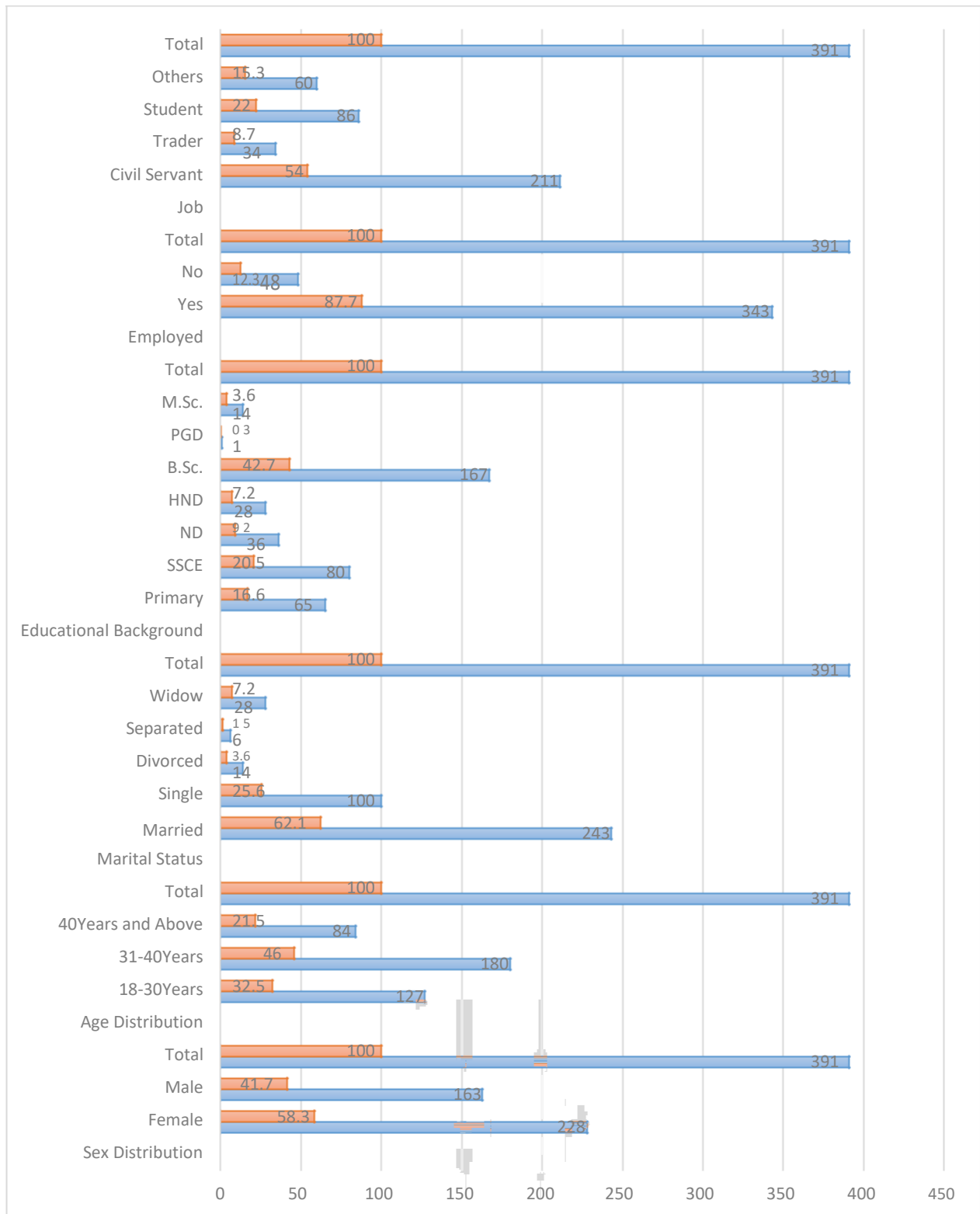
- i. What are the impacts of climate change in Lagos State?
- ii. To what extent have the national and international climate policies addressed climate change impacts in Lagos State?

The chapter adopts a mixed methodology by presenting both quantitative and qualitative data concurrently. It draws a conclusion from the data and unravels the impacts of climate change in Lagos state and how national and international policies have responded to managing these effects. The use of quantitative and qualitative methods is to ensure that one supports the other and ensure more rigorous findings. The chapter begins by presenting the demographic information of participants that participated in the study. Thereafter, it offers background information on Lagos State and what makes the city vulnerable to climate change impacts. The information gathered by qualitative and quantitative means was presented concurrently on the effects of climate change on local communities and critical sectors of the economy of the state. In the same manner, international and national policies on climate mitigation and adaptation were examined and their effectiveness in mitigating climate change impacts on local communities in the study area.

**Table 5.1: Demographic distribution of respondents**

| <b>Socio-demographic Characteristics</b> | <b>Frequency</b> | <b>Percentage</b> |
|--|------------------|-------------------|
| <b>Sex Distribution</b>                  |                  |                   |
| Female                                   | 228              | 58.3              |
| Male                                     | 163              | 41.7              |
| Total                                    | 391              | 100               |
| <b>Age Distribution</b>                  |                  |                   |
| 18-30Years                               | 127              | 32.5              |
| 31-40Years                               | 180              | 46                |
| 40Years and above                        | 84               | 21.5              |
| Total                                    | 391              | 100               |
| <b>Marital Status</b>                    |                  |                   |
| Single                                   | 100              | 25.6              |
| Married                                  | 243              | 62.1              |
| Divorced                                 | 14               | 3.6               |
| Separated                                | 6                | 1.5               |
| Widow                                    | 28               | 7.2               |
| Total                                    | 391              | 100               |
| <b>Educational Background</b>            |                  |                   |
| Primary                                  | 65               | 16.6              |
| SSCE                                     | 80               | 20.5              |
| ND                                       | 36               | 9.2               |
| HND                                      | 28               | 7.2               |
| B.Sc.                                    | 167              | 42.7              |
| PGD                                      | 1                | 0.3               |
| M.Sc.                                    | 14               | 3.6               |
| Total                                    | 391              | 100               |
| <b>Employed</b>                          |                  |                   |
| Yes                                      | 343              | 87.7              |
| No                                       | 48               | 12.3              |
| Total                                    | 391              | 100               |
| <b>Job</b>                               |                  |                   |
| Civil Servant                            | 211              | 54                |
| Trader                                   | 34               | 8.7               |
| Student                                  | 86               | 22                |
| Others                                   | 60               | 15.3              |
| <b>Total</b>                             | <b>391</b>       | <b>100.0</b>      |

**Source: Field Survey (2019)**



**Fig. 5.1: Demographic Characteristics of Respondents**

**Source: Field Survey, 2019.**

## **5.2. Presentation and Analysis of Socio-demographic Characteristics of Respondents**

Table 5.1 and Fig 5.1 present the demographic distribution of respondents that participated in the study. In contrast, Table 5.1 shows the information in a frequency and percentage distribution table; Fig 5.1 presents it in a histogram. The results, as presented, reveal the socio-demographic characteristics such as age, gender, employment status, marital status, and educational qualifications of the respondents. This information provides an insight into respondents' basic profiles. On the gender of the participants, the study revealed that two hundred and twenty-two, representing (58.3 percent) of the respondents, were females while one hundred and sixty-three, constituting (41.7 percent) of the respondents, were males. This result implies that more females participated in the study than males.

Meanwhile, this does not infer that there are more females than males in Lagos State's population. Based on the data from the National Bureau of Statistics, 52 percent of the inhabitants of Lagos are males while 48 percent are females (NBS, 2017). The fact that female respondents dominate the study implies that women are more susceptible to the adverse effects of climate change than their male counterparts. However, the male gender also had a robust representation which indicates that adverse impacts of climate change affect everyone irrespective of gender though the effects are more felt by women (see Dankelman, 2010; Ajibade, McBean, and Bezner-Kerr, 2013).

The respondents' age distribution showed that one hundred and twenty-seven, representing 32.5 percent of the respondents, were between 18 and 30 years. Also, one hundred and eighty, which embodies 46 percent of the respondents, were between 31 and 40 years while eighty-four, which indicates 21.5 percent of the respondents, were 40 years and above. This outcome denotes that most of the participants who are (78.5 percent) are between the ages of 18 and 40 years. This connotes that most of the respondents who participated in the study are young; hence, they are more conversant with contemporary issues such as climate change and are more informed about the policy responses on climate mitigation and adaptation by different actors at various levels. Furthermore, the marital status indicated that one hundred, which amounts to (25.6 percent) of the respondents, were single. In contrast, two hundred and forty-three, representing (62.1 percent) were married. Also, 3.6 percent were divorced, 1.5 percent were separated, and 7.2 percent were widowed. This finding revealed that the majority of the respondents were married. In truth, married people in most African societies

have more responsibilities than those that are single. Such obligations may be in terms of the provision of food, clothing, and shelter for the immediate family. Thus, climate change's adverse effects will have more impacts on married people due to their level of responsibilities. For instance, during flooding incidences, relocation of family members to a safer abode will be more challenging for married couples than their single counterparts (see Ajibade *et al.*, 2013).

On the respondents' educational qualification, 16.6 percent of the respondents had Primary School certificates; 20.5 percent of the respondents had Senior Secondary School Examination certificates. In the same vein, 9.2 percent of the respondents had National Diploma certificates, and 7.2 percent of the respondents had Higher National Diploma certificates. 42.7 percent of the respondents had Bachelor of Science certificates, while 0.3 percent had Post Graduate Diploma certificate. 3.6 percent had a Master's Degree qualification. The data indicates that majority of the respondents, about (64 percent), have post-secondary school education. It implies that most of the respondents who participated in the study are educated, and they can easily comprehend and provide answers to the research questions. This, in a way, enhanced the credibility, reliability, and validity of the research findings.

On the employment status, most of the respondents, which constitutes 87.7 percent, were employed while 12.3 percent were unemployed. Furthermore, 54 percent were civil servants, 8.7 percent were traders, 22 percent were students, while 15.3 percent ticked "other". The employment data of the respondents indicated that a preponderance of the participants are employed. This is in contrast with the general notion that most people living in coastal communities are below the standard of living/poverty line. The finding showed that most people who participated in the survey were employed, and they live in coastal communities. Based on Nigeria's standard of living, the working class cannot be categorised as poor; they are classified as middle-income earners (see Chiwuzulum *et al.*, 2010).

### **5.3. Geographical Background of Lagos State**

Lagos is in the southwestern part of Nigeria, bordered by the Atlantic Ocean in the South, in the West by the Benin Republic, and the East and North by Ogun state. The state has an area of 3,345 sq km

that constitutes 0.4 percent of the total land area of the country. With a seaboard of 180 kilometres, Lagos has a seaside that is majorly flat in topography with an elevation that is above sea level with less than 1.5m. Wetlands and water bodies cover approximately 40 percent of the land area which is prone to flooding (LSG, 2012). The seaside areas contain swamps, creeks, and lagoons which are divided from the ocean by sandy land that differs in size from 2-16 km.

Rain Forest and Wetlands are the major Eco-zones. Lagos state is a Tropical Rain Forest, and the zones are predominantly secondary forest, freshwater swamps, mangrove swamps, fallow land, and farmland. The topographies are sloping, and the soils are poorly drained. The weather of the area is a wet equatorial one which is inclined by its proximity to the Gulf of Guinea and the equator. Lagos state is shaped by climatic conditions in that the Inter-Tropical Convergence Zone is an influencing element. The shift of the ITCZ to the northward comes onto the dry land of a warm and moist air mass, while its withdrawal is characterised by dry and hot continental air mass. These two air masses give Lagos two contracting seasons: a dry season which is between November to March, and a rainy season which is between April and October every year.

There are two peak rainfall periods in the rainy season: May to July and September to October. With more intensity of rainfall between May-July, floods are prone to occur during this period of heavy rainfall. The city has a predominantly high temperature with a monthly mean of 30 degrees Celsius. The state always experiences a rise in temperatures from February to March and November to December, while the lowest temperatures are still from June to July, which happens to be the peak of rainfall. The above features of the state coupled with the high rate of population growth, with a population of over 17 million, 85 percent lives in the city, and this makes it the most urbanised state in Nigeria. The state population density is approximately 4,193 people per square km. These features make the state highly susceptible to the negative effects of climate change. The next section presents and analyses the quantitative and qualitative data on the impacts of climate change in Lagos State.

**Table 5.2: Ecological features of Lagos State and their eco-regions**

| Eco-area  | Geology  | Landscape  | Soil topographies   | Eco-zone    |
|---|--|--|---|-------------|
| Ikeja, Alimosho, Mushin, Coastal plain  |  | Nearly level plains with 1.2 percent slope             | Very deep, and well-drained; loamy, sandy loamy, sand, and well-drained soils   | Rain Forest |
| Epe, Agege, part of Eredo, Ejinrin and Ebute-Meta   |  |  |   |             |
| Eti-Osa, Surulere, Lagos Island, Ojo, Ibeju-Lekki Badagry                                     | Tidal flats  | Nearly level plains of 1-2 percent slope               | Very deep, moderately drained and poorly drained soils: sandy, loamy, sandy Soils   | Wetland     |
| Kosofe Agbowo, Mushin and Shomolu, Ejinrin, part of Epe, parts of Ebute meta, part of Ikorodu | Recent Alluvium  | Nearly level to gently undulating plains of 2-4% slope | Well-drained, deep, and deep poorly drained soils; sand, loamy sand, sandy loamy, clay loamy and gravel subsoils  | Wetland     |
| Part of Ikorodu leading to Shagamu  | Coastal Sands  | Plain Gently undulating plains of 2-4%                 | Very deep, well-drained and very poorly drained soils; sandy, sandy loamy and clay loam subsoils  | Rain forest |
| Part of Eredo towards Ijebu Ode   | Coastal sand Transitional materials of sub-recent alluvium | plain and 2% slope of                                  | Very deep, deep, and moderately deep well-drained and few imperfectly drained soils; sand, loamy sand, sandy loamy and gravel type sandy clay loam subsoils | Rain forest |

**Source:** Adapted from Ayeni, A.O. and Adedayo, V.T., (2012:36). Soil textural mapping: a pathway for sustainable urban agriculture in metropolitan Lagos, Nigeria. *Environ. Forensic*, 8, pp.31-41.



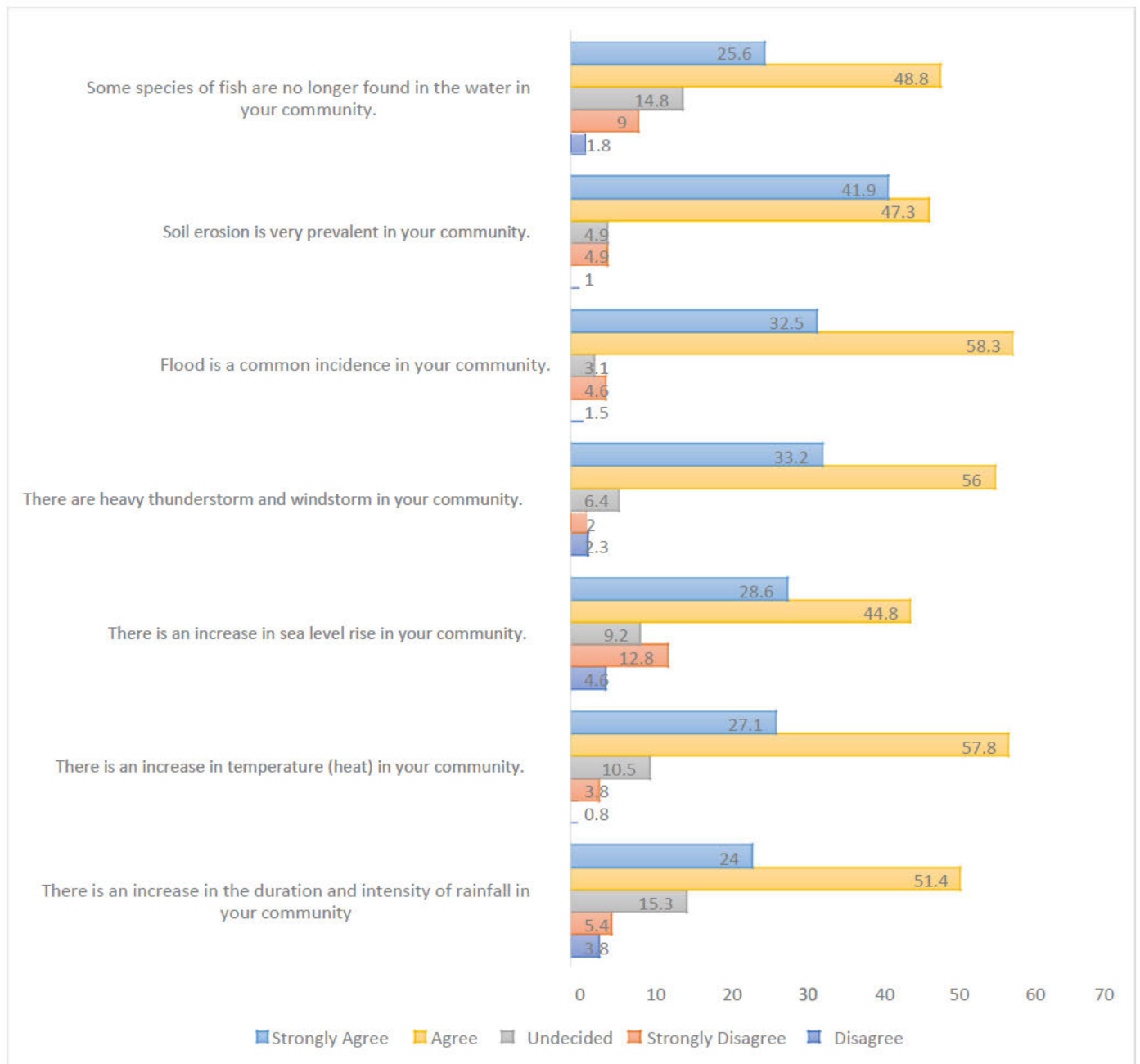
#### **5.4. Impacts of Climate Change on Local Communities in Lagos State**

To achieve the first research objective, which is ‘to examine the impact of climate change in local communities in Lagos State’ respondents that participated in the quantitative study were asked to indicate their level of agreement or disagreement with some of the climate change impacts in their respective communities using the 1-5 Likert scales. Table 5.3 conveys the frequency table and percentage distributions of respondents who are in agreement, undecided and in disagreement with the questions. Similarly, in-depth interviews were also conducted in six local governments: Ajegunle-Ifelodun local government, Surulere local government, Alimosho local government, Ikorodu local government, Eti Osa local government and Ojo local government, where community leaders shared their perspective on the impacts of climate change. The qualitative and quantitative data are presented and analysed below.

**Table 5.3: Responses on impacts of climate change in Lagos State**

| S/<br>N | Response   | Disagree  |         | Strongly Disagree |         | Undecided |         | Agree     |         | Strongly Agree |         | Total     |         |     |
|---------|--|-----------|---------|-------------------|---------|-----------|---------|-----------|---------|----------------|---------|-----------|---------|-----|
|         |  | Frequency | Percent | Frequency         | Percent | Frequency | Percent | Frequency | Percent | Frequency      | Percent | Frequency | Percent |     |
| 1       | There is an increase in the duration and intensity of rainfall in your community | 15        | 3.8     | 21                | 5.4     | 60        | 15.3    | 201       | 51.4    | 94             | 24      | 391       | 100     |     |
| 2       | There is an increase in temperature (heat) in your community.                    | 3         | 0.8     | 15                | 3.8     | 41        | 10.5    | 6         | 57.8    | 106            | 27.1    | 22        | 391     | 100 |
| 3       | There is an increase in sea level rise in your community.                        | 18        | 4.6     | 50                | 12.8    | 36        | 9.2     | 5         | 44.8    | 112            | 28.6    | 17        | 391     | 100 |
| 4       | There are heavy thunderstorm and windstorm in your community.                    | 9         | 2.3     | 8                 | 2       | 25        | 6.4     | 9         | 56      | 130            | 33.2    | 21        | 391     | 100 |
| 5       | Flood is a common incident in your community.                                    | 6         | 1.5     | 18                | 4.6     | 12        | 3.1     | 8         | 58.3    | 127            | 32.5    | 22        | 391     | 100 |
| 6       | Soil erosion is very prevalent in your community.                                | 4         | 1       | 19                | 4.9     | 19        | 4.9     | 5         | 47.3    | 164            | 41.9    | 18        | 391     | 100 |
| 7       | Some species of fish are no longer found in the water in your community.         | 7         | 1.8     | 35                | 9       | 58        | 14.8    | 1         | 48.8    | 100            | 25.6    | 19        | 391     | 100 |

**Source: Field Survey, 2019.**



**Fig. 5.3: The Impacts of Climate Change in Lagos State, Nigeria**

**Source: Field Survey, 2019.**

#### **5.4.1. Increase in Temperature**

Table 5.3 shows the response of the participants concerning the increase in temperature. A small proportion of the respondents (0.5 percent) disagreed, little percentage of 3.8 strongly disagreed, 10.5 percent of the respondents were undecided, and a considerable 57.8 percent agreed while 27.1 percent strongly agreed. It means that a massive percentage of the respondents, constituting (84.9 percent) of the respondents, established that there is an increase in temperature in their community. The result agrees with the study of Sojobi, Balogun, and Salami (2016), which implies that an increase in temperature is one of the effects of climate change in Lagos State. On a global scale, the heating of the atmosphere, ocean, and earth's surface is majorly caused by human activities such as burning fossil fuels and cutting carbon-absorbing trees. These activities release harmful substances such as carbon dioxide, methane and other dangerous GHGs into the atmosphere, and the immediate effect of this is the rise in global temperatures (Weart, 2008).

The International Panel of Climate Change Report of 2013 clearly stated that there is a consensus and more certainty among scientists that the activities of humankind are responsible for global warming (IPCC, 2013). Moreover, according to the United States National Oceanic and Atmospheric Administration (NOAA), the global average temperature of the earth has increased by 0.8 degrees Celsius in the last 100 years. The annual global temperature has increased at an average of 0.07 degree Celsius per decade since 1880 and has doubled that rate adding 0.18 degree Celsius since 1981. Based on the available data, 2016 was the warmest year on record with a surface of 0.99 degrees Celsius temperature, while 2019 was the second warmest in history, with an average global temperature of 0.95 degree Celsius (NASA/GISS, 2020).

The data from Nigeria's National Meteorological Agency (NIMET), from 1982-2018, show that Lagos has an average temperature of 27.5 degree Celsius with a maximum temperature of 33 degree Celsius, the variation in temperature is 3.4 degree Celsius (NIMET, 2018). An increase in global temperature has significant effects on the environment and human lives. Some of the effects include heatwaves, hurricanes, flood and drought, melting of glaciers resulting in sea-level rise, coastal submersion, biodiversity loss, freshwater loss and extinction of some species. The study finds out how some of these impacts manifest in Lagos State: increase in temperature has led to rise in sea

level, coastal erosion, the intensity of rainfall, flooding, windstorm, which are discussed in the subsequent sections of this chapter.

#### **5.4.2. Sea level rise**

Lagos State, as a coastal city, is not exempted from the adverse effect of sea-level rise. The topographical feature of Lagos state as a coastal town makes it susceptible to sea-level increase, which is further being exacerbated by climate change. From the findings, Table 5.3 indicated that 4.6 percent of the respondents disagreed that there is a rise in sea level in their community; 12.8 percent strongly disagreed; 9.2 percent of the respondents were undecided, 44.8 percent agreed, and 27.1 percent strongly agreed. The result showed that majority of the respondents, which represents (63.4 percent), affirmed that there is a rise in sea level in their community. This finding was corroborated by the qualitative data. Sea-level rise has worsened coastal erosion, and it has increased flood incidence, destruction of ecosystems and intrusion of seawater into freshwater sources. It has a grave implication for fisheries, agriculture and means of livelihood. For example, based on scientific predictions, a significant portion of the state's mangrove forests could be lost by 2100 if there is a sea level rise of 1 m. A government official that participated in the interview stated that:

*The adverse effects of this will be more felt by a coastal population that depends on mangroves as a source of food. For instance, coastal communities are using the mangroves as a nursery and reproductive ground for firewood, fish, and timber.<sup>2</sup>*

In essence, an increase in sea level is a consequence of global warming. The earth is getting warmer due to the effect of climate change. Global warming is triggering a rise in sea level in two significant ways: the melting of glaciers and ice sheets which is adding water to the ocean, and the volume of the sea is expanding as the water warms (IPCC, 2013). For instance, from the 1970s to date, melting of glaciers and heat expansion has been contributing enormously to rising sea level. As the global temperature continues to increase, the sea level rise will continue. The rate at which it will increase depends on the GHGs emission scale and the level at which glacier and the ice sheet is melting. Based on the available data, the level at which sea level is rising is alarming; it has been doubled

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<sup>2</sup>Interview with an official of the Lagos State Ministry of Environment.

from 1.4 mm per year in most of the 20<sup>th</sup> century to 3.6 mm per year from 2006-2015 (Nerem *et al.*, 2018).

Furthermore, in 2018, the global sea-level rise was 81 mm above the 1993 average, which is the highest annual average in the satellite record from 1993 to date (Lindsey, 2019). Even if there is a reduction in global emission, a rise in global sea level will likely be at 0.3 meters above 2000 levels by 2100, but if a high rate of global emissions persists, a worst case of 2.5 meters above 2000 levels by 2100 is possible. According to the United Nations Atlas of the Oceans, eight of the ten largest cities in the world are near the coast. Coastal populations are at a higher risk from the sea level. For instance, in the United States, nearly 40 percent of the population lives in coastal areas where the rise in sea level plays a significant role in shoreline erosion, flooding and hazards from windstorms (Atkinson *et al.*, 2013).

The sea levels have risen tremendously in Lagos over the past years and will continue to rise by 3.1mm per year by 2100 if the level of global warming does not change. According to a participant: *Sea level rise is already having and will continue to have health implications for diseases such as cholera and malaria. These diseases will worsen during flooding, and added to that, sea-level rise could displace over two million Lagosians.*<sup>3</sup>

Consequently, sea-level rise has a substantial effect on climate change (see Fashae and Onafeso, 2011; Elias and Omojola, 2015). Sea level rise creates stress on ecosystems of coastal communities, which protects from storms, recreation, habitat for wildlife and fish. It also contaminates freshwater aquifers, which sustain agricultural water supplies. Sea level rise leads to an increase in the duration and intensity of rainfall which is discussed in the next section.

#### **5.4.3. Increase in duration and intensity of rainfall**

Table 5.3 shows that 3.8 percent of the respondents differed in that there is an increase in rainfall in their community; 5.4 percent strongly disagreed, while 15.3 percent were undecided. 51.4 percent approved, and 24 percent strongly supported. From this data, it can be inferred that an

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<sup>3</sup> Interview with an official of Lagos State Environmental Protection Agency.

overwhelming majority of (75 percent) affirmed that there is an increase in the intensity and duration of rainfall in their community. This result agrees with existing literature in which scholars submit that one of the significant impacts of climate change is the increase in the duration and intensity of rainfall (see Ajibade and McBean, 2014; Elias and Omojola, 2015). A participant in the interview lamented the unpredictable nature of the rainy season:

*The rainy season period usually is from March to July each year, but from 2010 till date now, the rainy season is no longer predictable. It can start as early as February to November; the implication of this is enormous. It causes an overflow of the riverbanks which lead to flooding, soil erosion and destruction of lives and properties and it has made farming very difficult.*<sup>4</sup>

Scientific predictions by the Triple E Systems and Pennsylvania State University (2010) provided empirical support for this finding. It suggests that due to climate change impacts, Lagos State will experience an increase in the duration of rainfall, an increase in rainfall variability and an increase in temperature by 3 degrees Celsius by the year 2100. Similarly, the Climate Systems Analysis Group predicts a 2 degree Celsius increase by 2065 and 3.5 degree Celsius in Lagos state by the end of the century.<sup>5</sup> Rainfall in Lagos State is predicted to a peak of 2 mm per day in monthly rain between 2046-2065. Similarly, according to Nigeria's National Meteorological Agency's seasonal rainfall prediction for 2020, Lagos state is expected to have between 240-270 days of rainfall, starting from 19 March through 22 November 2020.<sup>6</sup> These changes will have enormous impacts on all social-economic sectors such as agriculture and food security, health, water supply, marine and coastal resources and human settlements. Incessant rainfall leads to flooding; this is discussed in the next section.

#### **5.4.4. Incident of flood**

Table 5.3 indicates the reaction of the participants regarding the incident of flood in their respective communities. 1.5 percent of the respondents disagreed that flood is a common occurrence in their community. 4.6 percent strongly disagreed, and 3.1 percent were undecided. 58.3 percent approved

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<sup>4</sup> Interview with a community leader in Ajegunle-Ifelodun local government.

<sup>5</sup> See: Climate Systems and Analysis Group, University of Cape Town

<sup>6</sup> National Meteorological Agency is responsible for national weather forecast in Nigeria

and 32.5 percent strongly approved. It can be deduced from the result that majority of the respondents, representing (90.8) percent affirmed that flooding is a common incidence in the study area. Also, a community leader during the interview submitted that:

*We are afraid of what the future holds for us; the type of flood we are witnessing now is disturbing. In the last two years, the flood has destroyed properties worth more than two million dollars, and thousands of people have been displaced. Yet, the scientific prediction of what will happen in the next ten years is worrisome.*<sup>7</sup>

This result is in tandem with the general notion among climate governance scholars that the increase in the incident of flood globally is a direct impact of climate change (see Kay *et al.*, 2009; Balica *et al.*, 2012).

However, while several other factors such as blockage of drainages, overflow of riverbank could be responsible for flooding, the intensity of rainfall is a major and causal factor. There is empirical evidence, as affirmed in this study, that the increase in the duration and intensity of rain and sea-level rise leads to flooding. Flooding in Lagos state can be dated back to 1947, when the state was still a miniature coastal settlement (Daily times 1947). Flooding and sea-level rise have had severe implications for the health of people in coastal communities. The 2014 flooding in Lagos State affected over three thousand people in the Makoko community (See NEMA, 2016). Floods destroy buildings in coastal communities, destruction of water pipelines, roads, and drains. Floods also affect the socio-economic activities in these areas. Floods and windstorms often destroy lives and properties, and infrastructure, leading to loss of GDP and disruption of socio-economic activities (see Adelekan, 2016; Adelekan and Asiyambi, 2016).

#### **5.4.5. Heavy thunderstorm and windstorm**

Table 5.3 revealed that 2.3 percent of the respondents disagreed that heavy thunderstorm and windstorm are common in their community, and 2 percent strongly disagreed. 6.4 percent were undecided, while 56 percent of the respondents agreed, and 33.2 percent strongly agreed. This result showed that a significant proportion of the respondents representing (89.2 percent) confirmed that there are heavy thunderstorm and windstorm in their community. To buttress this position, an official of the government that participated in the interview confirmed that “*In the*

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<sup>7</sup> Interview with a community leader in Lekki under Eti Osa local government

*study area, windstorm destroyed properties worth of two million Naira in 2016”.*<sup>8</sup> One of the consequences of an increase in temperature is heavy thunderstorm and windstorm, which destroy inadequate infrastructure in developing countries.

#### **5.4.6. Soil erosion**

An increase in the duration and intensity of rainfall and rise in sea level has led to coastal erosion. From the findings, 1 percent of the respondents disagreed that soil erosion is prevalent in their community, while 4.9 percent strongly disagreed. 4.9 percent were undecided. 47.3 percent agreed, and 41.9 percent strongly agreed (see Table 5.3). The result showed that a more significant percentage of the respondents, representing (89.2 percent), confirmed that soil erosion is common in their community. A participant in the interview believes that:

*Sea level rise and the construction of the Eko Atlantic Project<sup>9</sup> are responsible for coastal erosion in Lagos, and it is not only affecting the quality of the soil; it has washed away over 25 meters of land in the area.*<sup>10</sup>

Coastal erosion destroys properties and displaces people living in coastal communities. Given the increase in the intensity and duration of rainfall, soil erosion becomes inevitable in some areas. It is not surprising that most of the study participants affirmed that soil erosion is more prevalent in their communities.

#### **5.4.7. Loss of biodiversity**

An increase in temperature and rise in sea level have led to the extinction of some species. The study revealed that 1.8 percent of the respondents disagreed that there is an extinction of some species of fish in their water; 9 percent disagreed. 14.8 percent were undecided. 48.8 percent agreed, and 25.6 percent strongly agreed. The results showed a large proportion of the respondents, which consist of (74.4 percent), affirmed that climate change has led to the extinction of some species of fish. One of the participants affirmed that:

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<sup>8</sup> Interview with an official at Lagos State Emergency Management Agency

<sup>9</sup> Eko Atlantic Project is a new coastal city being built on Victoria Island as a way to solve shortage of real estate in Lagos state

<sup>10</sup> Interview with a community leader in Eti Osa local government

*One of the prominent works of people living in the coastal community is fishermen, even while some of them do have other sources of income; they do go out for fishing as a way of life.*<sup>11</sup>

In truth, sea-level rise and increase in the intensity of rainfall have significant impacts on habitats, organisms, and ecosystems. Waterlogging and flooding will lead to biodiversity loss (see Pimm, 2008; Harley, 2011; Warren *et al.*, 2013).

### **5.5. Sectorial Impacts of Climate Change in Lagos State**

Data from the interviews revealed the effects of climate change on different sectors of the economy in the state. For example, a participant stated that:

*Climate change does affect all areas of the economy in the city but majorly agriculture and food security, water, energy, ecosystem services and biodiversity, transport, industry, land use, human health, and human settlements.*<sup>12</sup>

Meanwhile, the rain-fed agricultural sector is highly vulnerable and has been affected by variability in climate. Evaporation is increasing due to an increase in temperature, which has led to more prolonged dry periods and poor water supply for agriculture, affecting the productivity of farmers and food security in the state. Furthermore, a participant said that:

*Ocean surges and sea-level rise have worsened the incidence of floods. It is responsible for coastal erosion intrusion of sea waters into sources of freshwater, destruction of the ecosystem, affecting fisheries, agriculture and means of livelihoods of the people.*<sup>13</sup>

The effects of climate change on the key sectors of the economy are discussed below.

#### **5.5.1. Impacts on agriculture and food security**

Agriculture accounts for over 30 percent of Nigeria's GDP, and it is also an essential means of livelihood and survival for Nigerians (Akpodigaga and Odjugo, 2010). Meanwhile, the sector is sensitive to the negative effects of climate change, and it is threatened by climate change (Ladan, 2014). Climate change affects both subsistence and commercial farming. While commercial

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<sup>11</sup> Interview with a community leader at EtiOsa local government

<sup>12</sup> Interview with an official at Lagos State Environmental Protection Agency

<sup>13</sup> An interview with an official of Special Climate Change Unit of the Lagos State Ministry of Environment

farming can still adapt to the adverse effect due to technology, adaptation seems difficult for subsistence farming, especially for smallholder farmers. An increase in rainfall has posed a significant challenge for agriculture and a substantial threat to food security. A community leader said that: *“Drought makes planting and growth of crops very difficult while flooding washes away plants, resulting in crop failure, decrease in soil fertility and destroy the farmland”*.<sup>14</sup>

The agricultural sector is crucial not only to the survival of people but also critical to ending poverty and hunger, which is crucial to the actualisation of the SDGs.

### **5.5.2. Impacts on water and water resources**

Water is a critical commodity for human survival; if it is too much, it will affect production and could destroy properties, and if it is too little, it is also dangerous (Brekke, 2009). According to a participant: *“Climate change has made water availability difficult in some parts and made an excess of water in other regions”*.<sup>15</sup> For instance, reduced river flow leads to the reduction of hydropower reservoirs storage and limits energy production. Already, there is a major concern on fluctuations in the level of waters in Shiroro, Jebba, and Kanji dams in Nigeria (Aisebeokhai, 2011). Hence, climate change is disrupting the generation of electricity from hydropower stations. Drought is affecting the availability of groundwater and intrusion of freshwater, which is a consequence of sea-level rise and pollution of drinking water availability for the population. One of the participants avers that:

*For the water sector, climate change has led to a poor water supply to the people and the over-abstraction of groundwater in meeting the demand of the rapidly growing population.*<sup>16</sup>

Lagos State is experiencing two opposite extremes of climate change impacts: an increase in rainfall duration, which leads to flooding and an extreme increase in temperature leading to dry seasons and drought. These two extremes are already having significant impacts on the quantity and quality of available water for use. For example, intense and frequent floods destroy water infrastructure in the form of pollution, and extreme dryness reduces river discharge and flow. The significance of the

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<sup>14</sup> An interview with a community leader in Surulere local government.

<sup>15</sup> Interview with an official of Nigeria’s Environmental Standard and Regulatory Agency

<sup>16</sup> Interview with a community leader in Eti Osa local government

challenges of climate change on the water resources in the state is further emphasised by the fact that more than 40 percent of the state is covered by water and 12 percent is subjected to periodic flooding. In the words of a participant:

*Pollution of water resources and loss of wetlands have a devastating effect on the means of livelihood and biodiversity resource. This is because wetlands provide habitats for marine animals, fish, variety of plants, shrimps and crabs and other endangered species.*<sup>17</sup>

With the increase in the intensity and duration of rainfall, Lagos State has abundant water resources in groundwater and surface water; lakes, rivers, lagoons, and creeks (see Idowu *et al.*, 2011). The water sector is being affected by climate change due to the high-water table, which is prone to flooding, pollution of groundwater and surface water with saltwater intrusion, human waste and industrial waste. Moreover, adverse impacts of climate change affect water resources that people in coastal communities depend on for food and commercial activities. An increase in temperature will lead to the loss of organisms and species sensitive to heat, affecting fisheries by drying up and breeding habitat in wetlands. Flooding causes loss of habitat, including fish habitat and groundwater contamination (see Ozor, 2010; Nwankwoala, 2012; Ngoran *et al.*, 2015).

### **5.5.3 Impacts on health**

Drought leads to an outbreak of diseases such as malaria, meningitis, and dengue. On the other hand, flooding also causes contamination of water, affecting the health of people who drink such contaminated water. A participant said that:

*Flooding leads to an outbreak of waterborne diseases such as hepatitis A, typhoid, shigellosis, cholera, and giardia. For example, after the 2014 floods in Lagos State, there was an outbreak of cholera in Alimosho local government area of the state.*<sup>18</sup>

Flooding also increases breeding sites for mosquitoes, leading to yellow fever, malaria and dengue and storm surge, which can lead to loss of lives (Olanrewaju *et al.*, 2019). Saltwater intrusion, which is a consequence of sea-level rise, affects the quality of drinking water which is dangerous to

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<sup>17</sup>An interview with an official at Lagos State Environmental Protection Agency

<sup>18</sup>Interview with a community leader in Alimosho local government area

people's health. Flood and windstorm kill some people, and others sustain injury. Heatwaves also cause skin rashes and have a significant effect on respiratory systems.

#### **5.5.4. Impacts on forests and forest resources**

Lagos state has five forest reserves which cover approximately 11,295 hectares. This is in great danger due to climate change.<sup>19</sup> One of the participants affirmed that:

*Heat stress reduces forest productivity, and it leads to a reduction of timber for food, medicine, and fuelwood. It also increases forest fire and reduction of soil microbes by delaying soil fertility.*<sup>20</sup>

Flooding destroys trees that are intolerant of waterlogging and loss of trees, and loss of revenue from plantations. Forest products are essential items needed by people to aid their survival. Fuelwood is required for cooking, wood poles for the building of houses and fences in rural communities in Nigeria, while in the urban centre, forest products are needed for medicine, food, and construction.

#### **5.5.5. Impacts on transportation and communications**

The inadequate transportation infrastructure in Lagos State is under a significant threat because of climate change impacts; flooding leads to the destruction of bridges, deterioration of roads and an increase in auto accidents. The majority of Lagos population depend on road transportation for movement and the movement of goods and services. However, flooding and erosion damage roads.

*Windstorm and heavy rainfall also destroy communication facilities such as the internet, microwave transmission, telephones, T.V. and radio satellite. Extreme weather event will lead to road closure, flight disruption, and loss of communication systems.*<sup>21</sup>

A rise in sea level has destroyed railways and roads along the coast, changes in river and lakes levels have also affected inland navigation. Shipping and other forms of transportation have also been affected. Windstorm also affects air transportation; airports that are mostly close to the ocean are susceptible to sea level rise (see Oladipo, 2010; Akuru, Okoro, and Chikuni, 2013).

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<sup>19</sup> Interview with an official of Lagos State Environmental Protection Agency

<sup>20</sup> Interview with an official of Special Climate Change Unit of the Lagos State Ministry of Environment

<sup>21</sup> Interview with an official at the Lagos state Ministry of Environment

### **5.5.6. Impacts on industry, commerce and energy**

Lagos State houses most industries in Nigeria, making it the economic hub of the country, and it accounts for more than 20 percent of the Value Added Tax that goes into the federation account. Most of these industries derive their raw materials from the climate-sensitive sector, such as agriculture, transport operations, energy production, road construction, and oil and gas operations.<sup>22</sup> Extreme weather events destroy the facilities of these companies. It disrupts their production and leads to loss of savings. It increases investment in maintenance cost and causes low productive capacity. The products of some industries are weather dependent. For instance, the windstorm is detrimental to offshore oil and gas drilling and fisheries industries which are dominant in Lagos State. Industries that depend on climate-sensitive sectors for raw materials which include, agricultural products, wood, domestic animals, mineral resources, water, and pharmaceutical companies, are exposed to climate change impacts. Moreover, the transport of finished goods and raw materials are affected by the bad road, which is a consequence of erosion and flooding. Extreme weather events like windstorm lead to the destruction of hydroelectric and thermal generation, which affects electricity supply and limits production (see Ebele and Emodi, 2016).

Furthermore, the energy sector is being affected by climate change impacts in Nigeria. An increase in temperature, rainfall, and windstorms affect both the production and consumption of energy (Elum and Momodu, 2017). The rise in temperature has led to a rise in demand for power in Lagos State for cooling purposes; storm surge may destroy or overload energy infrastructure.<sup>23</sup> While intense heat makes people demand more energy for cooling and refrigerating purposes, pumping of water will also increase for residential, irrigation and commercial use. There is always intense heat in Lagos state between November to January every year, and the demand for energy for cooling purpose during this time is high.

### **5.5.7. Impacts on ecology and ecosystems**

Climate change, as obvious in sea level rise, has a considerable impact on ecosystems. There is an increase in the deterioration in land cover, loss of biodiversity, and reduced water availability, which is a consequence of the destruction of aquifers and catchments. Flooding water logging has also

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<sup>22</sup>Interview with an official of Lagos state Environmental Protection Agency

<sup>23</sup>Interview with an official of Lagos State Environmental Protection Agency

made the regeneration of forest very difficult. The boundaries of ecosystems are affected by climate change. Lagos state has a long coastline with active lagoon beaches, ocean beaches, swamps, creeks, rivers and sandy uplands. The coastal region is highly populated and the choice area for people of the higher class in the society. However, because of the rise in sea level, coastal zones are at a higher risk of climate change shock. Furthermore, the discharge of industrial waste and domestic effluent poses a threat to the health of aquatic resources (see Mooney *et al.*, 2009; Grimm *et al.*, 2013; Pedrono *et al.*, 2016).

The findings from the qualitative and the quantitative data in this section show that there is a convergence between qualitative and quantitative data. This is because Table 5.3 shows that majority of the respondents in the selected local governments agreed that climate change impacts in their community are manifested in the following: increase in intensity and duration of rainfall, increase in temperature, soil erosion, biodiversity loss, flooding, sea-level rise, thunderstorm, and windstorm. Similarly, the qualitative data also reveal the same effects of climate change on local communities in the study area. These findings justify the rationale for using a mixed methodology which is to have a better understanding of issues rather than using just one of the approaches (Creswell and Clark, 2011). Given the impacts of climate change in Lagos State, as revealed in the findings above, the next section examines the attempts by international and national climate change policies to mitigate the impacts.

## **5.6. International Regime Approach to Climate Governance: An Analysis from Kyoto Protocol to Paris Agreement**

At the international level, there have been several attempts at managing climate change. The United Nations Conference on the environment in Stockholm in 1972 recognised climate change as a potential threat, but not until 1988 that the IPCC was established to assess and provide technical and scientific advice on global warming (Toulmin, 2009). Subsequently, in 1992 at the Earth Summit in Rio, nation-states negotiated and agreed on the establishment of the UNFCCC. This event signifies the beginning of climate governance at the international level because countries agreed on the inherent risk of climate change and the need to have a regulatory mechanism. Scholars have referred to the establishment of the UNFCCC as an international regime approach and a major breakthrough for climate governance (Bodansky *et al.*, 2016; Cole, 2011; Cole, 2015; Dorsch and Flachsland, 2017).

According to Young (1999), an international regime is a form of established guiding principles and laws agreed upon by nation-states on how a particular problem should be tackled. The problem, in this instance, is climate change. The major principle of the international regime is the “Principle of Common but Differentiated Responsibilities”. This implies that everyone has a common goal which is mitigation and adaptation to climate change, while the responsibilities of each country differ based on the content of the international agreements agreed upon by members’ signatory to such an Agreement. The UNFCCC Conference of Parties (herewith referred to as COP) entered into force in 1994, where parties to the Convention meet annually to assess and review progress being made on climate governance. The first COP was held in 1995 in Berlin, Germany. The Berlin Conference developed two years of “Analytical and Assessment Phases” for the negotiation of a robust plan of actions for nations to choose from and pick alternative action to tackle climate change (Arnold, 2011).

The Berlin mandate marked the establishment of the principle of Common but Differentiated Responsibilities, which exempt developing countries from an emission reduction target. The second COP was held in Geneva, Switzerland, in 1996. The conference adopted the IPCC (1995) Second Assessment and called for a legally binding target. The achievement at the COP2 led to the adoption of the Kyoto Protocol in COP3 after an intense negotiation in Kyoto, Japan, in 1997. At the fourth Conference of Parties, analysts expected that unresolved issues in COP3, such as the implementation strategies of the Kyoto Protocol, to be resolved at the meeting. But the difficulty and complexity of reaching an Agreement on these issues turned out to be insurmountable. Instead, parties at the Conference agreed on a two-year Plan of Action to devise mechanisms and accelerate efforts for the implementation of the Kyoto Protocol (Tangen, 1999; Johnson, 2001).

COP 6 was held in Hague, Netherlands, in 2000. The conference’s major discussions included the proposal of the U.S. to permit credit for carbon sinks in agricultural land and forest, punitive measures for states that did not meet up with their GHGs reduction goals, and the issue of loss and damage and adaptation financing for developing countries. Despite some agreement on the above problems, the United States, Germany, and Denmark rejected the compromise position. This led to the collapse of the meeting, which was suspended and later resumed in Bonn, Germany, in 2007 (Dessai, 2001; Schreurs and Tiberghien, 2007). At the conference in Bonn, progress was made on issues that caused the deadlock in Hague. Agreements were reached on significant issues such as

emission trading, joint implementation, compliance, climate financing and the Clean Development Mechanism (CDM).

In COP 7 meeting in Morocco in 2001, parties completed the Buenos Aires Action Plan and set the stage for the countries to ratify the Kyoto Protocol. The primary decision at the meeting was working rules for emission trading among parties to the Protocol, the clean development mechanism, joint implementation and a compliance regime that outlines the penalties for failure to meet the emissions target. The Kyoto Protocol enters into force in 2005 at COP11 in Montreal, Canada. The conference also served as the primary meeting of parties to the Protocol since its first engagement in 1997. At the end of the session, the Montreal Action Plan, with the goal of extending the life of the Kyoto Protocol beyond 2012, was developed. The entry into force of the Kyoto Protocol is a considerable achievement for the international climate governance framework because the Protocol was the first significant binding agreement by nation-states on climate change. Hence, the need to discuss the Kyoto Protocol in the next section.

#### **5.6.1. Kyoto protocol: A significant international climate change agreement**

The Kyoto Protocol was established at the third annual Conference of Parties to the UNFCCC in Kyoto in 1997 but came into force in 2005 intending to reduce emissions by an aggregate of 5.2% against the 1990 level from 2008-2012, which was the commitment period. At inception, climate scholars and practitioners were optimistic that the Protocol would achieve its objective of reducing GHGs emissions. The rationale for this assumption was that under the Protocol, industrialised countries categorised as Annex 1 were expected to reduce their emissions by 5.2% against the 1990 level (Maamoun, 2019). The GHGs listed in the Protocol included methane, carbon dioxide, hydrofluorocarbons, nitrous oxide, sulphur hexafluoride and perfluorocarbons (Toulmin, 2009). All African countries, including Nigeria, were categorised under non-Annex one countries, with no cap on their GHGs emissions. The Kyoto Protocol placed more responsibilities on developed countries due to their level of industrialisations and their historical carbon footprints compared to developing countries. For proper implementation of the Protocol, it has several mechanisms which include the CDM and the European Trading Emission System to facilitate reduction (Crosby *et al.*, 2007). CDM allows developed countries to fund emission reduction activities in developing countries as an alternative to domestic reduction by getting Certified Emissions Reduction, and the developing country will get carbon credit (Anil, 2012). Based on the available data, from 2003 to 2019, there

were a total number of eight thousand three hundred and seventy-seven (8377) CDM projects in the world out of which Asia and Pacific accounted for 81.4 percent of the global CDM projects, followed by Latin America, which accounts for 13.3 percent, Africa; the second-largest continent in the world, accounted for just 3.0 percent and Europe and Central America and the Middle East accounted for 1.0 percent and 1.3 percent respectively. The data is shown in Table 5.4 below.

**Table 5.4: Global distribution of CDM projects**

| S/N | Regional Distribution   | Number of Projects | Proportional Percentage |
|-----|-------------------------|--------------------|-------------------------|
| 1.  | Asia and Pacific        | 6817               | 81.4%                   |
| 2.  | Africa                  | 253                | 3.0%                    |
| 3.  | Europe and Central Asia | 84                 | 1.0%                    |
| 4.  | Latin America           | 1111               | 13.3%                   |
| 5.  | Middle East             | 112                | 1.3%                    |
|     | <b>Total</b>            | <b>8377</b>        | <b>100%</b>             |

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**Source: CDM, 2020**

The above data clearly show that the distribution of CDM projects on the Africa continent, which is the second-largest continent in the world and a developing continent. The responsibilities of the continent under the Kyoto Protocol were not effectively discharged due to the limited number of CDM projects on the continent. Out of the two hundred and fifty-three CDM projects in Africa, Nigeria, constituting two-thirds of the total population of the continent, has approximately 12 projects which are 4.7 percent. A review of the CDM projects by region and by country shows that they are unequally distributed among developing countries (CDM, 2015).

**Table 5.5: Registered CDM projects in Nigeria 2006-2012**

| S/N | Title of Project  | Registered Date | Other Parties                                     | Emission Reductions |
|-----|---|-----------------|---|---------------------|
| 1   | Gas Recovery Project at Kwale oil-gas processing plant  | 9, Nov. 2006    | Italy   | 1496934             |
| 2   | Pan Ocean Gas Utilisation Project   | 01, Feb. 2009   | Norway  | 2626735             |
| 3   | Efficient Fuel Wood Stoves Project  | 12, Oct. 2009   | Germany   | 31309               |
| 4   | Gas Recovery Project at Asuokpu Marginal Field, Nigeria   | 16, Oct. 2010   | Norway  | 256793              |
| 5.  | Ikorodu Solid Waste Composting Project  | 15 Dec 2010     | Ireland, Belgium, Norway, Portugal and Luxembourg | 281781              |
| 6.  | LFG project in Nigeria  | 12 Jul 2012     | France  | 129932              |
| 7.  | Afam Combined Cycle Gas Turbine Power Project   | 29, Oct. 2012   | Netherlands                                       | 550234              |
| 8.  | Alternative Fuels in Cement Facilities Project  | 18 Dec. 2012    | France  | 166557              |
| 9.  | Recovery and Utilisation of Associated Gas from the Obodugwa and neighbouring oil fields in Nigeria | 24 Dec. 2012    |   | 288147              |
| 10  | Kainji Hydropower Rehabilitation Project, Nigeria   | 28 Dec. 2012    | Sweden  | 873474              |
| 11  | Energy Efficiency of Nigeria's Residential Lightning Stove  | 31 Dec. 2015    | Britain and Northern Ireland                      | 28892               |
| 12  | Distribution of improved cooking stoves   | 25 Apr 2013     | Netherlands                                       | 39114               |

**Source: CDM, 2015.**

Table 5.5 shows the number of CDM projects in Nigeria. According to the database obtained from the CDM worldwide project database, below is the name of the CDM projects done in Nigeria. From Table 5.5, between the period of the implementation of the Kyoto Protocol (2005-2012), Nigeria implemented 12 CDM projects. A critical analysis of the projects shows that most of them are built around emission reduction, landfill gas, biomass energy and renewable energy. However, most of the projects are being implemented in the oil-rich Niger Delta region of the country. Lagos State, which is prone to climate change impacts, as revealed in Table 5.3, has a small proportion of CDM projects. For instance, the study conducted by Pillay (2016), while given a regional analysis of CDM projects in Nigeria, found out that Lagos state has 17 percent of CDM projects in Nigeria and Niger Delta has 59 percent. This clearly shows that the implementation of an international agreement mechanism cannot identify local people's peculiarities during and when implementing emission reduction projects.

One of the Kyoto Protocol's distinctive features is the Principle of Common but Differentiated Responsibilities, which requires developed countries to reduce their emissions by 5.2 percent below the industrial level. Furthermore, it gives no emission reduction cap for developing countries. This is one of the controversial provisions of the treaty since economic globalisation intensified in the post-Cold war era when the Protocol was ratified. It was obvious that the level of emissions of countries in non-Annex 1 would in a little while exceeded the emissions of Annex 1 countries. For example, new emerging economies most especially Brazil, India, China, and South Africa (BRICS) countries, are now part of the world's largest producers of GHGs (Peter, 2007). Consequently, the United States Senate in the 1997 BrydHagel Resolution condemned the Kyoto Protocol for appearing to penalise industries in the United States at a time of economic competition with China that has no emission reduction responsibilities under the Protocol. Following this, the GW Bush denounced the U.S. signature to the Protocol. The denouncement of the Protocol by the U.S. makes the European Union lead the Agreement into an operational and rectifiable instrument in February 2005.

Moreover, the United Nations Environmental Programme affirms that the end result of the Kyoto Protocol was quite low compared to the scientific assessments of the necessary outcome to evade a dangerous change in the climate. The emissions reduction attained as a result of the Montreal

Protocol was five times more than what was achieved within the commitment period of the Kyoto Protocol (UNEP, 2011).

After the expiration of the first phase of the Kyoto Protocol in 2012, there were attempts to achieve the second phase, but due to the global economic meltdown, which started in 2008, Canada, Russia and Japan refused to participate. However, the commitments of developed countries to the Kyoto Protocol remained an important swap for subsequent participation in emission reductions by E.U. and its allies and developing countries.

### **5.6.2. Copenhagen Accord: A turning point for international climate change regime**

The challenge against a Post-Kyoto climate change agreement is not a lack of adequate scientific knowledge on the potential climate change impacts but economic and political problems. This borders on how to involve the U.S. and engage developing countries, majorly China, which now accounts for a huge chunk of GHGs (Backstrand and Lovbrand, 2015). In the United States, there was opposition from fossil-fuel companies and Congress on any federal legislation; this will affect companies in the U.S. At the same time, Indians and China also view climate mitigation measures as an economic problem that can hinder their poverty reduction targets and development. Some achievements were made at the Bali Conference. This allowed the inclusion of the US in pursuit of a new treaty by dividing consultations into two phases. One on how the U.S. could be persuaded to participate in the Convention, and the other on the future of the Kyoto Protocol. The Bali conference also recognised the significance of adaptation for developing countries that have the least capability to deal with climate change impacts (Hass, 2008).

There are two dominant views in the literature on the efficacy of the Copenhagen climate change conference on climate governance. One views it as the collapse of the international climate change governance framework because the rationale for the meeting, which was to establish a treaty that would replace the Kyoto Protocol, failed. Members left the meeting with mere promises and commitments to reduce their level of emissions without a binding agreement that would enforce the compliance of states to such commitments (Ottinger, 2009; Dimitrov, 2010; Spak, 2010). On the other hand, some perceived this outcome as a positive point for climate governance because, for the first time, international climate governance architecture recognised the role that non-state actors can play in climate mitigation (Spak, 2010; Nicoll *et al.*, 2010; Ramanathan and Xu, 2010).

Consequently, the generation of emissions is not only by nation-states but private sectors and other actors, which the Copenhagen meeting allowed playing a pivotal role in Post-Kyoto.

The goal of the Copenhagen conference was to reach a new international agreement for climate change, however, the 2008 global economic recession hindered the possibilities of parties to arrive at GHGs reduction commitments and the provision of funds for mitigation and adaptation in developing countries. The Conference of Parties in Copenhagen was a huge public disappointment while others called it a disaster (Spak, 2010). Parties to the conference failed to negotiate an agreement that state leaders that attended the meeting could sign in their names. In its place, a hastily patched “Accord” was reached in the conference between the four BASIC countries and the United States<sup>24</sup>. Meanwhile, the Copenhagen Accord gave some headway to the future by legitimising the target of keeping the threshold of global mean temperature below 2 degree Celsius above pre-industrial levels (Dimitrov, 2010). It also moved from a top-bottom approach to a bottom-top approach in which nation-states publicly state the GHGs reduction that they will commence willingly. Unlike the Kyoto era, which had a reduction target level, parties took up a reduction target that they thought could be easily met by them. The Green Climate Fund was also established as a way to finance adaptation in developing countries. One of the distinctive features of the Convention was its democratic and open character through the involvement of small states and several nongovernmental organisations.

The Accord shows that the post-Kyoto Treaty would involve a bottom-top approach to climate governance and would encourage a pledge and review process instead of a binding requirement (Bodansky, 2010). This voluntary emission reduction strategy, which was mapped at Copenhagen, was formalised at the Cancun Conference of Parties in 2010, and it provides a politically viable platform for engaging major polluters such as the BASIC countries and the US. For instance, as of 2018, China and the US were responsible for half of GHGs globally, while the European Union has been taking the lead on robust Agreement accounted for only 11 percent (Maamoun, 2019). The rationale for a new treaty was established in the Durban Convention of 2011 with the replacement of the term of national commitments with a more loose word which was intended to nationally

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<sup>24</sup>The BASIC group was formed to project the climate interests of Brazil, South Africa, India and China

determine contributions and set in the process of discussion of a treaty that was concluded in Paris in 2015 (Gordon and Johnson, 2017).

Due to the failure of Copenhagen to reach a binding climate agreement, there were uncertainties that key members might leave the UNFCCC. Moreover, for a new treaty to be legitimate, it must be supported by most of the international communities. In the global North, the level at which the global South valued the UNFCCC and its procedures is not sufficiently known (Dimitrov, 2010). The E.U. policy recognised this and the Union, after the Copenhagen failure, embarked on a diplomacy program to rally support for a new treaty across the global community. They did this by focusing on neglected areas of climate governance; also, by providing funding for both mitigation and adaptation. This was done by elaborating the structure and procedures of the Green Climate Fund and funding for developing nations with a goal of reaching 100 billion dollars per annum by 2020 (Falkner *et al.*, 2010). However, a recent development suggests that the target has not been met. Also, new procedures were established in the 2013 Warsaw Instrument for loss and damage support to countries susceptible to adverse effects of climate change. Scholars in climate governance view the Copenhagen Accord as a turning point for climate governance because it signifies the beginning of state and non-state actor-led climate initiatives, a departure from the UNFCCC dominated Kyoto Era (Ottinger, 2009; Dimitrov, 2010; Spak, 2010).

### **5.6.3. Paris agreement: A decentralised approach to climate governance**

For over two decades, the goal of the climate change agreement lacks an exact definition. The Copenhagen Accord, which was formalised at the Cancun Conference of Parties, provided a threshold definition of 2 degrees Celsius for harmful anthropogenic interference. Nevertheless, this is not adequate to guarantee the adaptation of small Island states susceptible to inundation. Thus, the Alliance of Small Island States requested a 1.5-degree Celsius Threshold. To the amazement of analysts and climate governance experts, this was partly accomplished in COP21. Nation-states agreed to the rise in global temperature below 2 degree Celsius above pre-industrial levels and to pursue exertions to limit the temperature to 1.5 degree Celsius<sup>25</sup>. The treaty also highlighted the significance of adaptation and the provision of funding to ensure that the flow of finance is consistent with a pathway towards climate-resilient development (Obethur and Groen, 2018).

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<sup>25</sup> Article 2 (1) of the Paris Agreement

Since its initiation in 1992, the international climate change framework has been concerned about differentiation issues, arguments on climate justice, historical responsibilities, and structural inequalities in the climate governance framework. The Paris Agreement represents a departure from these issues. For instance, there is no mention of Annex I or non-Annex I Parties. It involves all countries on climate mitigation efforts, but the specific content of the treaty specifies some elusive differentiation between global North and global South (Brown *et al.*, 2019). For instance, the Agreement states that developed countries should take the lead by undertaking broad emission reduction goals. At the same time, Least Developed Countries and Small Island Developing States may prepare and communicate strategies for low GHGs development, while developed countries shall provide implementation support<sup>26</sup>. However, according to John Kerry, the former Secretary of State for the U.S., the intended nationally determined contributions by nation-states is a monument to differentiation.” This is because each country is at liberty to determine its fair contribution based on its unique national circumstances and capabilities (Victor, 2016).

Although there is no emission reduction target as spelt out in the Kyoto Protocol; the Paris Agreement is ambitious and yet unclear. The Paris Agreement seeks to achieve the objective temperature control by moving towards a decarbonised economy by 2050. The Agreement states that Parties to the Agreement should aim at reaching a global peak GHGs emissions as soon as possible and thereafter make rapid reductions to achieve a balance between sources of GHGs emissions and removals by sinks of GHGs by the second half of this century<sup>27</sup>. At the same time, another section of the Agreement states that each succeeding National Determined Contribution (NDC) will signify an advancement beyond its current NDC and must denote its highest promising ambition<sup>28</sup>. The Agreement does not contain a direct mention of carbon price or emission trading. Meanwhile, international transferred mitigation outcomes and collective action with strong accounting procedures are accepted as a means to achieve NDCs (Strand, 2019).

In comparison to the Copenhagen failure, the Paris Agreement was a great deal, and it will serve as guidelines for international climate governance for subsequent years. The way and manner in which the Agreement was able to achieve international cooperation on environmental issues are

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<sup>26</sup> Article 4 (5) and (6) of the Paris Agreement

<sup>27</sup> Article 4 (1) of the Paris Agreement

<sup>28</sup> Article 4 (7) of the Paris Agreement

one of the undeniable gains of the Convention. The provisions for adaptation which are stated in Article 10 of the Agreement by providing funding arrangements, climate financing, and technology transfer, is another benefit of the Agreement. According to Victor (2016) the significant success of the Paris Agreement is the flexibility of the INDCs. Rajamani (2016) argues that the Agreement is anchored on the equity and the principle of common yet differentiated responsibilities, but the way in which the principle operates differs from that of the Kyoto Protocol. Paris Agreement gives control to nation-states to determine their mitigation commitments, unlike the setting of mitigation target, which was done under the Kyoto Protocol. Parties will determine their NDC based on their capacities. - with the regulation that it will be reviewed and updated periodically. This allows the reduction of tension and political disagreement among countries. Kyoto failed because of the inflexibility of formulas and the division of countries into categories. Paris is different; it is more flexible and can be more effective (Aldy *et al.*, 2016; Bodansky, 2016; Victor, 2016).

However, despite the success recorded in Paris, the UNFCCC is an inadequate governance form to climate change. This is obvious because the new Agreement has no mechanisms to deal with free-riders. Another setback for the Paris Agreement is that it was inadequately framed from the beginning, which makes the Agreement reject the fundamental timetables and targets of the Kyoto Protocol for a pledge and review method. This seems to be the unavoidable price of an all-inclusive agreement. Although some relics of the Kyoto system are present in the new Agreement, such as common rules for transparency, openness, and the facilitation compliance mechanism, but which are not enforceable (Victor, 2016). The Paris Agreement is new reasoning in global climate change governance that identifies the importance of national politics in climate governance (See Falkner, 2016). The international regime approach to climate governance recognises nation-states as the major actor in climate governance. The rationale for this is because nation-states have the power and authority to make and influence decision within a geographical entity. Hence, the success or failure of the international climate change regime is predominantly measured through the compliance of nation-states to such agreement. The effectiveness and efficiency of the regime in limiting temperature to 1.5 degree Celsius above the pre-industrial level is consequent upon the mitigation and adaptation actions of nation-states. Thus, the next section examines national policy responses to climate change adaptation and mitigation in Nigeria.

## **5.7. National Responses to Climate Change Adaptation and Mitigation in Nigeria**

Nigeria is a federation with constitutional sharing of powers between the central and the coordinate units. Environment and climate are under the concurrent legislative list, which allows both national and subnational government to have power and authority to legislate on it. However, when there is a conflict between the federal and subnational laws or regulations, the national rules will prevail. Moreover, the national government has the constitutional authority to represent the country in international climate conferences and enter international treaties that are binding on the entire federation. Since the establishment of the UNFCCC in 1992, Nigeria has been playing her role as a Party to the convention. The three arms of government, namely executive, legislature and judiciary, have distinct roles to play in climate mitigation and adaptation<sup>29</sup>. The Federal Ministry of Environment leads the executive arm in the implementation of climate policies and action plan<sup>30</sup>. The ministry designs and executes the plans of the federal government on climate mitigation and adaptation. Within the ministry are different agencies and departments saddled with specific responsibilities on environmental issues: Department of Climate Change, National Environmental Standards and Regulations Agency (NESREA) are prominent examples. Agencies other than the Ministry of Environment that play a key role on environmental issues include the National Emergency Management Authority (NEMA), Nigerian Institute for Oceanography and Marine Research (NIOMR), Nigerian Meteorological Agency (NIMET), Centre for Climate Change and Freshwater Resources (CCFR), and the Nigerian National Petroleum Corporation (NNPC). At the legislative arm of government level, the National Assembly makes environmental law. It ratifies international treaties for domestication in the country. House Committees on Environment, Ecology and Climate Change provide an oversight function in ensuring that the relevant government agencies perform their responsibilities as stated in the law<sup>31</sup>. The judiciary plays the role of interpretation of pertinent climate laws in the country and can also make climate law through judicial decisions.

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<sup>29</sup> Principle of separation of power by Montesquieu

<sup>30</sup> The Federal Ministry of Environment is a under the supervision of a minister, who reports to the President and manages the day-to-day affairs of environmental issues in Nigeria

<sup>31</sup> See the 1999 constitution of the Federal Republic of Nigeria as amended

### **5.7.1. Nigeria's efforts in addressing the challenges posed by climate change**

The efforts of the Nigerian government in addressing the challenges posed by climate change started with the creation of the Federal Environmental Protection Agency (FEPA) through Decree No 59 in 1992. At this time, climate change issues were situated under the Department of Planning and Evaluation of the Agency (FGN, 2013). FEPA led Nigeria's delegation to Rio Conference on Environment in 1992 and signed the UNFCCC treaty on behalf of the Nigerian government. The agency was the focal point for the Nigerian government for implementation of the Convention and subsequent international climate change conference until when the Federal Ministry of Environment was established (FGN, 2014).

The Federal Ministry of Environment was established in 1999 and saddled with the duty of managing matters relating to environmental protection and conservation of resources in Nigeria. Nigeria ratified the Kyoto Protocol in 2004, which necessitated the need to coordinate the implementation of the treaty. This led to the creation of the Special Climate Change Unit in 2006. The unit was under the office of the Permanent Secretary of the Ministry until it was changed to a department headed by a Director in 2013 (FME, 2015). Nigeria submitted its First National Communication (FNC) in 2003; the Second National Communication was submitted in 2014. The country hosts several CDM projects (See Table 5.5).

#### **5.7.1.1. Nigeria's climate change policy framework**

The Nigerian government recognises the significance of creating a national response to climate change, and the different arms of government are initiating actions to establish a concrete governance architecture to respond to the problem posed by climate change. The Federal Executive Council in 2012 approved the National Climate Change Policy Response and Strategy. The policy thrust includes ensuring a climate-resilient society and low carbon economic growth and development. The strategies for implementation are: mitigation and adaptation measures, public awareness, climate science and technology, the participation of private sectors and strengthening of institutions (FME, 2014). The objective of the National Policy is to ensure economic growth and development, low carbon and foster a climate-resilient society through the following measures:

(i) strengthening climate adaptation capacity at the national level (ii) implementation of mitigation strategies that will enhance low carbon and sustainable economic growth (iii) increase in public awareness and campaign and promotion of the involvement of private sector in addressing climate

change (iv) Strengthening of national mechanisms and institutions to create a functional and suitable framework for climate governance and (v) promotion of research and build climate change science and technology to a level that will allow the country to participate actively in scientific and technological cooperation on climate change issues at the international level.

The government developed a Nationally Appropriate Mitigation Action (NAMA) as a way of achieving the national obligations under the UNFCCC. NAMA serves as a blueprint for government to design programmes and measures that support climate-resilient infrastructures, low carbon economy and gender-sensitive development. Nigeria's Intended National Determined Contribution was approved in 2015. Table 5.6 shows the key summaries of Nigeria's Intended National Determined Contribution (INDC).

**Table 5.6: Summary of Nigeria’s INDC**

| <b>Aspect</b>                                  | <b>Details</b>  |
|--|---|
| Major goal                                     | Reduction from Business as Usual  |
| Target year                                    | 2030  |
| Period of implementation                       | 2015-2030   |
| Conditional and unconditional mitigation Goals | 45 percent conditional<br>20 percent unconditional  |
| Key strategies and measures                    | <ul style="list-style-type: none"> <li>i. Ending of gas flaring by 2030</li> <li>ii. Reforestation and climate-smart Agriculture</li> <li>iii. Improvement in electricity grid</li> <li>iv. By making gas generators efficient</li> <li>v. Making energy renewable</li> <li>vi. Reduction of transmission losses</li> </ul> |
| Estimated Emission level per individual        | <p>Current: 2 tonnes</p> <p>Under Business as Usual by 2030: 3.4 tonnes</p> <p>Under Conditional Reduction: 2 tonnes</p>  |
| Global Assessment Used                         | Fourth IPCC Assessment Report   |
| Gases Covered                                  | Carbon dioxide, methane and nitrous oxide   |
| Percentage share out of global emissions       | Less than 1 percent (2010)  |
| Historical Emissions level (1850-2010)         | 2,564.02 million tonnes   |

**Source: INDC (2015).**

Table 5.6 shows that under a business-as-usual circumstance, the emissions level of Nigeria is expected to rise to 900 million tonnes per year by 2030; this indicates 3.4 million tonnes per individual. Currently, using the data from 1850-2010, the total emission level is 2, 564.02 million tonnes, and per individual was two tones. The country seeks to achieve 20 percent conditional, and 45 percent unconditional emission reduction target which will make emission per individual to remain at 2 tonnes by 2030. As a way of achieving the ambitious mitigation objectives by the national government, several measures and strategies are set out in each sector of the economy, and each of the sectors has an emission reduction target which is presented in Table 5.7.

**Table 5.7: Key sectoral mitigation measures and strategies**

| <b>Sector</b>            | <b>Strategies and Measures</b>  | <b>Potential Emission Reduction per year in 2030 (in million tonnes)</b> |
|--------------------------|---|--|
| Energy                   | <ol style="list-style-type: none"><li>i. Use of renewable energy</li><li>ii. Increase in energy efficiency</li><li>iii. Promoting the use of natural gas rather than fossil fuel</li></ol>  | 200 million tonnes   |
| Agriculture and Land use | <ol style="list-style-type: none"><li>i. Prohibiting the use of charcoal</li><li>ii. Promotion of Climate Smart Agriculture</li></ol>   | 74 million tonnes  |
| Industry                 | <ol style="list-style-type: none"><li>i. Promoting the adoption of green technology</li><li>ii. Regulating industrial energy usage with internal best practice</li></ol>  | 102 million tonnes   |
| Transportation           | <ol style="list-style-type: none"><li>i. The gradual shift from air transport to high-speed rail</li><li>ii. Mass urban Transit</li><li>iii. Upgrading of roads</li><li>iv. The shift from freight to rail</li><li>v. Promotion of the use of CNG</li></ol>   | 26 million tonnes  |
| Oil and Gas              | <ol style="list-style-type: none"><li>i. Strict enforcement of gas flaring regulations</li><li>ii. Development of microgrid such as Gas to Power Plants.</li><li>iii. The blending of 20 percent volume of Biodiesel with petroleum diesel and 10 percent of volume fuel ethanol with gasoline as transportation fuels.</li></ol> | 64 million tonnes  |

**Source:** Compiled by the researcher. (See INDC, 2015).

Table 5.7 shows the mitigation measures and the potential emission reduction target set by the Nigerian government as a way of achieving the obligation of the country to undertake mitigation initiatives under the Paris Agreement. Nigeria's government has national adaptation goals, which are discussed in the next section.

#### **5.7.1.2. National adaptation policy framework**

The National Adaptation Strategy and Plan of Action was developed under Building Nigeria's response to climate change projects for the Department of Climate Change of the Federal Ministry of Environment. The document describes the adaptation priorities of the country by reducing the susceptibility of the people to climate change impacts and strengthens the adaptive capacity of the economy. The objectives of the policy include the following:

- To strengthen the resilience of Nigerians to climate change
- To lessen the susceptibility of the people and minimise risks through building adaptive capacity and seek new opportunities.
- To improve preparedness and awareness creation on climate change impacts.
- To mobilise community participation in climate change actions
- To cushion the climate change impacts on major sectors of the economies and vulnerable groups
- To integrate adaptation plans into government planning at all levels and partnership with CSOs, universities and the media.

To accomplish the above objectives, there are some measures and strategies for each sector of the economy. Some of the key adaptation measures for the critical sectors are stated in Table 5.8.

**Table 5.8: Key adaption strategies for key sector of the economy**

| Sector                        | Adaptation Measures and Strategies |   |
|-------------------------------|------------------------------------|---|
| Agriculture                   | i.                                 | Adoption of improved soil management techniques   |
|                               | ii.                                | Providing early warning and weather forecasts to farmers  |
|                               | iii.                               | Diversification of livestock and improvement of range management  |
|                               | iv.                                | Use of irrigation system of farming   |
|                               | v.                                 | To put more focus on the impacts on agriculture in the savannah zones   |
| Housing and Human settlements | i.                                 | Development of climate adaptation plan of action for areas at risk  |
|                               | ii.                                | Supporting of communities through participatory planning of housing.  |
|                               | iii.                               | Discouraging the building of houses in low lying areas and high-risk zones  |
| Forest and Forest Resources   | i.                                 | Improving the implementation of Community-Based Forest Resources Management Programme   |
|                               | ii.                                | Enhancing the implementation and review of the National Forest Policy.  |
|                               | iii.                               | Maintaining and develop a forest inventory that facilitates the monitoring of forest and forest resources.  |
|                               | iv.                                | Strengthening of forest reserves management and strict enforcement of logging Activities  |
|                               | v.                                 | Provision of extension services to communities, CSOs and private sectors that will help to restore and establish community nurseries, plantations, and natural forest |
| Water and Water Resources     | i.                                 | Development of management of water resourcesprogramme   |
|                               | ii.                                | Intensifying and strengthening measures to survey water quantity and quality.   |
|                               | iii.                               | Enhancing the management of water demand and explore the efficiency of water.   |
|                               | iv.                                | Promoting artisanal fisheries and encouraging aquaculture   |
| Health                        | i.                                 | Conducting research to recognise the effect of climate change on health   |
|                               | ii.                                | Increasing the prevention and treatment of diseases that are likely caused by climate change  |
|                               | iii.                               | Developing health surveillance and early warning programmes   |
|                               | iv.                                | Facilitating and promote the utilisation of technologies and practices that minimise health impacts of climate change   |

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|                                   |      |  |
|-----------------------------------|------|--|
| Biodiversity                      | i.   | Implementing National Biodiversity Strategy and Action Plan, especially actions that address the impacts of climate change   |
|                                   | ii.  | Implementing recommended adaptation measures in sectors that shape biodiversity conservation such as energy, agriculture, and forestry                             |
| Energy                            | i.   | To increase protective margins in placement and construction of energy infrastructure.   |
|                                   | ii.  | To commence risk reduction and risk assessment programmes to enhance the resistance of the sector.   |
|                                   | iii. | To enhance and improve existing infrastructure through timely actions  |
|                                   | iv.  | To build energy backup systems that will allow supply of energy to critical sectors during emergency   |
|                                   | v.   | To expand energy sources and decentralisation of transmission to minimise the susceptibility of energy infrastructure to climate change                            |
| Commerce and Industry             | i.   | By increasing awareness creation on climate change opportunities and risks   |
|                                   | ii.  | By implementing risk reduction and risk assessments measures   |
|                                   | iii. | By incorporating climate change into an organisational business plan   |
|                                   | iv.  | By encouraging the relocation of high-risk facilities, markets, and industries.  |
|                                   | v.   | By encouraging insurance schemes for industries  |
| Transportation and Communications | i.   | Increase of protective margins in the construction of transportation and communications infrastructure.  |
|                                   | ii.  | Strengthening and improvement of existing communication and transportation infrastructures through timely efforts to ascertain and implement all feasible actions. |
|                                   | iii. | Building communication backup systems that will allow access to communication during an emergency.   |
|                                   | iv.  | Commencement of risk reduction and risk assessment programmes to enhance the resistance of the communication and transportation sectors                            |

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**Source: BNRCC (2011).**

In addition to the climate adaptation policies and their strategies listed in Table 5.7, there are other sectoral and environmental plans and policies that address climate change challenges. Some of these policies include:

- **National Policy on Environment**

To mitigate the challenges posed by extreme weather events which are manifesting in desertification, coastal surges, deforestation, flood and erosion, the Nigerian government set up a National Environmental Policy in 1989<sup>32</sup>. The objectives of the policy are to:

- i. secure a quality environment that will be good for the well-being and health of the people;
- ii. use and sustainably conserve natural and environmental resources;
- iii. maintain and preserve the ecosystems and create public awareness on the linkage between development and environment among the populace;
- iv. cooperate with other countries and international organisations on the efficient use of trans boundary resources and reduction of trans-boundary pollution.

As a way of implementing the national environmental policy, several programs were enacted. Some of these programmes are discussed below.

- **Drought and Desertification Policy**

Nigerian government's national policy on drought and desertification identified that climate change could intensify desertification and drought in some parts of the country. In this regard, the government designed strategies that would limit the climate change impacts on desertification and drought. The policy focuses on equipping relevant institutions, agencies and the people to be able to collect, analyse and utilise climate data to combat and ameliorate the effects of drought and desertification. The strategies for implementation of this policy include: strengthening of institutions and agencies of government for collection and analyses of hydrological and metrological information and dissemination of the information to the people, building awareness programmes that will enhance the knowledge of the people on climate change issues, improving the national early warning equipment for quality service delivery, and encouraging proper land use that enriches carbon dioxide sequestration such as agroforestry, reforestation and afforestation. Nigeria also has a Drought Preparedness Plan, which also consists of several adaptation strategies.

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<sup>32</sup>Federal Ministry of Environment (1989)

However, the information gathered from this study shows that while the policy is attractive on paper, implementation remains a daunting challenge.

- **National Forest Policy**

The major objective of the National Forest Policy is to ensure the sustainable use of forest resources in a way that increases social, economic, and environmental benefits for present and future generation. Some of the objectives of the policy are crucial for climate adaptation strategies. They include: to ensure quality forest management practices by enhancing and maintaining national forest estate; address the primary causes of desertification and deforestation, including rural poverty and weak regulations; encourage people that are dependent on forest resources as means of livelihood on new approaches to forestry, and build the capacity of key actors on forest resources development and management. Under the National Forestry Action Programme, Nigeria has afforestation programmes aimed at planting trees across the dry land area to push back deforestation. Similarly, there is a presidential initiative on 40 million trees to be planted annually, but when this planting will commence is still unknown.

- **National Biodiversity Strategy and Action Plan**

The National Biodiversity Strategy and Action Plan is a framework for biodiversity conservation and sustainable use of biodiversity resources in Nigeria. The primary objective is to preserve and encourage the sustainable use of biodiversity resources. Climate change impacts are daunting on ecosystems; hence, the need to conserve and preserve biodiversity resources in Nigeria by enhancing and promoting measures for in-situ and ex-situ conservation, strengthening and expanding the protected areas to include all the main ecosystems, establishing and restoring grazing reserves for nomadic pastoralists, and protecting water bodies and aquatic resources.

- **National Erosion and Flood Control Policy**

The objective of this policy is to protect the people and the environment from the adverse effects of floods and erosion. As earlier noted in this chapter, climate change has led to an increase in the intensity and duration of rainfall in the study area, the resultant effect of floods and coastal erosion. Some of the strategies in the implementation of the policy include the production of flood and erosion vulnerability map for all the zones in the country to aid their preparedness, the development of a mechanism for control, conducting training on erosion and flood prevention, management and

controls at all levels among others. The action plan for this policy is to ensure the following: involving all relevant stakeholders in the prevention and management of floods and erosion. It includes the involvement of all tiers of government, establishment of an efficient and effective institutional arrangement for flood and erosion control, and expedition of sustainable funding for effective flood and erosion management. Projects such as flood control projects are being implemented across the country with support from the National Ecological Fund.

- **Agricultural Policy**

The Nigerian agricultural policy's primary objective is to ensure self-sufficiency in food production and supply to ensure food security. This sector is very vulnerable to climate change as flood and drought pose a significant threat to production. Some of the strategies include the introduction of an agricultural insurance scheme to reduce the consequence of extreme weather events on the farmer, efficient and effective utilisation of resources, irrigation and agroforestry.

Considering the ambitious climate adaptation and mitigation measures of the federal government of Nigeria as revealed in Table 5.7 and Table 5.8, to what extent have these policies addressed the impacts of climate change in Lagos State, Nigeria? This question is answered in the next section.

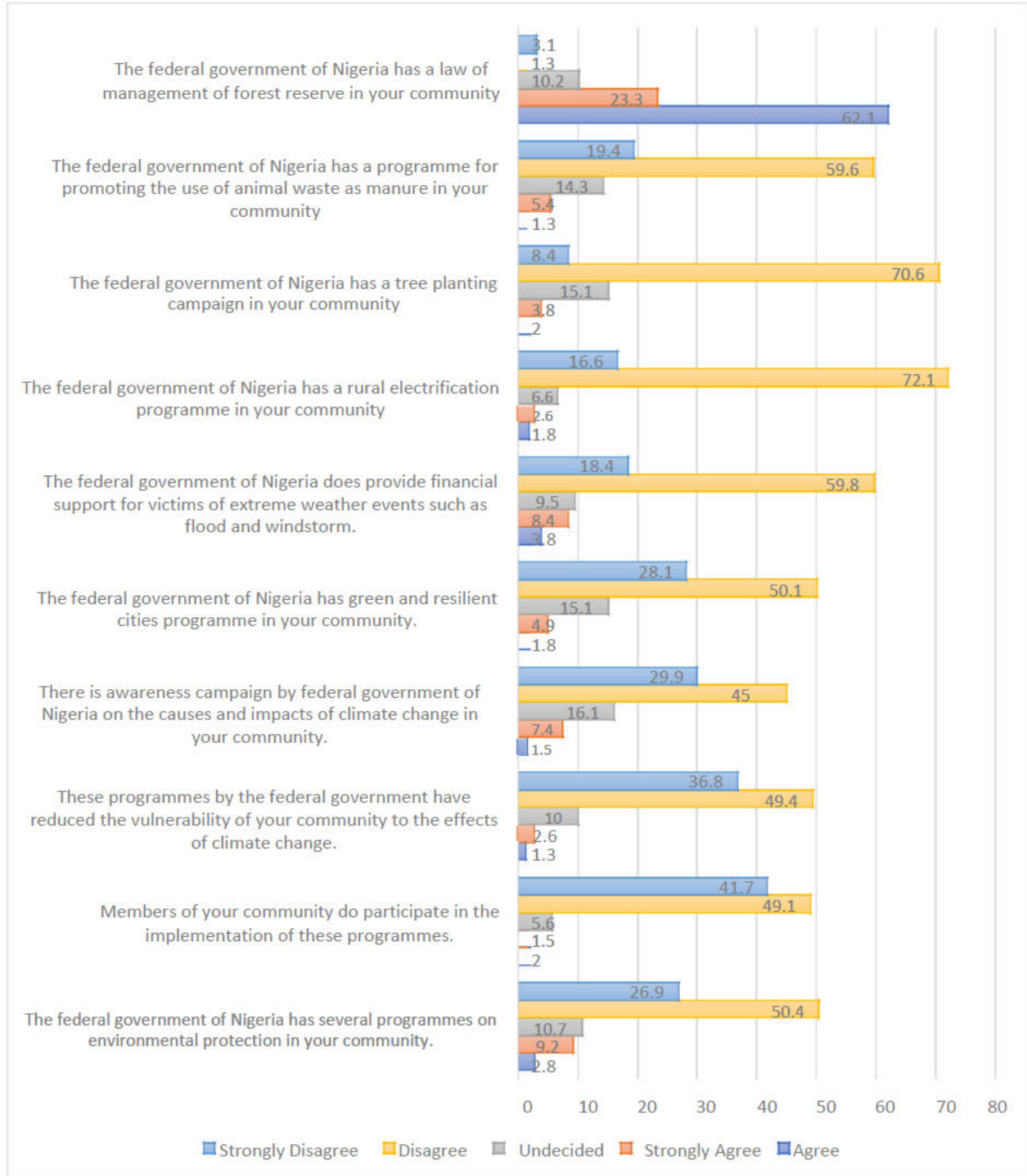
### **5.8. Effectiveness of National Policies on Climate Mitigation and Adaptation in Lagos State**

Due to the national climate mitigation and adaptation policies as presented in Table 5.7 and Table 5.8, this section examines how national policies of the federal government of Nigeria have responded to mitigating climate change impacts in Lagos State. Respondents were asked to indicate the level of approval or disapproval using the 1-5 Likert scale with some of the national programmes on climate governance.

**Table 5.9: Responses on how National Policies addressed have Climate Change impact in Lagos State**

| S/N | Response  | Agree     |         | Strongly Agree |         | Undecided |         | Disagree  |         | Strongly Disagree |         | Total     |         |
|-----|---|-----------|---------|----------------|---------|-----------|---------|-----------|---------|-------------------|---------|-----------|---------|
|     |   | Frequency | Percent | Frequency      | Percent | Frequency | Percent | Frequency | Percent | Frequency         | Percent | Frequency | Percent |
| 8   | The federal government of Nigeria has several programmes on environmental protection in your community.                             | 11        | 2.8     | 36             | 9.2     | 42        | 10.7    | 197       | 50.4    | 105               | 26.9    | 391       | 100     |
| 9   | Members of your community do participate in the implementation of these programmes.   | 8         | 2       | 6              | 1.5     | 22        | 5.6     | 192       | 49.1    | 163               | 41.7    | 391       | 100     |
| 10  | These programmes by the federal government have reduced the vulnerability of your community to the effects of climate change.       | 5         | 1.3     | 10             | 2.6     | 39        | 10      | 193       | 49.4    | 144               | 36.8    | 391       | 100     |
| 11  | There is an awareness campaign by the federal government of Nigeria on the causes and impacts of climate change in your community.  | 6         | 1.5     | 29             | 7.4     | 63        | 16.1    | 176       | 45      | 117               | 29.9    | 391       | 100     |
| 12  | The federal government of Nigeria has green and resilient cities programme in your community.                                       | 7         | 1.8     | 19             | 4.9     | 59        | 15.1    | 196       | 50.1    | 110               | 28.1    | 391       | 100     |
| 13  | The federal government of Nigeria does provide financial support for victims of extreme weather events such as flood and windstorm. | 15        | 3.8     | 33             | 8.4     | 37        | 9.5     | 234       | 59.8    | 72                | 18.4    | 391       | 100     |
| 14  | The federal government of Nigeria has a rural electrification programme in your community   | 7         | 1.8     | 11             | 2.6     | 26        | 6.6     | 282       | 72.1    | 65                | 16.6    | 391       | 100     |
| 15  | The federal government of Nigeria has a tree planting campaign in your community  | 8         | 2       | 15             | 3.8     | 59        | 15.1    | 276       | 70.6    | 33                | 8.4     | 391       | 100     |
| 16  | The federal government of Nigeria has a programme for promoting the use of animal waste as manure in your community                 | 5         | 1.3     | 21             | 5.4     | 56        | 14.3    | 233       | 59.6    | 76                | 19.4    | 391       | 100     |
| 17  | The federal government of Nigeria has a law of management of forest reserve in your community                                       | 243       | 62.1    | 91             | 23.3    | 40        | 10.2    | 5         | 1.3     | 12                | 3.1     | 391       | 100     |

Source: Field Survey, 2019



**Fig. 5.4: Extent at which National Policies have addressed climate change impact in Lagos State, Nigeria**

Source: Field Survey, 2019.

Table 5.9 shows the result of the existence of programmes by the federal government of Nigeria on environmental protection and its effectiveness on climate change impacts in Lagos State.

For any particular government policy to be effective, the people must be actively involved and knowledgeable about the existence of such policies or programmes. Community members were asked about the existence of climate change programmes by Nigeria's federal government in their community. Table 5.9 showed that 2.8 percent of the respondents approved that the federal government has policies and programmes on environmental protection. 9.2 percent strongly approved. 10.7 percent were undecided; 50.4 percent differed, and 26.9 percent strongly disapproved.

The outcome implies that most of the respondents, representing (77.3 percent), disapproved of the claim that Nigeria's federal government has several programmes on environmental protection in their community. However, a significant proportion of the respondents, representing (12 percent), affirmed that the federal government has several programmes on environmental protection in their community. Based on the results, the federal government of Nigeria's policies and programmes on climate mitigation and adaptation are unknown to people at the local level. This result negates the core objectives of the national adaptation policies aimed at ensuring the participation of people and community members in climate action. How can the people participate in what they are not aware of? The rationale for this communication lag is due to the poor implementation of policies by Nigeria's federal government.

However, this result was negated by the qualitative data; an official of the Lagos State Ministry of Environment Special Climate Change Unit said that: '*the federal government of Nigeria has several policies and measures on climate change*'.<sup>33</sup> Moreover, the emission reductions target of Lagos State is the one set by the federal government. The rationale for this conflicting result is not farfetched: community members at the local level are often being neglected by the government, in most cases, by paying lip service towards the concern of the people. Another participant supported this position

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<sup>33</sup>An interview with an official of the Special Climate Change Unit

by stating that “*The Nigerian government designs robust climate policies with no concrete plan of implementation*”.<sup>34</sup>

On the participation of community members during the planning and implementation of national climate change policies, 2 percent of the respondents approved that their members do participate; 1.5 percent strongly supported, 5.6 percent were uncertain, 49.1 percent differed, and 41.7 percent sharply differed. The outcome denoted that the bulk of the respondents, signifying (90.8 percent) disapproved of the claim that members of their community do participate in the implementation of programmes of the federal government on climate change. This result is not surprising because it was affirmed in the previous finding in which the majority of the people at the community level agreed that the federal government of Nigeria has no climate change programmes in their community. This means that people at the local level in Lagos State cannot participate in the implementation of a programme that they do not know exists (see Elias and Omojola, 2015).

On whether the programmes by the federal government of Nigeria has reduced the vulnerability of the people to climate change, 1.3 percent agreed, 2.6 percent strongly approved, 10 percent were undecided, 49.4 percent disagreed and 36.8 percent strongly disagreed. From the result, it can be deduced that majority of the respondents, representing (86.2 percent), contradict the claim that the programmes of the federal government of Nigeria have reduced the vulnerability of the people to climate change. This result is also substantiated by the interview with the civil society organisation, in which they affirmed that the policies of the federal government have little or no impacts on the vulnerability reduction of the people at the local level<sup>35</sup>. Hence, the foregoing postulation that the people are not aware of any national climate change programmes in this finding is justified.

Meanwhile, concerning the creation of the awareness campaign on climate change by the federal government of Nigeria, 1.5 percent of the respondents agreed, 7.4 percent strongly approved, 16.1 percent were uncertain, 45 percent disagreed and 36.8 percent strongly disagreed. This result revealed that most of the respondents, representing (74.9 percent), disapproved that Nigeria’s federal

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<sup>34</sup> An interview with a member of Non governmental organisation in Lagos State.

<sup>35</sup> Interview with an official of Non Governmental Organisation

government has an awareness campaign on the causes and impacts of climate change in Lagos State. The qualitative data also showed a similar result; a participant states that “*an awareness campaign on environmental protection is done by the Lagos State government*”.<sup>36</sup> This result negates one of the major objectives of the national adaptation and mitigation plan of action of the Nigerian government, which states that government will ensure participation and awareness among the people on the adverse impacts of climate change.

Furthermore, on the existence of Green and Resilient Cities programme of the federal government of Nigeria in their community, 1.8 percent agreed that they have heard about it, 4.9 percent strongly agreed; 15.1 percent were undecided. Also, 50.1 percent disagreed and 28.1 percent strongly disagreed. This result indicates that the majority of the respondents, representing (78.1 percent), opposed the claim of the Green and Resilient Cities programme of the federal government of Nigeria in their community. The interview also confirmed this position: “*Lagos State is not one of the states chosen by the federal government for the implementation of the Green and Resilient City Project*”.<sup>37</sup> This result indicates that the programme is not being implemented in Lagos state (see Zakka, Permana, Majid *et al.*, 2017).

On loss and damage and climate financing, community members were asked about the provision of financial support for victims of flood and windstorm by the federal government of Nigeria. 3.8 percent approved; 8.4 percent strongly agreed; 9.5 percent were unsure. 59.8 percent also differed and 18.4 percent strongly differed. This result revealed that majority of the respondents; representing (78.2 percent) rejected the claim that the federal government of Nigeria does provide support for victims of flood and windstorm. However, the result also showed that (11 percent) of the respondents affirmed that the federal government does provide financial supports. Caution must be taken before concluding that the federal government of Nigeria has no financial support for victims of floods. The reason is that financial supports by the federal government through Nigeria’s National Emergency Management Agency (NEMA) do not go directly to the people. The funds are given to the affected State Emergency Management Agency (SEMA). Thus, the affected victims will receive the fund from their state emergency management agency; they will likely think that the funds are being

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<sup>36</sup> Interview with an official of Lagos State Environmental Protection Agency

<sup>37</sup> Interview an official of Lagos State Environmental Protection Agency

provided by the state government, but it is always with the support of the federal government (see NEMA, 2011).

On the effectiveness of mitigation programmes of the federal government, community members were asked about the existence of the rural electrification project of the federal government in their community, 1.8 percent agreed, 2.6 percent disagreed, 6.6 percent were uncertain, 72.1 percent disagreed, and 16.6 percent strongly disagreed (see Table 5.9). The finding revealed that most of the respondents, consisting of (88.7 percent) affirmed that the national government does not support a rural electrification campaign in their communities. Moreover, on the reforestation programme, community members reacted to the existence of a tree planting campaign led by the federal government of Nigeria; 2 percent of the respondents approved, and 3.8 percent strongly approved. 15.1 percent were unsure, while 70.6 percent disagreed. 8.4 percent strongly disagreed. The outcome revealed that majority of the respondents, representing (79 percent), rejected the assertion that the federal government has a tree-planting campaign in Lagos State. The result contradicts the commitment made by Nigerian President Muhammadu Buhari at the 2019 United Nations special conference on climate change in Washington DC, where he said that Nigeria would plant twenty-five million trees by the end of 2019 (see Thisday, 2019). With this result, there is no sign of any tree planting campaign by the federal government. The statement in Washington DC is mere rhetoric without a concrete plan of implementation.

On the use of animal waste as manure, 1.3 percent of the respondents agreed that the federal government of Nigeria has such programme. 5.4 percent strongly approved, while 14.3 percent were not sure. 59.6 percent differed, and 19.4 percent strongly opposed. The finding implies that a preponderance of the respondents, representing (79 percent), opposed the assertion that the federal government of Nigeria has a programme on promoting the use of animal waste as manure in their communities. About the existence of a law on forest reserve in Lagos State, 62.1 percent of the respondents agreed, and 23.3 percent strongly approved, 10.2 percent were undecided; 1.3 percent opposed, and 3.1 percent strongly opposed. This result indicated that a massive chunk of the respondents, representing (75.4 percent), affirmed the statement that the federal government of Nigeria has a law on forest reserve in Lagos State. Hence, it is illegal in Lagos State to go into a forest reserve and cut trees. However, a law to preserve the forest by the federal government of

Nigeria was not enacted for climate change. Rather, it was enacted for the government to have the exclusive right to cutting the trees for exportation. When the issue of climate change was gaining momentum in Nigeria, the Nigerian government quickly saw the forest reserve law as an opportunity to campaign against deforestation (see Oates, 1995; Orimoogunje, 2014).

From the above analysis, it is not inappropriate to argue that international and national climate policies have not effectively addressed the adverse effects of climate change in local communities in Lagos State. Hence, the study questions the efficacy of international and national approach to climate governance. Meanwhile, the national government has the authority and power to sign and ratify international climate agreements on behalf of its subnational governments. It is expected that national climate change programmes should be targeted at meeting the needs of local people who are vulnerable to climate change. However, the study revealed that most national policies on climate change are not being implemented in Lagos State. The result is in tandem with assumptions of the polycentric governance approach that governance initiatives should be site-specific. It implies the coexistence of multiple levels of authorities within a polycentric governance framework and that each should be able to design and implement governance initiatives in their specific domain. Furthermore, in a federal state like Nigeria, there are issues in which the national and subnational governments have a considerable level of authority to make and implement policies.

Nigeria is a federation with thirty-six states and a Federal Capital Territory. The impacts of climate change are not the same across the country. The southern parts are more prone to flooding, and the northern regions are susceptible to drought and desertification. Therefore, the implementation of national adaptation and mitigation policies that will capture the peculiarities of the people remains a daunting task. The federal government cannot take into consideration all the distinctive features of the regions while negotiating a treaty or designing a national plan of action. An example is the Intended National Determined Contribution prepared by the Nigerian government, which states that the northeastern part of the country is the most vulnerable zone to climate change impacts. Meanwhile, based on scientific prediction, if sea-level rise persists in Lagos State, the entire city will be inundated by water by 2100.<sup>38</sup> Hence, there is a need for climate action to be site-specific, which

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<sup>38</sup>Interview with an official of Special Climate Change Unit

is one of the assumptions of the polycentric theoretical approach. While the national government enters into an international agreement and set the agenda for the country on climate mitigation and adaptation goals, the implementation should be at the local level. The subnational government can fast track it because it is closer to the people than the national government.

## **5.9. Conclusion**

This chapter investigated the impacts of climate change in Lagos State, Nigeria. It also examined how national and international policies have responded to mitigating the challenges posed by climate change. In doing this, qualitative and quantitative data were presented concurrently, and there is a high level of convergence between quantitative and qualitative data. The chapter revealed that the impacts of climate change in the study area include: increase in the intensity of rainfall, flood, increase in temperature, sea-level rise, loss of biodiversity, windstorm, thunderstorms and soil erosion with severe impacts on the socio-economic life of the people.

More importantly, the chapter expressed and affirmed some of the arguments that this study seeks to advance. For example, the chapter showed that despite several international agreements on climate governance by nation-states at the UNFCCC level, little has been achieved in terms of emission reduction. Hence, the chapter demonstrated that international and national policy responses to climate change have yielded little results in terms of climate mitigation and adaptation at the local level. Despite this, however, the international and national levels have a unique role in climate governance that cannot be played by any other actors. For instance, the international climate change regime performs the role of agenda-setting by providing a platform (UNFCCC) for nation-states to discuss and negotiate ideas and best practices on climate governance. Secondly, the international regime also serves as a knowledge-based system through the IPCC by providing scientific-based knowledge on climate change.

The chapter concluded that while the international and national domain of governance remains an important site for climate governance considering its distinctive role in climate change agreement, implementations of such agreement at the local level is more of the responsibility of subnational actors. Hence, climate change is a polycentric issue that should be addressed by multiple actors at diverse levels. This is because innovative governance measures by different actors at multiple levels will cumulatively add up to a greater climate change action rather than relying on a specific domain

of governance. The next chapter focuses on subnational initiatives and polycentric climate governance in Lagos State.

## CHAPTER SIX

### SUBNATIONAL INITIATIVES AND POLYCENTRIC CLIMATE GOVERNANCE IN LAGOS STATE, NIGERIA

#### 6.1. Introduction

As noted in the previous chapter, a top-down approach to climate governance by the international regime and nation-states has yielded little result in emission reduction and adaptation to climate change at the local level. Hence, this chapter discusses the roles of subnational actors in climate governance. It also investigates the effects of polycentrism and the relationship among polycentric actors involved in climate governance in Lagos State. The chapter seeks to answer research question three and four of the study, which are:

- i. What role has been/can be played by subnational government in climate change governance?
- ii. How effective are polycentric initiatives in addressing climate change impacts in Lagos State?

In doing this, the chapter utilised two statistical tools, which are frequency distribution Table and Inferential Statistics. The frequency distribution presents the respondents' percentage to the research question. The inferential statistics use Multiple Regression Analysis to determine the effects of subnational initiatives on the impacts of climate change. The significance level used for the Multiple Regression Analysis is 0.05. Given that the participants in this study are human beings, the 0.05 significant level specifies that an error of 5 percent of the collected data is likely to occur by chance. Therefore, the level of assurance of the relationship between the independent and dependent variable is 95 percent. For the analysis of the inferential statistics, the Statistical Package for the Social Sciences (SPSS) version 21 was adopted. The chapter is divided into three sections. Section one examines the measures of climate mitigation and adaptation employed by the Lagos State government, and the second part unearths the efforts of local community members, while the third section discusses a polycentric approach to climate governance and the relationship among the polycentric actors in Lagos State involved in the governance of climate change.

## 6.2. Climate Change Governance Measures by the Lagos State Government

In the last twenty-five years, subnational governments have become key policymakers in the area of climate change governance, most especially in Asia, Europe and North America. During this period, several cities have developed climate action strategies and plans (Bulkeley and Newell, 2015). While mitigation was the main focus in the early phase in developed cities, adaptation was the central theme in developing societies (Pohlmann, 2011). In this period, several cities become members of transnational and national networks such as C40 cities, Covenant of Mayors and the US Mayors Climate Protection Agreement. The involvement of cities in climate change governance is because climate change directly affects cities, and they must become accustomed to the cost of climate change (Kern and Bulkeley, 2009).

Globally, subnational governments' responses to climate change differ by reason of the following:

(i) the authority and competencies to regulate climate change issues; (ii) the impacts of climate change and the perception of these vulnerabilities by policymakers and citizens; (iii) national programmes that support local initiatives; and (iv) the involvement of cities in transnational and national networks. For example, in the United States of America, subnational governments have considerable authority in the direction of formulating and implementing climate change policies independent of the federal government. Similarly, in South Africa, municipal governments such as Durban and Cape Town have the legal, professional and fiscal capacity to design and implement climate change policies and programmes. Meanwhile, the opposite holds in China, where subnational governments are meant to implement the policy target set by the central government (Engel, 2005; Qi *et al.*, 2008; Ziervogel *et al.*, 2014).

In Nigeria, environmental protection issues are in the concurrent legislative list of the constitution, which gives both the central and subnational governments the constitutional authority to legislate on environmental protection and climate change issues within their jurisdiction. However, when there is a clash between national and subnational law, the former will prevail.<sup>39</sup> This is very common within a federal arrangement. On the African continent, South Africa is a typical example, where both the central and provincial governments have the constitutional power to legislate on environmental protection (Roberts, 2010; Rogerson, 2016).

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<sup>39</sup> See Part ii, Second Schedule of the 1999 Constitutional of the Federal Republic of Nigeria

Given the results presented and analysed in the previous chapter, it becomes an indisputable fact that the level of vulnerability of Lagos State to the adverse effects of climate change is high. Furthermore, the chapter revealed that international and national climate policies had not responded effectively to mitigate the threats constituted by climate change. Inadequate institutional framework and governance mechanism to address Lagos State peculiarities by Nigeria's federal government necessitates the Lagos State government's involvement in climate change governance. For instance, on the question about what drives the state government's participation in climate governance, a government official affirmed that:

*Lagos is a city that is bounded by water. The city is bounded by one hundred and eighty kilometres stretch of coastline, with low topography. The water bodies in Lagos are more than the land space. We are concerned about how we can save our state. There are several scientific predictions that by 2050 the entire city will be inundated by water. It is only a foolish man that will hear that an end is coming to him, and he will persist in his ways.*<sup>40</sup>

These predictions and the current realities informed the state government to institutionalise climate change and situate it under the ministry of environment to take active climate mitigation and adaptation measures. The data revealed that responses of the Lagos State government could be categorised under three major headings. One, institutional responses that involve establishing institutions and agencies for regulating issues relating to the environment and climate change in the state. Two, the establishment of climate mitigation and adaptation policies to strengthen the city's adaptive capacity to climate change impacts. Three, developing innovative mitigation and adaptation measures to achieve the state's climate mitigation and adaptation policy goals. Each of these categories is discussed below.

### **6.2.1. Institutional measures to climate change governance in Lagos State**

In the international and national governance domain, institutions perform a noteworthy role in the area of climate governance (Hare *et al.*, 2010; Dimitrov, 2013). Institutions such as the UNFCCC and IPCC are responsible for coordinating nation-states actions on climate change at the international

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<sup>40</sup> An interview with an official of the Special Climate Change Unit

stage. At the same time, national institutions such as the Ministry of Environment set the tone for climate actions and policies at the national stage.<sup>41</sup> At the subnational level, the data discovered four key institutions in Lagos State that are responsible for environmental protection, climate-related regulations and sanction of any community members that flout the stated rules. This is referred to as a traditional method of climate governance, in which subnational government utilises its power of sanction and control to establish the regulatory institution and framework for climate governance (Bulkeley and Kern, 2006). The institutions and agencies of government that are saddled with the development of climate protection and environmental policy in the Lagos State include the Lagos State Ministry of Environment, the Special Climate Change Unit, Lagos Environmental Protection Agency, and Lagos State Waste Management Authority.

#### **6.2.1.1. The Lagos State Ministry of Environment**

The Lagos State Ministry of Environment was created in 1979 by the first Executive Governor of the state, Alhaji Lateef Jakande. The central objective of the ministry is to foster a clean, hygienic, flood-free, and sustainable environment by the use of the most excellent environmental management. Different units and departments were established by the ministry to ease the handling of specific environmental issues. The ministry supervises the activities of other environmental protection agencies outside the ministry, such as the Lagos State Environmental Protection Agency (LASEPA), Lagos State Waste Management Authority (LAWMA), Lagos State Parks and Garden Agency (LASPARK), among others. The responsibilities of the ministry as it relates to climate change include the following:

- Formulation of policy on air pollution;
- Setting standards on industrial wastes;
- Cleaning and maintenance of public drainages;
- Treatment of wastewater for industries;
- Evaluation of Audit Report (EAR) and Environmental Impact Assessment (EIA) for all intending industrial facilities in the state; and
- Maintenance and control of public parks and gardens.

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<sup>41</sup>The Federal Ministry of Environment is the major national institution in Nigeria that coordinates environmental and climate change issues.

The establishment of the Ministry of Environment by Lagos State to oversee environmental and climate change issues, as revealed in the study, is not peculiar to Lagos State only. All the subnational governments in Nigeria have a ministry of the environment with similar responsibilities as that of Lagos State. The rationale for this is that all subnational governments in Nigeria are expected to establish a government ministry to coordinate government actions on issue areas where both the national and subnational governments have the constitutional power to legislate. However, unlike other ministries of the environment by subnational governments in Nigeria, the Lagos State Ministry of Environment in partnership with other stakeholders, is the first to develop a comprehensive climate change policy, namely: the Lagos State Climate Change Adaptation Strategy (LAS-CCAS) in 2011 and the Lagos State Climate Change Policy (LAS-CCP) in 2014 (FME, 2014).

Furthermore, to achieve its commitment to ensuring that the Lagos State government delivers on its commitment to undertaking a robust climate action, the ministry established a Special Climate Change Unit in 2011 to coordinate climate change affairs for the state. The establishment of a Special Climate Change Unit makes the state the first to have such a specialised institution in charge of climate change issues at a subnational level in Nigeria. The Special Climate Change Unit is discussed in the next section.

#### **6.2.1.2. The Special Climate Change Unit**

Lagos State is the first sub-national government in Nigeria to establish a Special Climate Change Unit (FME, 2014). The Unit is housed within the state's Ministry of Environment. According to a government official:

*The Unit is saddled with the responsibility of coordinating the affairs of climate change for the state government. We look at climate science such as emission inventory, and we relate vertically and horizontally with the federal government, community leaders, local NGOs, and international organisation to establish the best protocol for climate change issues in Lagos.*<sup>42</sup>

The Special Climate Change unit can be described as an innovative institutional measure to climate governance by the Lagos State government. This is for the reason that unlike other subnational

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<sup>42</sup>Interview with the director of the department of climate change

governments in Nigeria that do not have such institutional measure to tackle climate change challenges, Lagos State is setting the pace for others to follow in the country.

**The responsibilities of the Unit include the following:**

- Formulation of climate change policies;
- Representative of Lagos State government in both local and international climate change conferences;
- Management and execution of donor assisted climate change projects;
- Development of guidelines on ecological issues; and
- Liaison with the federal government and government parastatals on climate change issues.

As a way of achieving the above objectives, the unit performs a pertinent role in the development of the Lagos State Climate Change Adaptation Strategy (LAS-CCAS) and the Lagos State Climate Change Policy (LAS-CCP) in 2014. The two policies constitute the first subnational climate change policies in Nigeria (FME, 2015). The unit is also responsible for implementing the policies through stakeholder engagements and development of programmes that will strengthen the adaptive capacity of the state to climate change and reduce the state carbon footprint. Some of these programmes and their effects on climate mitigation and adaptation are discussed in the latter section of this chapter. Another climate change institution is the Lagos State Environmental Protection Agency (LASEPA).

**6.2.1.3. Lagos State Environmental Protection Agency (LASEPA): Setting the environmental standard for the people**

Historically, LASEPA was the first environmental management body in Nigeria (FME, 2013). In the 1960s, when Lagos State was the capital city of Nigeria, the need to manage cocoa waste arose, and it resulted in the founding of a pollution control unit within the federal ministry of works. The pollution control unit metamorphosed into a pollution control department and after the relocation of the capital city of Nigeria to Abuja, the department was named Lagos State Environmental Protection Agency in 1991. At the inception of LASEPA, the major challenges for the environment were pollution arising from industries' activities and in the port. The agency is in charge of the wellbeing of Lagosians with regards to environmental management and protection. In the words of a participant:

*At LASEPA, we draft policies, programmes, and plans towards achieving the Ministry of Environment's mandate in terms of environmental protection. We provide guidelines for the government to ensure they follow international best practices in ensuring that Lagos is clean and healthy for the inhabitants.*<sup>43</sup>

The purview of LASEPA is the management of liquid and gaseous wastes. This is done through several regulations that companies operating in the state must adhere to by ensuring that the waste they generate does not harm the environment. For instance, before any industry is permitted to operate, an Environmental Impact Assessment (EIA)<sup>44</sup>, Environmental Audit Report (EAR)<sup>45</sup> and Environmental Management Plan (EMP)<sup>46</sup> must be done and submitted to LASEPA for verification and assessment. EMP is a tool to ensure a cleaner and safer environment. LASEPA also has a Carbon Desk, which is a globally accepted tool for emission reduction. Some of the regulations of LASEPA include the following:

- **Ban the use of Plastic Bags**

Globally, plastic bags pose a major threat to the environment. In accordance with the Earth Policy Institute, almost a trillion plastic bags are utilised all over the globe yearly (EPI, 2014). The problem with plastic bags is that they cannot biodegrade, and it poses a threat to animals and human beings. Hence, countries need to take the drastic step of banning it while others place taxes on it. Some of Africa's countries that have either prohibit it or impose taxes on polythene bags include Kenya, Mali, Morocco, South Africa, and Tanzania (Grover *et al.*, 2015). However, Nigeria has neither banned it nor placed heavy taxes on it, but Lagos State, in its drive for climate action, has banned the use of polythene plastic bags in government office premises. The rationale for this ban is because of the threat it poses to the environment. It blocks drainage channels, and it is not degradable. More so, the Lagos State government has commenced the process to ensure a statewide ban by sending the law to the state's House of Assembly. However, despite the ban in government

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<sup>43</sup> Interview with an official of Lagos State Environmental Protection Agency.

<sup>44</sup> Environmental Impact Assessment involves the process of evaluating the possible impacts of a project on the environment.

<sup>45</sup> Environmental Audit Report is the report that shows the level of compliance of a project with existing standards and regulations

<sup>46</sup> Environmental Management Plan describes the likely impacts of a project on the environment and states how such impacts will be reduced, managed, or avoided.

offices, the level of compliance is still very poor, and plastic bags still constitute a significant threat to Lagos State's environment (Adeniran *et al.*, 2017).

- **Prohibition of hazardous wastes from Vehicles, Plants and Equipment and discharge of untreated wastes by industries and companies**

LASEPA has several regulations on emissions from plants and equipment. These include plants that are not well serviced or are outdated, they often generate much emission that pollutes the environment, and a specific section of LASEPA law prohibits such. Section 182 (1) states that:

*All emissions from Vehicles, plants, and equipment, including generating plants in residential, commercial, and industrial areas within the state, shall meet the agency's air emission standard and that a person who sites or maintain any plants and equipment including electricity generating plant and other plants with an emission level above agreed emission standard subject to the provision provided by these regulations shall be punished.* (LASEPA, 2017).

Furthermore, LASEPA monitors all industries in the state by ensuring that they treat their waste before discharging it to the environment. The 2017 Environmental Management and Protection Law empowers the agency to do it. Part 185 (b) of the law prohibits the discharge of untreated liquid waste to the environment. According to an official of the agency, she stated that:

*We do examine the toxic level of company waste to assess the impacts of such waste on the environment. When we go out to monitor industries and collect the sample, we do collect wastewater, and we do air and noise assessment and the toxic level of sludge; once the toxic level content of the waste is above the prescribed level, such will not be allowed to be discharged.*<sup>47</sup>

Part 186 of the law states that “A person shall not discharge into the environment untreated waste or chemical substances listed in any federal or state laws”.<sup>48</sup> It is an offence to discharge into the atmosphere any injurious gases. It is an offence to release any inadequate filter and purified gaseous waste containing hazardous substances that are harmful and injurious to the environment. If not properly disposed of and managed, hazardous waste significantly affects the environment by

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<sup>47</sup> Interview with an official of Lagos State Environmental Protection Agency

<sup>48</sup> Lagos State Environmental Protection Agency 2017 Regulations

contaminating underground water, which will have severe impacts on human health. Hazardous materials also release a substantial portion of CO<sub>2</sub> into the atmosphere. The activities of LASEPA have reduced the carbon footprints of Lagos State because most industries in the state comply with the stated regulations, those that failed to comply are sanctioned (see Olugbuyiro, 2011; Awoyemi *et al.*, 2014). Another regulatory agency belonging to the state government is Lagos State Waste Management Authority (LAWMA) which is discussed in the next section.

#### **6.2.1.4. Lagos State Waste Management Authority**

Solid waste is one of the significant contributors to greenhouse gases, hence the need for an agency to regulate and manage waste. For example, emissions from solid waste make up 3 percent of the total worldwide emission in 2018 (Maalouf and El-Fadel, 2019). Waste management is also a part of emissions generating sectors that subnational government have significant power and control (Bulkeley, 2011). Given the rate at which waste is being generated in Lagos State and the need for effective waste management, LAWMA was established to regulate and manage solid waste. At its establishment in 1977, it was previously called Lagos State Refuse Disposal Board (LSRDB). The inability of the two local governments of Lagos Mainland and Lagos Island to cope with the volume of waste from immigrants from different parts of the country into the oil boom economy necessitated its establishment (LSG, 2012). At the time of its creation, the agency's primary responsibility was to manage waste collection and disposal within the state. On 13th March 1989, its name was officially called Lagos State Waste Disposal Board (LSWDB), with added tasks of cleaning and maintenance of drainage in the city. In 1991, the agency was named Lagos State Waste Management Authority through Edict No 55, which gave the agency the responsibilities to collect, transport and dispose of industrial and municipal waste and also provide waste services on a commercial scale to the state government. The agency was 2007 renamed Lagos State Waste Management Authority through LAWMA Law No. 5, cap. 27 of 2007. The authority was restructured in the waste management sector from an operator into a full regulator.<sup>49</sup>

Climate governance experts have categorised the above institutional measures for climate governance as governing by regulations, which uses traditional forms of authority, such as establishing institutions and agencies that regulate, sanction and control environmental issues in

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<sup>49</sup>Interview with an official of Lagos State Waste Management Authority

the state. (Bulkeley and Betsill, 2003; Kern *et al.*, 2005; Bulkeley and Kern, 2006;). Several studies have identified the lack of effective institutional frameworks as a major cause of ineffective climate mitigation and adaptation (Lebel *et al.*, 2011; Raymond and Robinson, 2013; Mandryk *et al.*, 2015). Failure of government institutions in responding to changing ecological, social and biophysical contexts intensifies vulnerability (Adger, 2006). For instance, the 81 studies review by Biersbroek *et al.* (2013) identified a lack of regulatory institutions as a major barrier to adaptation. Invariably, strong institutions are essential for robust climate mitigation and adaptation goals.

The fact that Lagos State is the only subnational government in Nigeria with four distinctive institutions on climate change shows the state's preparedness and commitment towards the implementation of necessary climate change adaptation and mitigation measures. This is because the establishment of institutions is important in developing and implementing robust climate actions (Gollier and Tirole, 2015).

## **6.2.2. Policy responses of Lagos State government to climate change**

One of the ways subnational governments around the globe have participated in climate governance is through the development of policies on climate change directing and dictating the steps taken on climate change at their level of governance (Reckien *et al.*, 2018). The Lagos State Ministry of Environment and the Special Climate Unit, in partnership with other stakeholders, developed two policies on climate change which are the Lagos State Climate Change Adaptation Strategy (LAS-CCAS) and the Lagos State Climate Change Policy (LAS- CCP).

### **6.2.2.1. Lagos State Climate Change Adaptation Strategy**

The vulnerability of Lagos State to the adverse climate change impacts is extraordinary (see chapter five). According to IPCC, vulnerability is explained as the extent to which people are prone to and incapable of coping with the adverse impacts of climate change (IPCC, 2014). There is a seeming consensus among climate governance experts that developing countries are more prone to climate change when compared with developed ones, hence the need for ambitious adaptation goals (Adger *et al.*, 2009; Toulmin., 2009). In partnership with the Building Nigeria Response to Climate Change project (BRNCC), the Lagos State government developed the Lagos State Climate Change Adaptation Strategy (LAS-CCAS) 2011, saddled with the responsibility of detailing the adaptation measures and strategies that will enhance the state's adaptive capacities and resilience on the adverse

effects of climate. The central objective of the plan is to establish and put into robust operation measures that will enhance people's adaptive ability to the negative impacts of climate change. This will be achieved by mainstreaming adaptation issues into the processes of development planning (see LAS- CCAS, 2011). The policies aim to: (i.) reduce vulnerability by building social, economic, and environmental resilience. (ii) conduct a periodic vulnerability assessment and (iii) impact monitoring on crucial sectors of the economy by reducing over-dependence on climate-sensitive sectors by promoting diversification of the economy. The policy objectives will be achieved through the following:

- Providing support for the establishment and implementation of adaptation strategies and plans;
- Developing resources for mobilisation plan and implementation of adaptation strategies and plan of actions;
- Collaborating with the federal government to implement strategies recognised in Nigeria's National Communication to the UNFCCC;
- Provision of an enabling and conducive institutional and legal framework to advance climate adaptation; and
- Mainstreaming climate change adaptation into development planning in key sectors of the economy.

For effective implementation of the adaptation strategies, the government has specific measures for each sector of the economy, which is shown in Table 6.1.

**Table 6.1: Adaptation measures by sectors in Lagos State, Nigeria**

| Key sector of the economy           | Climate Adaptation Measures   |
|-------------------------------------|---|
| Water                               | <p>Protection of water resources from pollution through institutional and legal instruments.</p> <p>Promoting sustainable use of groundwater resources through the creation of cofferdams, artificial recharge of aquifers and regulation of abstraction of water resources.</p> <p>Develop legal measures to discourage wastage of water and illegal tapping.</p> <p>Distribution of water-efficient technologies.</p> <p>Investment in water storage facilities such as dams, man-made for reservation of water for use during dry seasons.</p> <p>Enhance water security through the protection of watersheds.</p> <p>(Improve water resource conservation and sustainable and efficient water resources exploitation and use).</p>  |
| Wetlands and Fresh Water Ecosystems | <p>Promoting sustainable use and management of wetlands to the advantage of the present and upcoming generations.</p> <p>Implement a classified inventory of the state wetlands and refine management and conservation needs as a way of enhancing quantity and quality of information on wetland ecosystems in the state.</p> <p>Protection of wetlands by constructing defences such as dykes and barriers.</p> <p>Increase awareness campaign on the worth and significance of wetlands in erosion, sediment and flood control, climate stability, pollution abatement, fisheries and food production.</p> <p>Survey wetlands to know those that will need the construction of barriers and dykes, which will serve as artificial protection against the impacts of rising sea level.</p> <p>Establishment of wetland conservation committees which will involve key stakeholders such as community based association, women and youths.</p> <p>Undertake research to understand the effect of low precipitation, excessive rainfall and drought on wetlands.</p> <p>Restoration of degraded wetlands</p> <p>(Sea level rise would inundate most parts of Lagos and turn wetlands to open waters).</p> |
| Coastal Zones and Marine Ecosystems | <p>To make better the adaptive ability of the marine and coastal ecosystems to the effects of climate change.</p> <p>To educate community members on the danger of living in valley areas and provide incentives for relocation to safer locations.</p> <p>Establishment of storm and flood warning system including a GIS-based flood and storm simulation system.</p> <p>Promote research to recognise cost-effective protection of shoreline technologies.</p> <p>Promote Integrated Coastal Zone Management in coastal communities.</p> <p>Provision of climate-proof infrastructure against the potential effects of floods.</p> <p>Creation of sea walls at vulnerable points to minimise the effects of storm surges and rise in sea-level.</p>  |

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|                                     |   |
|-------------------------------------|---|
| Agriculture and Food Security       | <p>To improve food security through enhanced agricultural productivity, food storage and food distribution networks.</p> <p>Promote research on the potential impacts of flooding on agriculture to inform the creation of abatement measures such as the construction of culverts, bridges and drainage infrastructure.</p> <p>Support the use of suitable technologies such as culverts, bridges and drainage for flood reduction.</p> <p>Promote research and development and the distribution of salt and water-tolerant crops.</p> <p>Promote heat and drought tolerant and fast-maturing crops in areas with low rainfall.</p> <p>Strengthening of early warning system for farmers.</p> <p>Promote integrated farming, especially the use of cover crops such as melon, groundnuts, potatoes and cowpeas, to protect against soil erosion.</p> <p>Support insurance scheme for practicing farmers to cushion the impacts of losses from climate change impacts</p> <p>Promote agriculture extension services as a way of passing important information to farmers on how they can cope with climate change.</p> <p>Support agro-processing and food storage capacity.</p> <p>Promote crop diversification as an adaptive and resiliency strategy.</p>  |
| Land Use, Forestry and Biodiversity | <p>Promote the conservation and suitable use of forest and other natural resources as part of ecosystem-based adaptation.</p> <p>Encourage afforestation programmes by distributing fast-maturing tree and conservation of forested areas.</p> <p>Support the establishment of timber plantations and sustainable timber production.</p> <p>Promote alternative sources of energy to minimise the reliance on biomass for energy in both rural as well as urban locations.</p> <p>Enforcement of laws on forest conservation.</p> <p>Support collaborative management of forest.</p> <p>Execute pest control and forest fire control measures.</p> <p>Creating awareness on the importance of forest among community members.</p> <p>Human Settlements and Economic Infrastructure.</p> <p>Mainstreaming of climate change into the structuring and planning of development of infrastructure.</p> <p>Ensure compliance with the principles of planning and building standards to reduce the susceptibility to climate change.</p> <p>Establish and support climate change proofed infrastructural codes and standards.</p> <p>Promoting the integration of potential risk of climate change into housing development policies.</p> <p>Raise awareness among engineers and architects on the need to put climate change into consideration in their profession.</p> |
| Human Health                        | <p>To ease the susceptibility of the people to climate-related diseases and enhance the health sector capacity to respond to climate-induced diseases.</p>  |

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|--------------------------|---|
|                          | <p>Provide health equipment, facilities and medicine to assist in early discovery and treatment of climate-induced diseases.</p> <p>Provide healthcare services to vulnerable groups such as women, children and old people. Development of early warning systems and emergency health measures for climate-induced diseases.</p> <p>Build the capacity of health practitioners to respond effectively to climate change-induced diseases.</p>  |
| Disaster Risk Management | <p>To minimise the vulnerability of socio-economic of the state to climate risk by utilising disaster risk reduction (DRR) as a mechanism for adapting to climate change.</p> <p>Develop and implement climate-related disaster risk lessening as a mechanism for adaptation.</p> <p>Support community-based adaptation and community-based approach to disaster risk lessening.</p> <p>Ensure disaster risk vigilance and post-disaster resurgence to lessen climate change impacts.</p> <p>Support the implementation of the Africa regional DRR strategy.</p> <p>Support climate risk monitoring and assessment through hazard and risk mapping and vulnerability assessment in climate-sensitive sectors.</p> <p>Prioritise the needs of prone groups like females, children and the aged during emergencies.</p> |

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**Source: Lagos State Climate Change Adaptation Strategy, 2011.**

Table 6.1 shows the strategies for adapting to climate change for the key sectors of the economy that are prone to the impacts of climate change in the state. If the above measures are effectively implemented, it will strengthen the economy's adaptive capacity to climate change impacts and reduce the susceptibility of the state to climate change shock. This is because climate change policy has shifted from concentrating on adaptation responses to the strengthening of adaptive ability, which is the capability and potential of a sector to change to a more desirable state when confronted by climate change impacts (Brooks and Adger, 2004). The shift becomes important because strong adaptive capacity allows the flexibility required to respond to the uncertainties of climate change (Ziervogel and Taylor, 2008).

Lagos State government's approach to adaptation, as pointed out in the Climate Change Adaptation Strategy, is anticipatory by putting specific measures in place to take into account the adverse impacts of climate change (see Smit and Wandel, 2006). Anticipatory adaptation is always viewed as the sole responsibility of the government acting on behalf of the people by preparing for possible climate change impacts (Adger *et al.*, 2003). However, despite the ambitious sectoral adaptation measures by the Lagos State government, implementation remains a daunting task due to the inadequate financial and technological capacity of the state. The response from the interview supports this position. An official of the Special Climate Change Unit on the barriers for climate adaptation in the state affirms that:

*Funding is a major challenge for the effectiveness of this unit, the budgetary allocation to the ministry of environment has drastically reduced in the past years due to the drop in the global oil market which has affected the economy of the state.*<sup>50</sup>

This finding corroborates Schipper and Pelling (2006), which identify the high level of poverty, low level of economic development, limited financial capacity as major impediments to strong adaptive capacity to climate change in Africa. Hence, technology and adequate finances are crucial to building and strengthening the adaptive capacity to climate change (Adenle *et al.*, 2017).

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<sup>50</sup>Interview with an official of the Lagos State Special Climate Change Unit

### 6.2.2.2. Lagos State Climate Change Policy

To broaden the scope of the Lagos State Adaptation Strategy 2011 to include the new realities of the state regarding climate change mitigation and adaptation issues, the Lagos State government developed a new policy document named the Lagos State Climate Change Policy in 2014. The policy allows the state to have a planned approach to climate mitigation and respond effectively to climate change impacts and benefits from international climate governance instruments such as NAMA, CDM, and REDD+. The LAS-CCP represents the commitment of the Lagos State government to addressing climate mitigation and adaptation. According to an official of the Ministry of Environment “*the policy is guided by the precepts of an international agreement as reflected in the Kyoto Protocol, Cancun Agreement, Durban Agreement and Bali Plan of Action*”.<sup>51</sup> The Special Climate Change Unit within the state’s Ministry of Environment is responsible for coordinating and implementing the policy to enhance synergies and reduce duplication of governance measures. The Unit works with relevant state and national agencies, institutions, and department established for the execution of the policy. The Special Climate Change Unit develops plans and strategies that promote the state’s climate mitigation and adaptation commitment. The objectives of the policy include the following:

- To establish a climate change governance framework to coordinate and harmonise climate change initiatives and activities at the local level;
- To identify key adaptation and mitigation action areas and the state and non-state actors’ roles in addressing climate change;
- To enhance capacity building through research and development, education and training, public awareness, information and knowledge sharing, and technological transfer;
- To strengthen climate change observations and research through model prediction, attribution and monitoring detection to enhance preparedness to climate change impacts;
- To promote the mainstreaming of climate change into the development planning processes; and
- To mobilise resources for the implementation of climate change activities and initiatives.

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<sup>51</sup> Interview with an official of the state ministry of environment

The new policy takes into cognisance the national mitigation objectives of the federal government, and the policy aims to consolidate and ensure the achievement of national goals. Nationally, the policy is in accordance with the National Communications (NCs), which Parties use to communicate their commitments implementation status such as the emission inventories, potential mitigation action, removal of carbon sinks to the UNFCCC. The policy complements the various international agreements on the environment and natural resources. In particular, the policy aims to achieve the mitigation and adaptation goals under the UNFCCC, Kyoto Protocol, Cancun, Durban and Paris Agreements. The policy is being reviewed every three years to allow for emerging climate change problems at international, regional, national and local levels. The major issue affecting the implementation of the new policy is inadequate funding. For example, Table 6.2 shows the budgetary allocation for the Ministry of the Environment between 2011 and 2019.

**Table 6.2: Budgetary Allocation for Environmental Protection in Lagos State (2011-2020)**

| S/N | Year | Total Budgetary Allocation | Budgetary Allocation for Environmental Protection<br>(in Billion) | Percentage |
|-----|------|----------------------------|---|------------|
| 1.  | 2011 | N450.775 billion           | N36.390   | 8.2%       |
| 2.  | 2012 | N491.941 billion           | N44.227   | 9.1%       |
| 3.  | 2013 | N507.105 billion           | N44.131   | 8.87%      |
| 4.  | 2014 | N489.690 billion           | N39.727   | 8.11%      |
| 5.  | 2015 | N489.690 billion           | N34.953   | 7.1%       |
| 6.  | 2016 | N662.587 billion           | N53.043   | 8.01%      |
| 7.  | 2017 | N812.998 billion           | N56.569   | 6.96%      |
| 8.  | 2018 | N1.046.118 trillion        | N54.542   | 5.22%      |
| 9.  | 2019 | N873.532 billion           | N48.252   | 5.52%      |
| 10  | 2020 | N1.168.56 trillion         | N66.54  | 5.69%      |

**Source: Compiled by the Author, see: Lagos State Ministry of Economic Planning and Budget, (2020).**

Table 6.2 shows a downward reduction in the budgetary allocation for environmental protection in the state between 2015-2020. This shows that the commitment to financing climate mitigation and adaptation through the establishment of agencies are not financially supported. This is critical in ensuring the agencies achieve their stated goal. Little wonder, a government official that participated in the interview stated that *“One of our major challenges is funding; the agency lacks the adequate budgetary provision to performs its responsibilities in ensuring a safe and clean environment”*.<sup>52</sup> Any policy document without the necessary financial provision to ensure implementation is doomed to fail. Hence, the Lagos State government needs to commit more financial resources to the implementation of climate change policy. The state can take a clue form South Africa in which provincial governments of Kwazulu-Natal and Western Cape increased their budgetary allocation to environmental protection between 2005 and 2010 (Roberts, 2010; Taylor, 2016).

Apart from the above policy approaches to climate change governance by the Lagos State, the data revealed some innovative climate mitigation and adaptation measures. These measures are developed by different government agencies and institutions responsible for climate governance.<sup>53</sup>

### **6.2.3. Innovative climate change mitigation measures by Lagos State government**

The Paris Agreement emphasised the need for countries to determine Intended National Determined Contribution, which is to be submitted to the UNFCCC, unlike the Kyoto Protocol, which did not place any mitigation obligation on developing countries. Subnational countries in developing counties are implementing some mitigation actions through the Nationally Appropriate Mitigation Action (NAMA). Bali Action Plan defines NAMA as mitigation activities that are voluntarily carried out by developing states and are supported technologically and financially by developed countries. This definition applies to mitigation activities funded through external support. There are also NAMA initiatives supported through domestic funds. The general mitigation objective of Lagos State is to implement projects that will support global efforts on climate mitigation and contribute towards sustainable development. Other mitigation objectives include the following:

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<sup>52</sup>Interview with an official of Lagos State Environmental Protection Agency

<sup>53</sup>The institutions are: Lagos State Ministry of Environment, Special Climate Change Unit, Lagos State Environmental Protection Agency and the Lagos State Waste Management Authority.

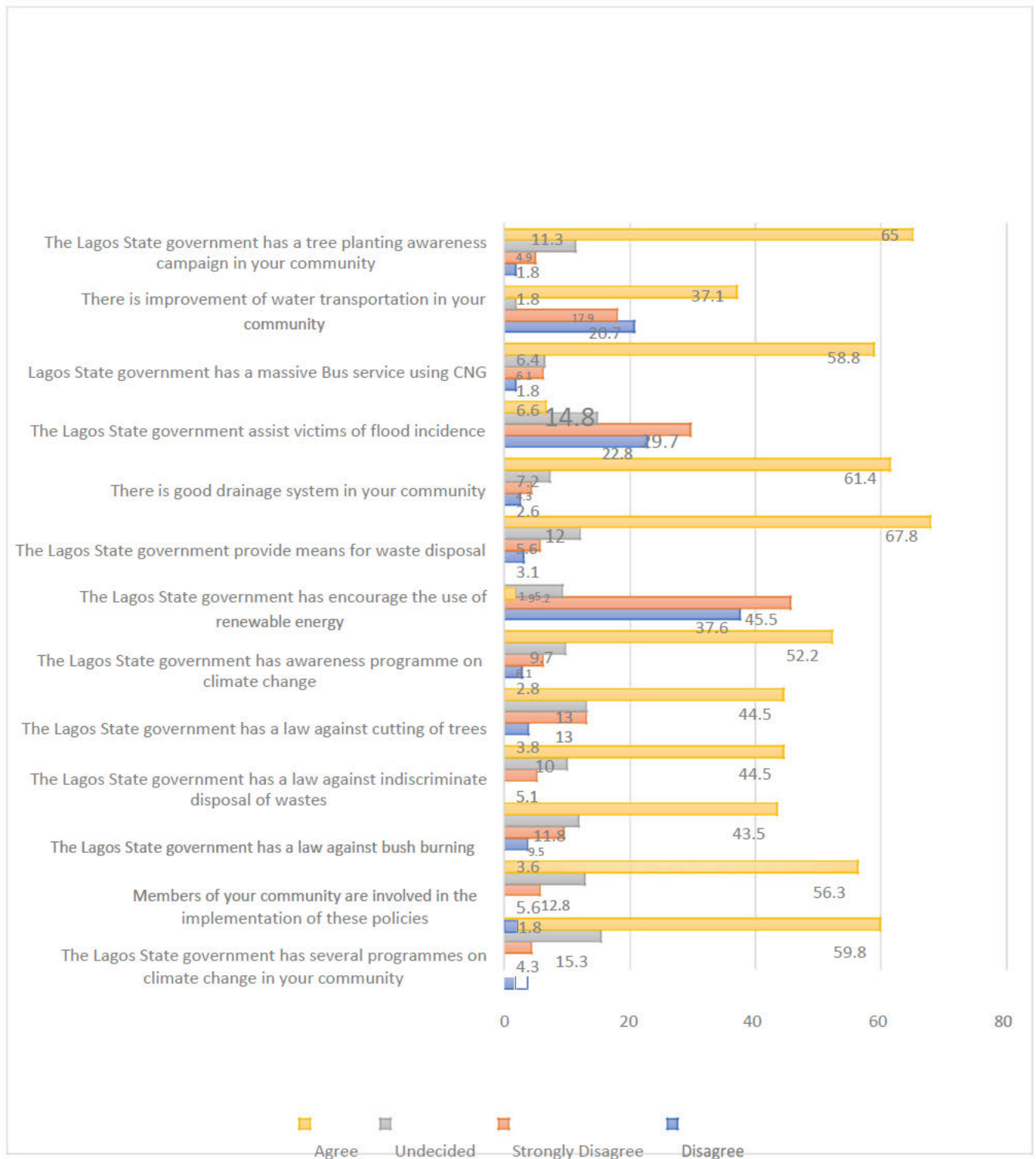
- Implement and develop mitigation strategies one of which is the Nationally Appropriate Mitigation Actions (NAMAs) that can draw technological support and international finance;
- Organise international support for the implementation of mitigation actions;
- Establish low and new air pollution standards for transportation and industrial sectors, and the creation of a regulatory structure to support the execution of the standards; and
- Establish programmes for capacity development of technological acquisition that will support mitigation actions.

To achieve the above objectives, the state government has several climate mitigation programs and strategies which are discussed below. Table 6.3 and Fig. 6.1 show the respondents' responses to the roles played by the Lagos State government on climate change.

**Table 6.3: Responses on Role played by Lagos State Government on Climate Mitigation and Adaptation**

| S/N | Response  | Disagree  |         | Strongly Disagree |         | Undecided |         | Agree     |         | Strongly Agree |         | Total     |         |
|-----|---|-----------|---------|-------------------|---------|-----------|---------|-----------|---------|----------------|---------|-----------|---------|
|     |   | Frequency | Percent | Frequency         | Percent | Frequency | Percent | Frequency | Percent | Frequency      | Percent | Frequency | Percent |
| 18  | The Lagos State government has several programmes on climate change in your community | 6         | 1.5     | 17                | 4.3     | 60        | 15.3    | 234       | 59.8    | 74             | 18.9    | 391       | 100     |
| 19  | Members of your community are involved in the implementation of these policies        | 7         | 1.8     | 22                | 5.6     | 50        | 12.8    | 220       | 56.3    | 92             | 23.5    | 391       | 100     |
| 20  | The Lagos State government has a law against bush burning                             | 14        | 3.6     | 37                | 9.5     | 46        | 11.8    | 170       | 43.5    | 124            | 31.7    | 391       | 100     |
| 21  | The Lagos State government has a law against indiscriminate disposal of wastes        | 7         | 1.8     | 20                | 5.1     | 39        | 10      | 174       | 44.5    | 151            | 38.6    | 391       | 100     |
| 22  | The Lagos State government has a law against cutting of trees                         | 15        | 3.8     | 47                | 13      | 51        | 13      | 174       | 44.5    | 104            | 26.6    | 391       | 100     |
| 23  | The Lagos State government has awareness programme on climate change                  | 11        | 2.8     | 24                | 6.1     | 38        | 9.7     | 204       | 52.2    | 114            | 29.2    | 391       | 100     |
| 24  | The Lagos State government encourages the use of renewable energy                     | 147       | 37.6    | 178               | 46      | 36        | 9.2     | 6         | 1.5     | 24             | 6.1     | 391       | 100     |
| 25  | The Lagos State government provides means for waste disposal                          | 12        | 3.1     | 22                | 5.6     | 47        | 12      | 265       | 67.8    | 45             | 11.5    | 391       | 100     |
| 26  | There is good drainage system in your community                                       | 10        | 2.6     | 17                | 4.3     | 28        | 7.2     | 240       | 61.4    | 96             | 24.6    | 391       | 100     |
| 27  | The Lagos State government assists victims of flood incidence                         | 89        | 22.8    | 116               | 30      | 58        | 14.8    | 26        | 6.6     | 102            | 26.1    | 391       | 100     |
| 28  | Lagos State government has a massive Bus service using CNG                            | 7         | 1.8     | 24                | 6.1     | 25        | 6.4     | 230       | 58.8    | 105            | 26.9    | 391       | 100     |
| 29  | There is improvement of water transportation in your community                        | 81        | 20.7    | 70                | 18      | 7         | 1.8     | 145       | 37.1    | 88             | 22.5    | 391       | 100     |
| 30  | The Lagos State government has a tree planting awareness campaign in your community   | 7         | 1.8     | 19                | 4.9     | 44        | 11.3    | 254       | 65      | 67             | 17.1    | 391       | 100     |

**Source: Field Survey, 2019**



**Fig. 6.1: Roles of Lagos State Government on Climate Mitigation and Adaptation**

**Source: Field Survey, 2019.**

### **6.2.3.1. Reduce emission through transportation**

One of the sectors that generate a high rate of emission is the transportation sector because transportation equipment is fossil fuel-based which is a significant source of GHGs (Van Fan *et al.*, 2018). Globally, the transportation sector is responsible for 13 percent GHGs and 23 percent of energy-related CO<sub>2</sub> emissions (Emodi *et al.*, 2017). Lagos' transportation sector accounts for a 50 percent share of the total emissions from the transportation sector in Nigeria (LAMATA, 2016). As stated by the Lagos State Bureau of Statistics (2018), 1.6 million vehicles run Lagos road daily, while 226 cars ply the road per km compared to the national average of 16 cars per km. Meanwhile, most of these vehicles are old and do not meet the national standards of roadworthiness. For instance, some of the city's buses are close to 50 years old. According to a World Bank Report, most of the cars imported into Nigeria have exceeded their economic life, making most cars in the country old and with high emissions (World Bank 2013). The high level of urbanisation in Lagos State leads to high traffic volumes, resulting in a high vehicular emissions rate. The transportation sector's challenges include inadequate public transport facilities, an increase in the private cars, the majority of which are not roadworthy, congestion, and a lack of regulatory mechanism (Soyinka *et al.*, 2016). The Lagos Metropolitan Area Transport Authority (LAMATA) stated that the government is working to reduce emissions from the transportation section by 50 percent by 2030 through the Strategic Transport Master Plan (STMP) (LAMATA, 2015). The plan's objective is to have a modern sustainable multi-modal transport system that will make Lagos a green city. The strategic actions to implement the STMP include:

- The introduction of the mass transport scheme known as Bus Rapid Transit (BRT); the scheme aims to minimise the number of cars on the road and ensure low carbon modes of transportation;
- Investment in other modes of transportation such as the construction of Lagos Badagry light rail and the inland water transportation system's commencement with the boat using CNG;
- Mobilising and stimulating sufficient investment in knowledge, technology, innovation, and infrastructure in the transportation sector;
- Promote the importation of fuel-efficient means of transportation such as electric trains, plug-in hybrids;

- Encourage lifecycle assessment of biofuels (biodiesel, bio-ethanol and bio-butanol) to define their environmental gains and benefits;
- Promotion of non-motorised means of transportation such as bikeways, pedestrian walkways; and
- The expansion of pipeline for the transportation of liquid fuel across the state to reduce emissions associated with tankers.

On the implementation of the above measure, community members were told to state if they agree or disagree with the existence of some of these strategies in their communities. Table 6.3 showed the majority 58.8 percent agreed with the presence of mass transit Bus service using CNG (Gas) in Lagos State, followed by those who strongly agreed 26.9 percent, 6.4 percent reported being uncertain, 6.2 percent strongly disagreed, while 1.8 percent disagreed. This result implies that most of the respondents consisting of (85.7 percent) confirmed mass transit CNG-based buses in Lagos. This means that Lagos State is moving gradually from diesel to CNG. This is important for climate mitigation because the rate of CO<sub>2</sub> emission of a diesel-based bus is higher compared with CNG-based. However, the qualitative data revealed that the number of BRT buses available is still very few, and most of the people still rely on private cars as a major means of transportation in the state. This finding provides empirical support for the study of Madueke *et al.* (2020), which submit that Lagos State will not achieve the emission reduction by 50 percent by 2030 with the increasing number of ageing cars plying the road.

On water transportation, Table 6.3 showed the response of the respondents about the current state of water transportation in the city, 20.7 percent disagreed that there is an improvement in water transportation, 17.9 percent disagreed strongly, 1.7 percent were undecided, 37 percent agreed, and 22.5 percent agreed strongly. This result implies that most of the respondents, representing (59.5 percent), approved an improvement in Lagos State's water transportation. However, a significant number of respondents, representing (38.6 percent), believe that water transportation has not improved in the state. But, on a general level, the result indicates that the state is gradually prioritising the usage of water transportation, which is a significant step in reducing the number of vehicles on highways in the cities and a way of reducing the carbon footprint of the state. Also, to reduce vehicular emission in the state, the government established a vehicular emission testing unit responsible for testing vehicles' roadworthiness and issuing a certificate that such vehicle emission

rate is moderate.<sup>54</sup> The above measures in the transportation sector such as improving public transportation, light rail projects, and bikeways, are ways in which Scandinavian countries in Europe have reduced their carbon footprint (see Salvucci *et al.*, 2019). Sustainable urban means of transportation ensures energy efficiency, and it will ensure the reduction in energy consumption, congestions, and emissions.

### **6.2.3.2. Reduce emission through alternative energy**

Another prominent source of emissions is how human beings consume energy such as power, heating, and cooking. The mode of energy acquired determines the impacts of such on the environment. Conventionally, fossil fuel constitutes a major source of energy generation for most homes. Additionally, Lagos State is the economic hub of Nigeria and houses 70 percent of the country's industries; more so, most industries in Nigeria have their headquarter in Lagos. Hence, the production and consumption of energy for production lead to a high emission generation rate. The state generates the country's highest emissions, with 35 percent of the total share (see LAS-CCAS, 2011). More so, most of the informal sectors rely on power generator for electricity to run their businesses. To reduce the level of emission of power generation from energy consumption in industrial, manufacturing and household activities, the state government introduced the following measures:

- Ensure sustainable manufacturing and industrial sector that reduces greenhouse gas emissions and other environmental pollutants during the processes of production and delivery of products;
- Promote the recovery of water energy, which represents a huge amount of energy savings, and it offers opportunities for CDM;
- Support Best Available Technologies and Best Environmental Technologies such as moving from the use of petrol to natural gas;
- Promote energy security and the state's social-economic sustainability through the diversification of sources of energy and investment in alternative energy;
- Make the use of energy efficiency technology and renewable energy compulsory in government offices;

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<sup>54</sup>Lagos State Computerised Vehicle Inspection Service (LACVIS) was established in 2016 by introducing vehicle testing technologies and computerised inspection services.

- Promote the investment in renewable energy through the provision of fiscal incentives and other measures;
- Support and stimulate SMEs' sustainability and growth through investment in green technology and organic energy like wind power, biomass and solar, and provide access to market and financial opportunities; and
- Promote establishing an industrial park that will allow SMEs to be in the same location and draw their power from a central power generating system, rather than multiple uses of power generators.

The above measures aim to reduce the emission generation of industrial and manufacturing activities by promoting alternative energy adoption. However, Table 6.3 showed that 37.6 percent disagreed, 46 percent disagreed strongly with the assertion that the Lagos State government encourages the use of renewable energy, 9.2 percent were unsure, 1.5 percent concurred, and 6.1 percent agreed strongly. This result indicates that most of the respondents disapproved that the Lagos State government does encourage the use of renewable energy. The rationale for this contradictory result is that, while there are several programmes by the government to promote green energy, investment in green and renewable energy is low, and the utilisation of renewable energy is the non-affordability of the cost by most household. For example, the cost of acquiring a solar inverter panel is higher than getting a fuel-based power generator. Unlike the renewable energy drive of the city of Heidelberg, Germany, in 2001, in which the government invested EUR 330,000 in 25 percent renewable energy consumption in the municipality, investment in alternative energy sources is still at an elementary level in Lagos State, Nigeria. The qualitative data corroborated this result. A participant affirmed that: *“In this community, most of us rely on power generator for electricity because electricity supply is very poor and the cost of acquiring solar panel is too expensive”*.<sup>55</sup>

Based on this finding, it is safe to argue that the renewable energy drive by the Lagos State government is on paper without concrete action, and the investment in low carbon technology by the government is very poor. This result supports the study of Adepoju and Akinwale (2019), which

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<sup>55</sup> Interview with a community leader at Eti Osa local government

argue that micro and small-scale enterprises (MSEs) that account for a significant proportion of Lagos State businesses rely on power generator as a major source of power.

### **6.2.3.3. Reduce Emission through Waste Management**

Globally, emission from wastes accounts for three percent of total greenhouse gas emissions in 2019 (Campitelli and Schebek, 2020). Lagos State is a megacity that is cosmopolitan in nature; there are disparities in the waste generated daily, but it is safe to say that the city generates 13000 metric tons of waste per day.<sup>56</sup> Two aspects of waste management have a direct effect on climate change. One part is land-filling, which is very conspicuous in the generation of greenhouse gases; decomposition of wastes at land-fill and dumpsites releases GHGs like carbon dioxide, nitrous oxide and methane. Two, the movement of waste by trucks also generates emissions. For example, Lagos state waste trucks have about 800-1000 trips per day to keep the city clean.<sup>57</sup> More so, poor management of industrial wastes also results in the emission of carbon dioxide and methane. In Lagos State, strategies for waste management include:

- **Waste Minimisation Policy**

Given the enormous effect of waste on the environment in terms of pollution on soil and underground water resources, the state government, through LAWMA, is dedicated to enlightening as well as educating residents on the need for waste minimisation through the application of the 3Rs; reuse, reduce and recycle. This is being implemented through the following measures:

- The ban on the use of plastic bags in all government offices and parastatals across the state. The rationale is that plastics do not decompose easily and constitute a threat to the environment;
- Recyclables such as cans, plastic bottles, fabrics, cardboards, plastic nylon, electrical equipment and plastic bottles are collected from the land-fill sites for separation and sorting after which they are bailed and sent to companies which use it for production;
- Promote the use of efficient and cleaner production principles to minimise the generation of waste during production processes;

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<sup>56</sup> Interview with an officer of Lagos State Waste Management Authority

<sup>57</sup> Interview with an officer at the Lagos State Ministry of Environment

- Establish environmentally-friendly waste management equipment such as land-fills for better disposal of waste and incineration where there are no other solutions;
- Encourage the segregation and separation of waste at source to ease recycling; and
- Support the generation of organic fertiliser, bio-energy and by-products of organic wastes.

In addition to the above measures, the government also introduced several initiatives such as the introduction of Private Sector Participants (PSP), Cleaner Lagos Initiative and the Blue Box Initiative.

- **Private Sector Participants (PSP) and Waste Management in Lagos State**

Lagos State generates 13,000 tonnes of waste daily, which is three times higher than what the whole of Ghana generates daily (Ayantoyinbo and Adepoju, 2018). Solid waste management has since been recognised as an avenue for the government to ensure a clean city and contribute to climate action. Given the rate at which waste is being generated in Lagos State due to her rapid population growth and commercial activities in the city, the government of Mr. Babatunde Raji Fashola, the Executive Governor of the State (2007-2015), established the Private Sector Participants (PSP) for solid waste management. Historically, the state's waste management is done by a mix of informal workers such as waste pickers and scavengers and formalised enterprises contracted by the state government to collect waste and transport it to dumpsites. The government introduced PSP as a way of taking the burden of waste collection off the government. PSPs are small scale companies that comprise informal sector actors and mobilised by the government and reform into formal entities. LAWMA's role was to coordinate the activities of PSPs, management of dumpsites, and transfer loading stations. The collection of wastes by PSPs reduced the incidence of indiscriminate disposal of waste, which block drains and result in flooding during heavy rainfall.

While some scholars such as Anestina, Adetola, Odafe (2014), and Taiwo (2009) accede that PSPs was a turnaround for the waste management sector in Lagos State, others such as Ayantoyinbo and Adepoju (2018) differ. However, majority of the participants in the interview affirmed that PSPs performed creditably in the management of waste in the state, but the administration of a new Executive Governor suspended the PSP and introduced the Cleaner Lagos Initiative.

- **Cleaner Lagos Initiative**

The former Governor of Lagos State, Akinwumi Ambode<sup>58</sup>, on the assumption of office in 2015, felt discontented with PSPs' performance in managing waste in the state. The governor, while citing the need to mitigate climate change challenges from wastes, disbanded the PSPs and established through an executive order, the Cleaner Lagos Initiative. The initiative deploys a new private sector known as VisionScape for waste collection and transportation in the state. Under the new law, LAWMA was in charge of regulating and licensing waste collection and disposal. The rationale for the initiative's introduction was to ensure that the state is free of waste and there is no indiscriminate disposal of waste by the people. The rationale given by LAWMA for the downsizing of PSP operators was that they were small and did not have the financial and technical capacity to deliver on the scale required to meet the objectives of the CLI, hence, the responsibility for the household waste collection was given to a waste management company Visionscape, which had no prior knowledge operating in Nigeria. The few surviving PSPs was collecting waste generated in commercial premises, and LAWMA was collecting waste generated in public areas like streets and highways.

The performance of Visionscape in waste management was abysmal, and the situation deteriorated during the intervening period of the company. There were several uncollected wastes in neighbourhoods in the city. There are conflicting reasons as to the poor performance of Visionscape. At the same time, some people adduced the non-indigenous nature of the company. LAWMA attributed the increase in the waste of waste generation in the state to it. Some also gave the account of institutional wrangling between PSP operators and the Visionscape due to the ouster of the former from the scene. From the interview, most of the participants referred to the introduction of VisionScape by Lagos State government as a big mistake because it dealt a major blow to the state government's waste management effort. In the words of a participant:

*During the time of Gov. Fashola, the waste collectors were very effective they do come on time to collect our waste, they come every week, but since the introduction of new people when Gov. Ambode came on board, we have not been seeing them regularly, they come*

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<sup>58</sup>Akinwumi Ambode was the Governor of Lagos State between May, 2015 to May, 2019

*once in a while look at that part (he pointed to heaps of wastes), that is where we now dump waste, and it will later end up in the drainage.*<sup>59</sup>

The rationale for the ineffectiveness of the VisionScape was revealed by a senior government official at the Lagos State Waste Management Authority. In his words:

*When you take over from a local indigenous company and bring in a foreign company to collect waste in unfamiliar terrain, you should be aware that the effect will be disastrous. That was the situation of the waste management sector in Lagos state during the government of Ambode; he sacked PSPs operators that are very familiar with the terrain and brought in aliens to do the job.*<sup>60</sup>

The data revealed that waste management under the regime of former Governor Akinwumi Ambode was very poor in comparison with the government of Governor Babatunde Fashola. A member of the Environmental Rights Action<sup>61</sup> stated that:

*One of the reasons Gov. Ambode was not reelected as governor was his poor management of waste in the state; how will you meet a cleaner Lagos when you came on board, and you brought in “vision fraud” that have taken the state back in terms of waste management.*<sup>62</sup>

This result further confirmed the data from community members on the poor management of waste in the state during the administration of former Gov. Akinwumi Ambode. As revealed earlier in the literature, leadership plays a crucial role in climate action. Just as we have climate denials in leaders such as former President Donald Trump, there are also climate enthusiasts such as President Joe Biden. However, decisions that such leaders make while in office do have a huge impact on the climate goals and objectives of such a country. One of the points that the incumbent Governor Babajide Sanwoolu used during his electioneering campaign were environmental and climate change issues. After his emergence, which is barely a year in office, he introduced the Blue Box Initiative.

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<sup>59</sup> Interview with a community member at Ajegunle-Ifelodun local government

<sup>60</sup> Interview with an official of Lagos State Waste Management Authority

<sup>61</sup> Environmental Right Action is a local NGO in Lagos State

<sup>62</sup> Interview with official of Lagos State Waste Management Authority

- **Blue Box Initiative**

The Blue Box Initiative is a recyclable gathering which encourages the sorting of recyclable items from the point of waste generation. This is done through the distribution of different waste colour-coded bags to household across the state. After putting the various wastes inside the different colour bags, the designated community recycling agent will pick it up for sorting and sell to off-takers. The blue box programme aims to capture 60 percent of recyclable materials with zero tolerance for scavenging by 2021. The programme also intends to create green jobs, encourage zero waste generation and a cleaner environment. The initiative also includes the development of an organic waste plant, which enables the creation of manure from organic waste. According to an official of the agency:

*Lagos has about 50% organic waste by weight. A compost plant was installed to withdraw organic waste from solid waste; after removal, it reduces organic waste. The more organic waste you have in your waste, the higher the propensity of bio-degradation and the higher the bio-degradation, the higher the methane gas generation.*<sup>63</sup>

The government aims to build more of such to reduce organic waste that goes to the dumpsite, which will reduce methane gas, bio-degradation activities, and environmental and public health impacts. Unlike the previous administration's waste collection initiatives, the Blue Box Initiative has a more elaborate scope which includes the 3 Rs Reuse, Reduce and Recycle. According to an official of the government: he stated that:

*The Blue Box Initiative is more concerned with the need to minimise the volume of wastes that get to the dumpsites because landfill is a major source of GHGs and the government aims to reduce the number of landfill sites in the state as part of his climate mitigation objective.*<sup>64</sup>

If implemented properly, the Blue Box initiative will reduce the volume of waste produced in the state, and the carbon emissions from waste will also reduce. However, most community members who participated in the interview affirmed that the rate at which waste is being collected in their

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<sup>63</sup> Interview with an official of Lagos State Waste Management Authority

<sup>64</sup> ibid

community is very poor. This shows that there is a need to increase the number of waste collectors in the city if the state government's target to reduce municipal waste by 60 percent will be met.

- **Tree Planting Campaign**

Lagos State recognises the role that massive afforestation plays in climate governance as seen in the institutionalisation of tree planting campaign in the state. The states' Parks and Garden produce tree seedlings, which are given free to the people for planting across the state. At its inaugural annual climate change summit in 2009, the state government launched the tree planting campaign and 14th July every year was declared as a tree planting day in the state. The government established the Lagos State Parks and Gardens to ensure that trees are planted massively across the state. The citizens are mobilised through the activities of LASEPA every Thursday of the week. The quantitative data affirm this finding of a massive tree-planting campaign in the state, 1.8 percent of the interviewed persons disagreed that the state has a tree-planting drive, 4.9 percent disagreed strongly, 11.3 percent were undecided, 65 percent agreed, and 17.1 percent agreed strongly. From this result, majority of the respondents, (82.1 percent) affirmed that the Lagos State government has a tree-planting campaign (see Table 6.3 and Fig. 6.1).

Tree planting is primarily a climate mitigation and adaptation measure; it serves as a carbon sink. It also protects the building from the negative effect of windstorm (LAS-CCAS, 2011). The state also has a law against the cutting of trees, 3.8 percent disagreed, 13 percent disagreed strongly, 13 percent were uncertain, 44.5 percent were in agreement, and 26.6 percent agreed strongly. This result indicated that the majority, representing 71.1 percent, approved a law against felling of trees in Lagos. Thus, the Lagos State government is against deforestation. However, a significant proportion of the respondents, which constitutes 16.8 percent, opposed the assertion; this indicates that the level of awareness about the existence of the law is not on a full scale. From the above data, it is not out of place to argue that the Lagos State government's tree-planting drive will contribute immensely to the federal government's national target of planting twenty million trees by 2021. According to a government official: he stated that "*We have received technical and financial support from the federal ministry of environment on the implementation of the tree planting campaign, which has made the implementation very easy.*"<sup>65</sup>. This result provides empirical support to Elinor Ostrom's

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<sup>65</sup> An interview with an official of Lagos State Environmental Protection Agency

postulation that international and national target on climate change without local action is doom to fail (Ostrom, 2009).

- **Annual Climate Change Conference**

Lagos State is the first and currently the only state in Nigeria that holds an annual climate change summit. The summit started in 2007 during the administration of Babatunde Raji Fashola. The conference aims to bring all key stakeholders in the state for dialogue on climate actions. Communique and plan of action are issued after the event. It will guide all stakeholders on climate action for the preceding year, and a review of successes and failures is debated at the next conference. From 2007 till date, the state government has conducted 18 conferences; this means that there are tremendous collaboration and discussion regarding climate change mitigation and adaptation with major stakeholders in the state. Organising an annual conference at a subnational platform on climate change is a pertinent measure in driving stakeholders to adhere to the government's emission reduction target. If there is no such avenue for different stakeholders to discuss the government plans on climate mitigation and adaptation, compliance to such measure may be difficult. Hence, the annual climate change conference by the Lagos State government shows the government's readiness and willingness to involve different actors that are key to the actualisation of the government's mitigation and adaptation goals.

- **Establishment of Climate Change `Clubs Across Public Schools in the State**

The adverse impacts of climate will have significant implications on children's future, with children from developing countries at greater risks due to inadequate adaptive capacities and weak institutions (Currie and Deschênes, 2016). More so, children are also key change agents; if they are trained to be environmentally conscious at an early age, it will go a long way in building an environmentally-conscious society. In all secondary schools in the state, the Special Climate Change Unit established climate change clubs. The essence of the club is to teach students issues relating to climate change and how they can come into play in ensuring a safer environment. The programme exposes children to the advantages of recycling and proper waste disposal. The inculcation of climate change mitigation, as well as adaptation procedures to children at an early stage of their life, will make them grow into adults who will be environmentally-friendly than the present generation (Burke *et al.*, 2018).

#### **6.2.4. Innovative climate change adaptation measures and initiatives by Lagos**

##### **State government**

Regardless of the achievement in the reduction in GHGs now, historical emission will have significant impacts in the years ahead, hence, the need for countries to have effective adaptation strategies and measures. In the precarious situation of Lagos State as a low-lying region with a vulnerability to sea-level rise, adaptation measures become imperative. Of all the climate change impacts in the study area, as discussed in chapter five, the most hazardous to the survival of the people was flooding. This can be attributed to rising sea level as well as incessant rainfall in the state. Hence the innovative adaptation methods by the government are designed majorly to tackle the challenges posed by flood (Elias and Omojola, 2015; Shiru *et al.*, 2019). Flood management is a crucial climate adaptation goal due to the high rate of flood incidence in the state. The data revealed that the state government rolled out the following steps to manage flood incidence in the state.

- **The Construction of Drainage Channels and Annual Cleaning of Drains**

One of the major contributing factors to flooding in most cities in Africa has been identified to be the inadequate and poor drainage system (Douglas, 2017). During heavy rainfall, the blockage of drains and poor water channels leads to flooding, which destroys lives and properties. One of the approaches to flood management by the Lagos State government is the construction of drainage channels. According to an official of the Ministry of Environment:

*Efforts to address flooding and stormwater in Lagos began in 1974 with the development of a mainland drainage master plan. Afterwards, in 1992 and 1998, two other drainage master plans were developed for other sections of the state.*<sup>66</sup>

An effective drainage system is a crucial adaptation measure; it ensures a free flow of water and helps reduce the incidence of floods (Lumbroso, 2020).

Furthermore, the government undertakes an annual cleaning of the drains in the state before the commencement of a new raining season through the department of drainage in the ministry of environment of the state. The quantitative data affirmed this finding; Table 6.3 shows that 2.6 percent disagreed on the existence of a proper drainage system in their community, 4.3 percent

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<sup>66</sup>Interview with an official of the ministry of environment

strongly disagreed, 7.2 percent were not sure, 61.4 percent concurred, and 24.6 percent agreed strongly. This result infers that the greater part of the interviewed persons, representing (86 percent) approved the assertion that there are sound drainage systems in Lagos State. This result further confirms flooding to be a major problem in Lagos due to the impacts of climate as manifested in the increase and intensity of rainfall which overflows the existing drains.

- **Urban Planning and Land Use Regulations**

The unpleasant effects of climate change constitute a huge menace to urban development, and it places several cities across the world at risk. As a result, the city government is looking for creative ways to include climate adaptation measures into urban planning and land use regulations (Bulkeley *et al.*, 2009). For Lagos, the government controls flood through urban planning and land use regulations. Lagos State government constructed 7 km of revetment, popularly known as the “Great Wall of Lagos” to defend the city from coastal flooding and storm surges. More so, the regulatory mechanism contains provisions that offer safeguards for flood risk. For example, the government ordered the demolition of buildings on waterways and the buildings that are built on drainage paths, most especially in the flood-prone area of the state. According to a government official, “*We demolished over 50 buildings on waterways in Ijora, Ajegunle and Agege area of the state*”.<sup>67</sup> Another measure was the provision of land to real estate developers at a minimal cost to prevent arbitrary buildings on the land. The government also directed the cancellation of the physical development in areas liable to wetlands and flood. These urban planning measures and land use regulations are crucial to the adaptation of the city in response to the unfavourable effects of climate change.

- **Flood Awareness Campaign and Early Warning System**

Climate change’s unfavourable effects manifest with or without warning; however, improving the early warning capability is critical to enhancing the resilience of the people (Pace *et al.*, 2015). In Lagos State, the government has a campaign on flood awareness; this is done through electronic and print media to sensitise the people on flood preparedness, seasonal rainfall predictions and an early

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<sup>67</sup> Ibid

warning sign of a potential flood incidence. According to an official of the Special Climate Change Unit:

*We do give early warning signs to the people, especially those living in coastal areas about a potential flood incidence, but the response is always poor, we do give them an option to relocate, but our people will wait to see the flood which in most cases is too late for them to act.*<sup>68</sup>

The rationale for the refusal of people not to relocate is due to limited financial resources; a community member states that: “the government will tell us to leave our house because of the flood, but they did not provide where we will go to”.<sup>69</sup> Most people stay back to defend their property because they do not have the means for alternative accommodation. The data show that despite providing timely caution signs for the people on potential climate change impacts, the government does not provide an alternative for the poor people who have nowhere to relocate (see Adelekan, 2010; Ajibade and McBean, 2014).

- **The Provision of Means for Waste Disposal**

As the rate of urbanisation increases, so also does the amount of waste generation. Hence one of the critical services that the subnational government offers is solid waste management (Hoorweg and Bhada-Tata, 2012). According to available data, Lagos State generates the highest amount of solid wastes in Nigeria with 13000 metric tonnes of waste per day (NBS, 2018). The data showed that 3.1 percent disagreed that the Lagos State government provides means of waste disposal to the community members, 5.6 percent agreed strongly, 12 percent of the interviewed persons were uncertain, 67.8 percent were in agreement, and 11.5 percent agreed strongly (see Table 6.3). This result infers that most of the respondents (79.3 percent) avowed that the Lagos State government provides waste disposal to their populace.

Proper disposal of waste is the primary way of not only keeping the city clean but also avoiding the blockage of drains, which often leads to flooding during heavy rain. Proper management of waste is a vital step in climate mitigation and adaptation in several ways. If not properly disposed

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<sup>68</sup>Interview with an official of the special climate change unit

<sup>69</sup>Interview with a community member at Eti Osa local government

of it will end up in the drains, and the blockage of the drains will lead to flooding (Adelekan, 2016).

- **Provision of Financial Assistance to Flood Victims**

The loss and damage from climate change's adverse effects is a prominent issue under the UNFCCC, with compensation for developing countries at the centre stage (Page and Heyward, 2017). Data from the interview reveal the state government's claims of providing financial support to victims of flood and other disasters in the state. This is done through the establishment of the Lagos State Emergency Management Agency (LASEMA).<sup>70</sup> According to an official of the agency, *"We do provide prompt and adequate emergency response to the people through relocation to a temporary abode, provision of financial assistance, relief and recovery support"*.<sup>71</sup> However, the result from the quantitative data differed; majority of the participants in the community disagreed on the provision of financial assistance to victims of flood in their community. 22.8 percent of the respondents were in disagreement with the notion that government provides financial assistance to flood victims, 30 percent strongly disagreed, 14.8 percent were undecided, 6.6 percent agreed, and 26.1 percent disagreed strongly. This result showed that most of the respondents (52.8 percent) disapproved that Lagos State government provides financial assistance to the victims of flood incidence.

On the other hand, 32.7 percent of the respondents avowed that the Lagos State government does offer financial aid to flood victims (see Table 6.3 and Fig. 6.1). This means that financial assistance being given by the government of the state to flood victims is not adequate. This finding affirmed Adelekan's (2016) study on the management of flood in Lagos State, in which she found out that only 5.5 percent of her respondents agreed to have received support from the Lagos State government. Climate financing is a crucial component of climate adaptation; financing loss and damages from climate change is not an act of charity but that of justice. Victims of flood always lose their properties and valuables, that if the government does not compensate them, they may not get back to their usual way of life (see Warner *et al.*, 2013; Mechler *et al.*, 2019).

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<sup>70</sup>LASEMA is saddled with the responsibility of coordination of all emergency response in Lagos State

<sup>71</sup>An interview with an official of LASEMA

The above analysis unearths the mitigation and adaptation responses of the Lagos State government to climate change. On the implementation of the above climate mitigation and adaptation measures and programmes at the community level in Lagos State, Table 6.3 and Fig. 6.1. illustrate the responses of community members regarding the existence of programmes on climate change by the Lagos State government in their community, 1.5 percent disagreed, 4 percent disagreed strongly, 15.3 percent were indecisive, 59.8 percent concurred, and 18.9 percent agreed strongly. This result implies that majority of the respondents, (78.7 percent) affirmed that the Lagos State government has several programmes on climate adaptation and mitigation in their community. Furthermore, on the level of awareness of these programmes among the city members, of the respondents, 2.8 percent disagreed, 6.1 percent disagreed strongly, 9.7 percent were undecided, 52.2 percent agreed, and 29.2 percent agreed strongly. This result implies that majority (81.4 percent) affirmed that Lagos State government creates awareness about her programmes on climate adaptation and mitigation. Consequently, on the question about the involvement of community members in the implementation of these programmes, 1.8 percent were in disagreement, 5.6 percent disagreed strongly, 12.8 percent were indecisive, 56.3 percent concurred, and 23.5 percent agreed strongly. This result revealed that the largest proportion of the respondents, representing (79.8 percent) confirmed that members of their community are carried along in the implementation of climate mitigation policies (see Table 6.3 and Fig. 6.1). The next measures the effects of the Lagos State adaptation and mitigation approaches on climate change impacts using Multiple Regression Analysis.

### **6.3. Effect of Lagos State Government Climate Change Mitigation and Adaptation Measures on Impacts of Climate Change in Lagos State.**

To test the effect of Lagos State climate mitigation and adaptation measures (Independent Variables) on climate change impacts in Lagos State (dependent Variables), the respondents' scores on eight variables of programme and policies of Lagos state government and climate change impacts were calculated and run through multiple regression analysis. From Table 6.4, the correlation coefficient (R) was positive with a value of 0.638; this revealed that there exists a positive and strong relationship between Lagos state programme and policies (law against bush burning, the law against indiscriminate disposal, the law against cutting of trees, renewable energy, waste disposal, drainage system, water transportation) and the climate change impacts.

From Table 6.4,  $R^2$  value indicating the level of variation in the dependent variable explained by the independent variables was found to be 0.407; this implies that law against bush burning, the law against indiscriminate disposal, law against cutting of trees, use renewable energy, proper waste disposal, a good drainage system and improvement of water transportation brought about 40.7 percent variance on impacts of climate change. This was proven further by the value of the adjusted  $R^2$  (0.394), which reveals the goodness of fit of the model, the implication of which is that upon the correction of all errors and adjustments made, the model can only explain 39.4 percent of the variation in climate change brought about by Lagos state programmes and policies (law against bush burning, the law against indiscriminate disposal, the law against cutting of trees, renewable energy, waste disposal, good drainage system, water transportation). In comparison, the remaining 60.6 percent variance experienced in the impacts of climate change is as a result of the error term in the surveyed model, as shown in Table 6.4.

The unstandardised beta co-efficient of law against bush burning was 0.052 with  $t= 1.009$  and ( $p= 0.314 > 0.05$ ). The result showed that the law against bush burning had a weak and positive effect on climate change impacts. The implication of this is that Lagos State has a law against bush burning, but the implementation of such law lacks the necessary force because some people still flout the law and they go scot-free. Hence, the law against bush burning does not have a significant effect on climate mitigation in the study area. The unstandardised beta co-efficient of law against indiscriminate disposal is 0.150 with  $t= 2.081$  and ( $p= 0.038 < 0.05$ ). This outcome shows that the law against indiscriminate disposal has a positive relationship with climate change impacts and put forward that there exists a strong relationship between the law against indiscriminate disposal of wastes and climate adaptation and mitigation.

**Table 6.4: Effect of Lagos State climate mitigation and adaptation policies on climate change challenges in Lagos State**

| <b>Variables</b>                                  | <b>Coeff.</b> | <b>Std. Error</b> | <b>t-value</b> | <b>p-value</b> |
|---|---------------|-------------------|----------------|----------------|
| Constant  | 1.472         | 0.232             | 6.342          | 0.000          |
| Law against bush burning                          | 0.052         | 0.052             | 1.009          | 0.314          |
| Law against indiscriminate disposal               | 0.150         | 0.072             | 2.081          | 0.038          |
| Law against cutting of trees                      | 0.324         | 0.055             | 5.9253         | 0.000          |
| Renewable energy                                  | 0.336         | 0.054             | 6.253          | 0.000          |
| Proper waste disposal                             | -0.003        | 0.093             | -0.028         | 0.978          |
| Good drainage system                              | -0.039        | 0.105             | -0.369         | 0.712          |
| Financial supports for victims of flood incidence | -0.225        | 0.044             | -5.087         | 0.000          |
| Improvement of water transportation               | 0.081         | 0.067             | 1.202          | 0.230          |
| R   | 0.638         |                   |                |                |
| R Square  | 0.407         |                   |                |                |
| Adj. R Square                                     | 0.394         |                   |                |                |
| F Stat.   | 32.725(0.000) |                   |                |                |

Dependent variable: Impacts of Climate Change

The unstandardised beta co-efficient of the law against cutting trees was 0.324. The t value = 5.925 with ( $p = 0.000 < 0.05$ ), indicating that the law against cutting of trees exerts a positive and strong influence on climate change. This result implies that the Lagos State government has a law against cutting trees. The unstandardised beta co-efficient of renewable energy is 0.336 with ( $p= 0.000 < 0.05$ ) and a t value of 6.253. The output indicates that renewable energy has a positive influence on climate change impacts. This suggests that the Lagos state government is encouraging the use of renewable energy by its citizens, albeit expensive. The unstandardised beta co-efficient of proper waste disposal was -0.003 with  $t= -0.028$  and ( $p= 0.978 > 0.05$ ). This finding indicated a negative and weak relationship between proper waste disposal and climate change. This implies that although the Lagos state government has a law against indiscriminate disposal of wastes, the law is not effective because most of the citizens do not dispose of their wastes properly.

The unstandardised beta co-efficient of good drainage system was -0.039 with  $t= -0.369$  and ( $p= 0.712 > 0.05$ ). The finding indicates a weak and negative relationship between a good drainage system and climate change impacts. Hence, no significant relationship exists between the drainage system and the impacts of climate change.

The unstandardised beta co-efficient of financial support for victims of flood incidence is -0.225 with ( $p= 0.000 < 0.05$ ) and  $t= -5.087$ . The outcome showed that financial support exerts a negative influence on climate change impacts. However, the support by the Lagos State government to assist victims of flood incidence whenever it occurs is very poor. The unstandardised beta co-efficient of water transportation is 0.081 with  $t= 1.202$  and ( $p= 0.230 > 0.05$ ). The finding shows that water transportation has a weak and positive relationship with the impacts of climate change, further revealing that no significant relationship exists between water transportation and climate change impacts. Water transportation will go a long way in reducing the number of vehicles on the highways, thereby reducing emissions, but the level at which water transportation is done in Lagos state is still very low.

This result is in agreement with the finding revealed in the frequency percentage distribution table in which the majority of the respondents affirmed that the Lagos state government is implementing several programmes on climate mitigation and adaptation in their communities (see Table 6.3).

Hence, as revealed in Table 6.4, a significant relationship exists between subnational policies and the impacts of climate change in Lagos state. The result provides empirical support for the study of Elias and Omojola (2015), which observe that initiatives and programmes of the Lagos state government have reduced the vulnerabilities of the people to climate change impacts.

The results also showed the linkage between the subnational and national policy made by the Nigerian government on climate change. Subnational climate change actions are a mix of top-down and bottom-up experimentation. In some cases, the federal government sets the national target, while in other ones, the subnational government determines what to implement. In some federal states, the central government sets the national target for other levels of government to implement. For example, in China, the central government defines and monitors national target (Kostka and Hobbs, 2012). Other countries have an intermediate case between decentralisation and central control. In India, the central government developed national climate policies while subnational governments developed action plans to implement the national target in their domain of governance (Dubash *et al.*, 2013). In most European countries, the EU targets were adopted as national objectives. For example, France mandated all its urban agglomerations to design Climate and Energy Territorial Plans to realise the EU's goals (Nationale, 2010). This approach allows the mainstreaming of climate change into local planning. While the central government leads and initiates climate action in Germany, the subnational government has veto power against federal initiatives through their representative in the upper legislative chamber (Weidner and Mez, 2008).

In other cases, subnational governments also attempt to compensate for the national level's lack of action (Dubash, 2011). For example, in the United States, the national government has been slow in taking concrete national climate change action. There have been several multiple efforts at the subnational level (Rabe, 2010). Climate policy in California is worth noting because of its economic size (Farrell and Hanemann, 2009). The central government in some countries do encourage sub-national governments to undertake climate action. For example, in the Netherlands, the central government has a programme that provides incentives such as subsidies for subnational governments to carry out climate actions (Gupta *et al.*, 2007).

The Nigerian type is similar to that of the Republic of South Africa, where both the central and subnational governments have the constitutional power to initiate and implement climate policies.

However, the financial capacity of cities like Cape Town and Kwazulu-Natal to design and implement climate action is robust compared to that of Lagos State. The Nigerian experience is due to the type of federal system in the country, in which there is a high concentration of resources at the central government. Meanwhile, the availability of resources is important in the implementation of climate change policy. Thus, for the Lagos State government to access grants from the federal government, there is a need to tailor her climate change policy in accordance with that of the federal government. It is not surprising that Lagos State adopted the 20 percent conditional and 45 percent unconditional emission reduction target set by Nigeria's federal government. The Lagos State situation is also found in Norway in the study of Aall *et al.* (2007), in which subnational climate change initiatives are dependent on the financial grant from the central government.

Meanwhile, contrary to findings in chapter five, the respondents affirmed that the policies of the federal government of Nigeria on climate change have not adequately addressed climate change issues in their community (see chapter five). In contrast, some of the Lagos State government climate change adaptation and mitigation actions like the waste minimisation policy, tree planting campaign, regulations against bush and waste burning and discharge of untreated wastes were adjudged by the respondents to be effective. Conversely, the impacts of the renewable energy drive, financial supports for victims of floods, green and efficient transportation system are not being felt by the people. Hence, it is safe to argue that some of the mitigation and adaptation measures of the Lagos State government have reduced the people's vulnerability to climate change impacts, while others have failed to achieve the objectives set by the government. Hence, the fact that some of the climate adaptation measures of the Lagos State government have not lessened the susceptibility of the people to the impacts of climate change necessitates local community initiatives to climate change adaptation.

#### **6.4. Local Community Initiatives and Climate Governance in Lagos State**

In the early 2000s, scholars such as Blanco 2006, Ayers *et al.* 2009, Ayers and Forsyth 2009, Heltberg *et al.* 2009, and Schipper *et al.* 2004 contend on the need to focus on adaptation initiatives at the local level because that is where climate change impacts are being felt and experienced. Hence, adaptation components such as resilience, adaptive capacity, and vulnerability will be more

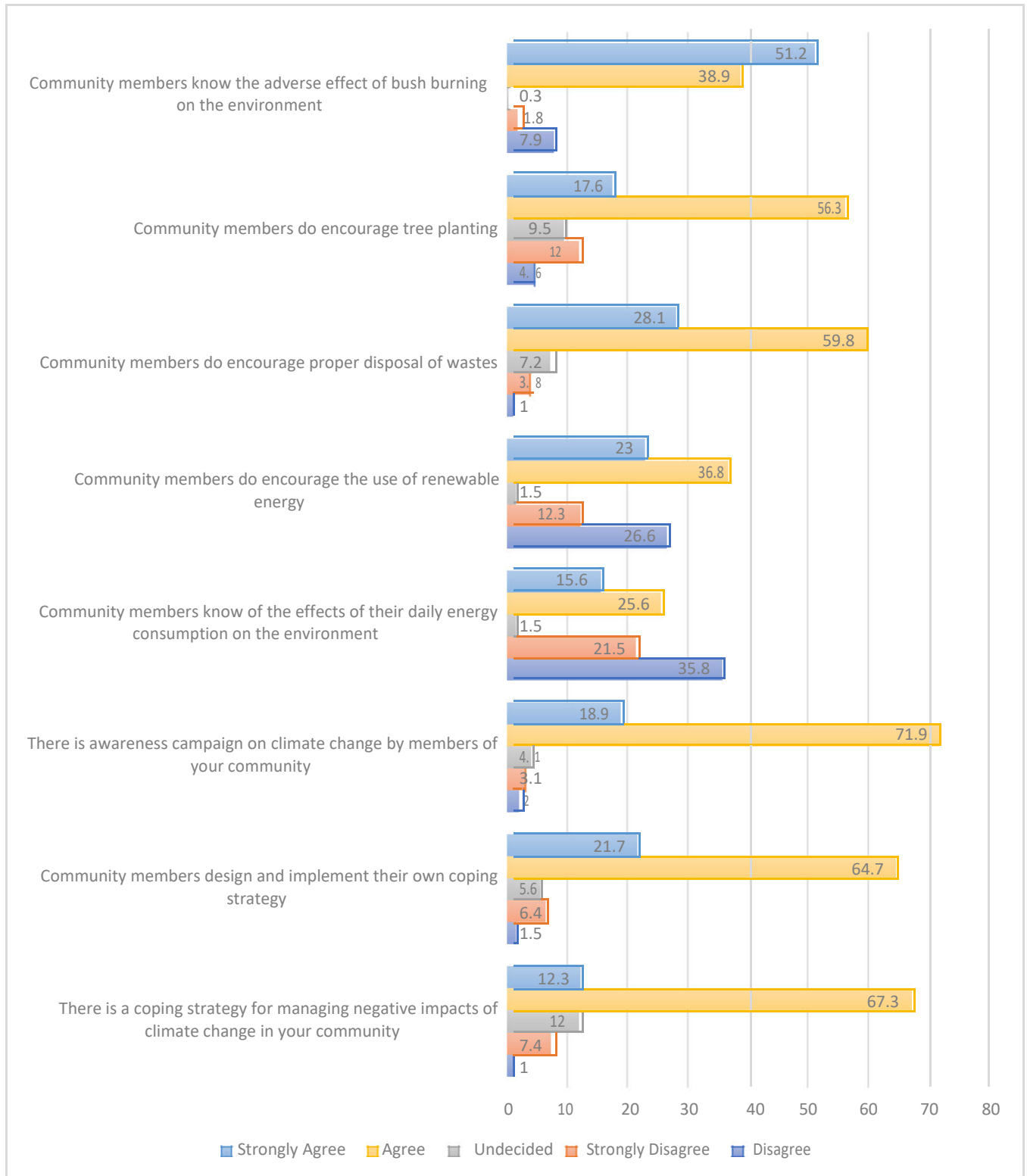
comprehended at this level. The top-down approaches at the onset of climate mitigation and adaptation were always determined based on regional and national scenarios that did not reflect local peculiarities. The shift to community-level initiatives is important owing to the identification of existing adaptive capacity and coping strategies of different communities around the world, most especially in the form of natural resource and local environmental management (Barnett, 2001; Riedlinger and Berkes, 2001; Smit and Skinner, 2002; Adger *et al.*, 2009). Employing adaptation measures from the bottom-up guarantees a practical approach that values the context of the community, their knowledge and adaptive capacities (Allen, 2006; Blanco, 2006; Thornton *et al.*, 2009; Ayers and Forsyth, 2009). The stress on the responsibilities of local communities and bottom-top initiatives has given drive for community-based adaptation measures.

As a governance framework below the national sphere, this section examines local communities' roles in climate mitigation and adaptation. Respondents were requested to point out their level of agreement, uncertainty and disagreement with the several functions that local communities are playing on climate governance using the 1-5 Likert scale. Table 6.5 and Fig 6.2 present the responses. In the previous chapter, several adverse effects of climate change in Lagos State were revealed. Out of the severe impacts of climate change, the most severe consequences based on this study was flooding. Based on available data, community members lost properties worth two million dollars due to the 2017 and 2018 flood incidence in the state (NEMA, 2019). The unfavourable impacts of flooding on people's homes and livelihood necessities local community members and local institutions' involvement in climate adaptation.

**Table 6.5: Responses on Roles of Local Communities in Climate Change Mitigation and Adaptation**

| S/N | Response   | Disagree  |         | Strongly Disagree |         | Undecided |         | Agree     |         | Strongly Agree |         | Total     |         |
|-----|--|-----------|---------|-------------------|---------|-----------|---------|-----------|---------|----------------|---------|-----------|---------|
|     |  | Frequency | Percent | Frequency         | Percent | Frequency | Percent | Frequency | Percent | Frequency      | Percent | Frequency | Percent |
| 31  | There is a coping strategy for managing negative impacts of climate change in your community | 4         | 1       | 29                | 7.4     | 47        | 12      | 263       | 67.3    | 48             | 12.3    | 391       | 100     |
| 32  | Community members design and implement their own coping strategy                             | 6         | 1.5     | 25                | 6.4     | 22        | 5.6     | 253       | 64.7    | 85             | 21.7    | 391       | 100     |
| 33  | There is awareness campaign on climate change by members of your community                   | 8         | 2       | 12                | 3.1     | 16        | 4.1     | 281       | 71.9    | 74             | 18.9    | 391       | 100     |
| 34  | Community members know of the effects of their daily energy consumption on the environment   | 140       | 35.8    | 84                | 21.5    | 6         | 1.5     | 100       | 25.6    | 61             | 15.6    | 391       | 100     |
| 35  | Community members do encourage the use of renewable energy                                   | 104       | 26.6    | 48                | 12.3    | 6         | 1.5     | 144       | 36.8    | 90             | 23      | 391       | 100     |
| 36  | Community members do encourage proper disposal of wastes                                     | 4         | 1       | 15                | 3.8     | 28        | 7.2     | 234       | 59.8    | 110            | 28.1    | 391       | 100     |
| 37  | Community members do encourage tree planting   | 18        | 4.6     | 47                | 12      | 37        | 9.5     | 220       | 56.3    | 69             | 17.6    | 391       | 100     |
| 38  | Community members know the adverse effect of bush burning on the environment                 | 31        | 7.9     | 7                 | 1.8     | 1         | 0.3     | 152       | 38.9    | 200            | 51.2    | 391       | 100     |

**Source: Field Survey, 2019.**



**Fig. 6.2: Roles of Local Communities in Climate Change Mitigation and Adaption**

**Source: Field Survey, 2019.**

#### **6.4.1. Coping strategies for flooding at the local level**

The lack of adequate adaptation measures that can meet the peculiarities of local people necessitates their involvement in designing appropriate initiatives that will strengthen their adaptive ability (Rashid *et al.*, 2013). The data showed that community members in Lagos State have coping techniques to adverse impacts of climate change. The data showed that 1 percent of the respondents were in disagreement that the community have coping strategies, 7.4 percent disagreed strongly, 12 percent showed uncertainty, 67.3 percent agreed, while 12.3 percent agreed strongly. It can be deduced from this data that most of the respondents, representing 79.6 percent, affirmed that community members have their coping techniques for handling the adverse effects of climate change (see Table 6.5 and Fig 6.2).

The qualitative data corroborated the above finding by revealing two levels of responses to climate change at the local stage, at the household level on one hand and at the community level on the other. The responses to flooding in low-income households include the following:

- Clearing of drains;
- Staying indoors during a heavy downpour;
- Proper disposal of wastes;
- Construction of wooden walkways; and
- Prayers and seeking government support.

However, for high-income households, their coping strategies include:

- Relocation to another area that is not prone to flood;
- Construction of drainages;
- Evacuation of floodwater with water pumping machine;
- Insure property and building; and
- Planting of trees.

This result showed that community members' financial capacity determines how they respond to climate change impacts. Meanwhile, it is an undisputed reality that low-income households which are dominant in developing countries suffer more from climate change impact (see Adelekan, 2016). At the community level, the response includes the following:

- Use of sandbags;

- Sand filling of roads;
- Clearing of drains;
- Construction of drainage channels; and
- Construction of bridges.

According to a community member: “*At times we pay levies to build drainage channels, wooden bridges so that there will be a free flow of water and flood will reduce*”.<sup>72</sup> In high-income residential areas such as the state’s Eti Osa local government area, community members contribute money to buy boulders that protect the community from storm surges. In some communities, they use canoes as a means of movement during a severe flood incidence. The above strategies at both individual and community level are critical to climate adaptation, especially in the absence of adequate support from the state government. The data showed that the strategies that members of the community adopt in coping with climate change impacts are diverse and varied, and they are mostly determined by the economic status and exposure of the people. While some community members have abandoned their homes to safer areas, others have developed strategies for coping. Nevertheless, most people living in slum communities choose to stay in flooded areas rather than relocating. The rationale for this is because of their low economic status, and they do not have the financial means to relocate to safer zones. In most developing countries, community members design and implement coping strategies with little or no support from the state, while in developed countries, most local actions are supported by the local authority (Reid *et al.*, 2009).

#### **6.4.2. Awareness campaign on climate change and its impacts**

Awareness on climate change is essential to achieve sustainability in developing countries, while lack of awareness is a major impediment to climate adaptation. Creating awareness of climate change at the local stage is imperative due to the increasing rate of climate-related disasters in different countries of the world (Shahid *et al.*, 2016).

As shown in the data, there is an awareness campaign going on regarding climate change impacts at the community level in Lagos State. Table 6.5 showed that 2 percent of the respondents were in disagreement that there exists an awareness campaign regarding climate change at the community

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<sup>72</sup> An interview with a community member at Ajegunle

stage. 3.1 percent disagreed strongly, 4.1 percent recorded indecision, 71.9 percent agreed, and 18.9 percent agreed strongly. This result indicates that an overwhelming majority of respondents, constituting 90.8 percent affirmed that community members in Lagos State do create awareness on climate change impacts (see Table 6.5 and Fig. 6.2). The qualitative data substantiated this result. A community leader in Eti Osa local government affirmed that:

*we do have a monthly sensitisation and awareness campaign on the need to keep our environment clean and ensure proper waste disposal so that there can be a free flow of water and we can prevent floods*<sup>73</sup>.

It implies that the level of knowledge on how the role individuals can play in ensuring that they are protected from the adverse influence of climate change is high (see Adelekan, 2016). Furthermore, on the awareness among community members on the impacts of their daily energy consumption on the environment, of the respondents, Table 6.5 revealed that 36 percent disagreed, 21 percent agreed strongly, 2 percent were not sure, 25 percent agreed, and 16 percent agreed strongly. From this result, most of the respondents, representing (57 percent), disagreed that members of the community know the effects of their daily energy consumption on the environment. However, a significant percentage of the respondents, which constituted (41 percent) affirmed that members of the community know the effects of their daily energy consumption on the environment (see Table 6.5 and Fig. 6.2). This result implies that, to an extent, respondents are aware of energy consumption and its impacts on climate change among the people, which is an important mitigation measure at the local level.

#### **6.4.3. Use of Green and Renewable Energy**

The shift from fossil fuel-based energy sources to green and renewable energy has been identified by climate scientists and climate governance experts as a key climate mitigation action (Quaschnig, 2019). Of all the respondents, Table 6.5 showed that 27 percent disagreed that they know the importance of green and renewable energy usage, 12 percent strongly disagreed, 1.2 percent were undecided, 37 percent agreed, and 23 percent agreed strongly. 60 percent of the respondents affirmed that members of the communities in Lagos do encourage the utilisation of renewable energy in the protection of the environment. Moreover, a significant percentage of the

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<sup>73</sup>Interview with a community member in Eti Osa local government

respondents, 39 percent disapproved of this claim (see Table 6.5 and Fig. 6.2). This implies that it may be difficult to assume that community members in Lagos State know the importance of renewable energy. The reason for this may be due to the earlier findings in this study that the Lagos State government is not encouraging the use of renewable energy given that it is not affordable for the people to use.

#### **6.4.4. Tree planting campaign**

Table 6.5 revealed that the community members embark on tree planting. The quantitative data showed that of all the respondents, 4.6 percent disagreed, 12 percent disagreed strongly, 9.5 percent were undecided, 56.3 percent agreed, and 28.1 percent agreed strongly. This result infers that majority (74.4 percent) of the respondents affirmed that members of the community do campaign and encourage tree planting. This means that people at the community level in Lagos State know the importance of tree planting as a carbon sink and as a protection for their building against windstorm. Similarly, community members are also conscious of the adverse effects of bush burning. Table 6.5 showed that 7.9 percent of the respondents were in disagreement that community members know the harmful effects of forest burning on the environment, 1.8 percent disagreed strongly, 0.3 percent were unclear, 38.9 percent of the respondents agreed, while 51.2 percent agreed strongly. From this result, an overwhelming majority (90.1 percent) of the respondents affirmed that members of the community in Lagos State know the adverse effect of bush burning (see Table 6.5 and Fig. 6.2).

#### **6.4.5. Waste management initiatives at the local level**

Although the Lagos State government provides means of waste disposal to the people as revealed in the finding (see Table 6.5), there is still the incidence of blockage of drains in many parts of the city, which is a major contributing factor to flooding. This necessitates the involvement of the community members in the proper management of wastes using the 3 Rs (waste reduction, reuse, and recycle).

The result showed that community members encourage proper disposal of waste. 1 percent disagreed, 3.8 percent disagreed strongly, 7.2 percent expressed uncertainty, 59.8 percent and 28.1 percent agreed strongly. This result indicates that most of the interviewed persons, representing (87.9 percent), affirmed that members of the Lagos State communities do encourage proper

disposal of wastes (see Table 6.5 and Fig. 6.2). This implies that the level of wastes management at the community level in Lagos state is impressive, and it is a key adaptation measure. Apart from the individual households and community strategies, local NGOs do support local community members on waste management initiatives as a coping strategy to minimise indiscriminate disposal of wastes, which will also reduce blockage of drains and minimise the incidence of flooding. The initiatives are:

- **RecyclesPays Education Project**

The Recyclepays education project is an initiative of the African Cleanup Initiative<sup>74</sup>. The project is being implemented in partnership with LASEPA, LAWMA and other CSOs. The project is a recycling initiative that promotes recycling culture among the people using wastes to pay for school fees in low-income communities in Lagos State. Under the project, parents used pet bottles to pay for their children school fees. The project started in 2018, and it was implemented in 10 secondary schools across six local government areas of the state. The local governments include Ikorodu, Ajegunle-Ifelodun, Eti Osa, Surulere, Alimosho and Agege. According to the project manager,

*Through the recyclepays project, we have recycled over 3 million pet bottles and water sachets on the average, parents have used recyclables to pay for 50 percent of their children's tuition.*<sup>75</sup>

Similarly, a community member affirmed that:

*The recyclepays education project is a good initiative because it teaches members of the community the value of waste and ensuring a cleaner and safer environment. Pet bottles are not seen as wastes anymore but as a ticket to pay for school fees.*<sup>76</sup>

The initiative has reduced the volume of disposed pet bottles that do end up at dumpsite in the state. Payment for waste is ubiquitous in European countries, and it is being led by the private sector. For instance, over half of the pet bottles sold in Europe in 2017 were collected through recycling (Gálvez-Martoset, 2018).

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<sup>74</sup> ACI is a local NGO working on environmental and climate change issues in Lagos State

<sup>75</sup> An interview with a member of the African Cleanup Initiative

<sup>76</sup> A community member that participated in the interview

- **Value for Waste Initiative**

The Value for Waste Initiative is also a recycling programme led by a social enterprise company in affiliation with the Lagos State government. According to the programme officer of the company on what drives her to start a recycling company, she stated that:

*Some years back, the improper and indiscriminate disposal of waste in my community was worrisome to me. Anytime it is about to rain, my community members have two options either to relocate to a temporary abode or to remain indoors for some days. Because after the rain, everywhere will be flooded due to blockage of drainage and it takes two to three days for the water to dry off, after which normal way of life can return to the community. As a young lady, I became interested in addressing the root cause of this ugly event, and I discovered that if I can sensitise people on how to create wealth from wastes, it will go a long way in waste reduction.<sup>77</sup>*

These data revealed that an individual was tired of the waste situation in her community, and she established a social enterprise in affiliation with the state government. On how the initiatives work, the programme director stated that:

*We started with awareness creation and campaign where people were implored to keep their recyclables such as plastic, aluminium, cans, water sachet and every other form of recyclables. We then visit once every week to collect and weigh and give them what we call green points. The reward ranges from Recharge card, Cooking Pot, Blender, Electric Kettle, Electricity Generating Set, Laptop, Television Set, among others. Many people in the community are always looking forward to exchanging wastes for any of the items.<sup>78</sup>*

This initiative is a crucial solution to reducing waste in the city by making recycling more convenient for people as much as possible. The two wastes recycling programmes in Lagos State were introduced by non-governmental organisations and always with external funding. But if such measures are to be more than isolated initiatives, it needs to be mainstreamed into government policies, structures and planning processes. This is because NGOs come and go, but the structures

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<sup>77</sup> An interview with an official of Greenhill Recycling company

<sup>78</sup> Ibid.

of government are more permanent. Entrenching future and existing CBA projects into government structures at different levels will enhance the replication of the projects, and it can be rolled out as part of government programmes. It will also protect the programmes from those who do not support it or see it as a threat. As Reid *et al.* (2009) consider that CBA initiatives should provide support and link communities to appropriate decision-making institutions. The government has more capacity than NGOs to provide financial and technical support for programmes on a large scale. Donor support is more unpredictable. Mainstreaming CBA initiatives into government programmes and policies will likely be difficult because most governments at different levels have a poor history of responding to the needs of the poorest, and some government structures are anti-poor. This is true at both international and national levels. For example, at the UNFCCC, indigenous communities are excluded from formal negotiations because nation-states are the primary negotiating party. For CBA to be successful, it must be a mixture of top-down approaches and bottom-up process. Adaptation must be mainstreamed into government policy and planning process as in the case of Lagos State, but the people must participate in the planning process because if not, the adaptation needs of the most vulnerable and poorest may not be captured.

#### **6.5. The Effect of Local Community Efforts on Impacts of Climate Change in Lagos State**

To test the effect of local community efforts on climate change impacts, the respondents' scores on five variables of actions of communities' member (community member design and implement coping strategy, community awareness programme, use of renewable energy, proper disposal of waste, tree planting) and impacts of climate change were calculated and run through multiple regression analysis.

**Table 6.6: Estimated effect of local community initiatives on the impacts of climate change in Lagos State**

| <b>Variables</b>                               | <b>Coeff.</b> | <b>Std. Error</b> | <b>t-value</b> | <b>p-value</b> |
|--|---------------|-------------------|----------------|----------------|
| Constant                                       | 1.896         | 0.243             | 7.811          | 0.000          |
| Community member design and implement strategy | -0.175        | 0.069             | -2.541         | 0.011          |
| Community awareness programme                  | 0.215         | 0.082             | 2.601          | 0.010          |
| Renewable energy                               | 0.056         | 0.077             | 0.725          | 0.469          |
| Proper disposal of waste                       | 0.152         | 0.094             | 1.610          | 0.108          |
| Tree planting campaign                         | 0.377         | 0.058             | 6.463          | 0.000          |
| R  | 0.589         |                   |                |                |
| R Square                                       | 0.347         |                   |                |                |
| Adj. R Square                                  | 0.339         |                   |                |                |
| F Stat.  | 40.976(0.000) |                   |                |                |

**Dependent variable: Impacts of Climate Change**

**Source: Field Survey, 2019.**

From Table 6.6, the correlation coefficient (R) was positive with a value of 0.589; this reveals that there exists a positive and strong relationship between actions of community members (community member design and implement strategy, community awareness programme, renewable energy, proper disposal of waste, tree planting) and impacts of climate change. The Table shows  $R^2$  value indicating the level of variation in the dependent variable explained by the independent variables was found to be 0.347; this implies that community members design and implement strategy, community awareness programme, renewable energy, proper disposal of waste, tree planting brought about 34.7 percent variance on impacts of climate change. This is proven further by the value of the adjusted  $R^2$  (0.339) which reveals the goodness of fit of the model, the implication of which is that upon the correction of all errors and adjustments made, the model can only explain 33.9 percent of the variation in climate change brought about by actions of community members (community member design and implement strategy, community awareness programme, renewable energy, proper disposal of waste, tree planting). In comparison, the remaining 66.1 percent variance experienced in the impacts of climate change is as a result of the error term in the surveyed model, as shown in Table 6.6.

The unstandardised beta co-efficient of community member design and implement strategy was -0.175. The t value = -2.541 with ( $p = 0.011 < 0.05$ ), indicating that community member design and implement strategy possesses a positive and strong influence on the impact of climate change, further suggesting that community members design and implement strategies on how to manage the adverse climate change impacts in their community. The unstandardised beta co-efficient of the community awareness creation programme was 0.215 having a t value of 2.601 and ( $p = 0.010 < 0.05$ ). The result indicates that community awareness programme has a positive and strong relationship with climate change impacts. This implies that within the communities, there is awareness creation on climate change impacts.

The unstandardised beta co-efficient of renewable energy was 0.056. The t value = 0.725 with ( $p = 0.426 > 0.05$ ), indicating that renewable energy has a weak and positive effect on climate change impacts in Lagos state communities. However, a significant relationship existed between uses of renewable energy and climate mitigation and adaptation since the p-value = 0.426 is greater than 0.05, which is the level of significance. The result suggests that the members of the communities

know the importance of using renewable energy for the environment, but they cannot use it because of its unaffordability, so most of them still rely on fossil fuel-based energy as a major source of energy.

The unstandardised beta co-efficient of proper disposal of waste was 0.152 with  $t= 1.610$  and ( $p= 0.108 > 0.05$ ). The result showed that the proper disposal of waste has a positive and strong influence on climate change impacts in Lagos State communities. But there is no significant relationship between proper disposal of wastes and climate change impacts, given that ( $p\text{-value} = 0.108 > 0.05$ ). This implies that the community members know the importance of proper disposal of wastes, but they do dispose of their wastes indiscriminately due to a lack of sufficient provision for waste management by the government.

The unstandardised beta co-efficient of tree planting was 0.377 with  $t= 6.463$  and ( $p\text{-value} = 0.000 < 0.05$ ). This finding indicates that tree planting possesses a positive and strong influence on climate change impacts, and it implies community members are committed to the tree planting campaign of the Lagos state government. This result further confirmed the earlier finding presented in Table 6.5, in which majority of the respondents affirmed that local community initiatives had lessened the susceptibility of their communities to climate change impacts. The finding provides empirical support for Adelekan's (2016) study on flood management in Lagos state, where she maintains that local initiatives play a key role in the adaptation of the local communities to climate change.

Reflecting on the above results, it is not out of place to argue that local community members and local institutions perform an important role in climate mitigation and adaptation, especially in their domain through several innovative. This result is not surprising because several studies globally have shown how local people are adapting to climate change using indigenous knowledge. For instance, the study of Rankoana (2016), showed how rural community in Limpopo Province of South Africa used indigenous knowledge of mixed cropping, crop diversification and rainfall prediction to minimise the impacts of climate change on crop production. Similarly, several studies in Nigeria have shown how local community members are adapting to the impacts of climate (see Idowu *et al.*, 2011; Sofoluwe *et al.*, 2011; Tambo and Abdoulaye, 2013).

Based on the above results, it is safe to argue that climate governance in Lagos State is being carried out by different actors (international, national, subnational, and local), operating at different levels. Elinor Ostrom (2009) describe this as a polycentric approach to climate governance. However, Dorsch and Flachslan (2017) posit that polycentrism should not be used as a metaphor to describe multiple levels of governance; they conclude that local initiatives, trust and collaboration among the governance units must be considered before polycentrism can be said to be in action and not just the existence of multiple levels of governance. The next section discusses how polycentric governance approach is playing out in Lagos State.

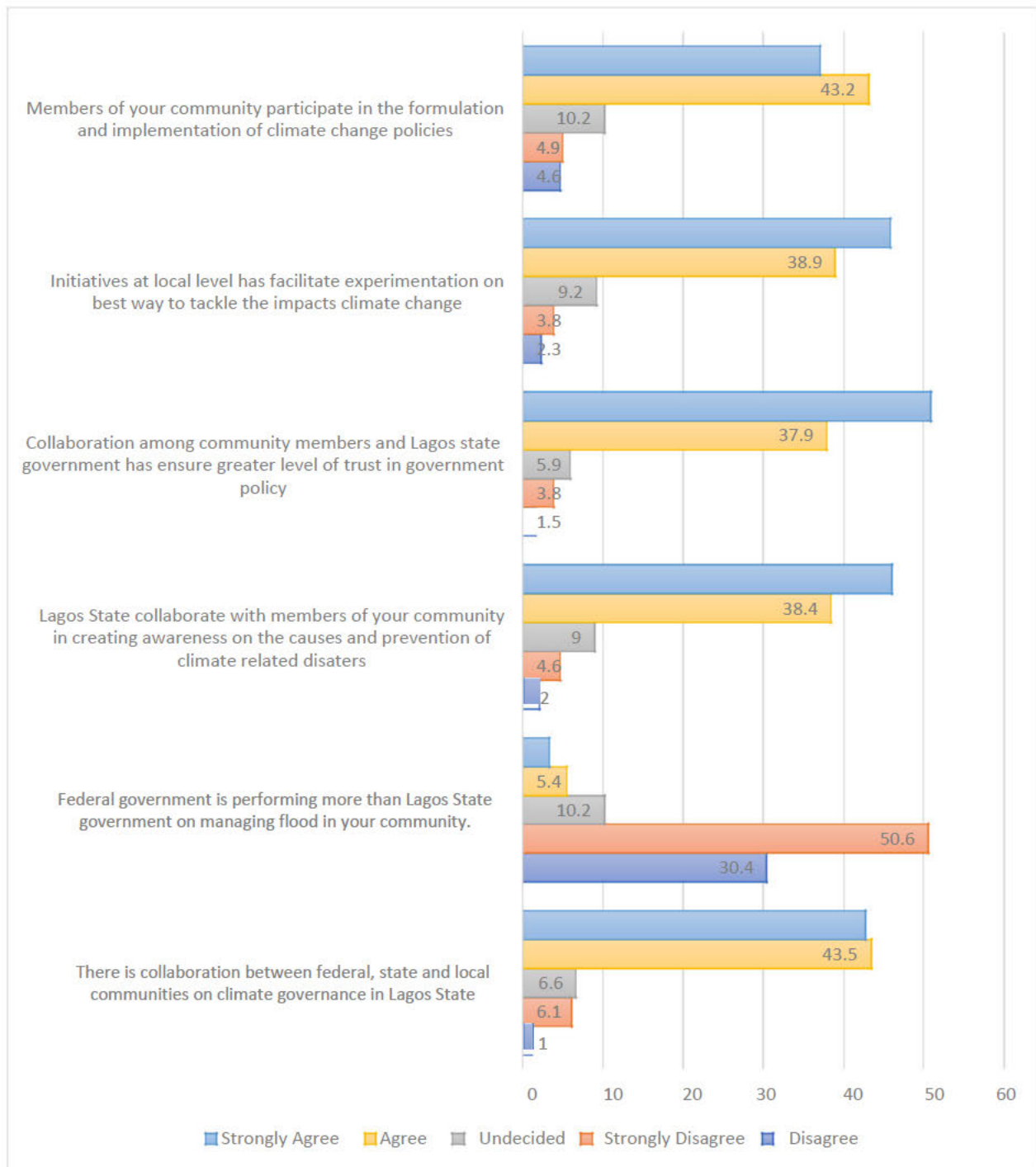
### **6.6. Polycentric Approach to Climate Governance in Lagos State, Nigeria**

Given the involvement of national, subnational, and local actors in climate governance in Lagos State, respondents were required to specify their level of agreement or disagreement with features of the polycentric governance approach, which are necessary before the climate governance architecture in Lagos State can be described as polycentric in nature. Table 6.7 and Fig 6.3 shows the responses of the participants.

**Table 6.7: Responses on how polycentrism is employed to address climate governance in Lagos State**

| S/N | Response  | Disagree  |         | Strongly Disagree |         | Undecided |         | Agree     |         | Strongly Agree |         | Total     |         |
|-----|---|-----------|---------|-------------------|---------|-----------|---------|-----------|---------|----------------|---------|-----------|---------|
|     |   | Frequency | Percent | Frequency         | Percent | Frequency | Percent | Frequency | Percent | Frequency      | Percent | Frequency | Percent |
| 39  | There is collaboration between federal, state and local communities on climate governance in Lagos State  | 4         | 1       | 24                | 6.1     | 26        | 6.6     | 170       | 43.5    | 167            | 42.7    | 391       | 100     |
| 40  | Federal government is performing more than Lagos State government on managing flood in your community. Lagos State collaborates with members of your community in creating awareness on | 119       | 30.4    | 198               | 50.6    | 40        | 10.2    | 21        | 5.4     | 13             | 3.3     | 391       | 100     |
| 41  | the causes and prevention of climate related disasters  | 8         | 2       | 18                | 4.6     | 35        | 9       | 150       | 38.4    | 180            | 46      | 391       | 100     |
| 42  | Collaboration among community members and Lagos state government has ensured greater level of trust in government policy  | 6         | 1.5     | 15                | 3.8     | 23        | 5.9     | 148       | 37.9    | 199            | 50.9    | 391       | 100     |
| 43  | Initiatives at local level have facilitated experimentation on the best way to tackle the impacts of climate change   | 9         | 2.3     | 15                | 3.8     | 36        | 9.2     | 152       | 38.9    | 179            | 45.8    | 391       | 100     |
| 44  | Members of your community participate in the formulation and implementation of climate change policies  | 18        | 4.6     | 19                | 4.9     | 40        | 10.2    | 169       | 43.2    | 145            | 37.1    | 391       | 100     |

**Source: Field Survey, 2019.**



**Fig. 6.3: How Polycentrism is being employed to address Climate Governance in Lagos State, Nigeria.**

**Source: Field Survey, 2019.**

### 6.6.1. Collaboration amongst different levels of government

It is important to know if there is a collaboration or not among the different actors involved in climate governance in Lagos State; this will shed light on the governance efforts being coordinated or disjointed. The study discovered that flood management-which is one of the main effects of climate change in the state, Table 6.7 shows that of all the respondents, 1 percent disagreed there is collaboration between national and subnational governments on flood management, 6.1 percent disagreed strongly, 6.6 percent expressed uncertainty, 43.5 percent agreed, and 42.7 percent agreed strongly. Majority of the respondents affirmed that there is a strong collaboration between the federal and subnational governments on the management of flood in Lagos State.

This finding was affirmed by the qualitative data in which an official of the subnational government stated that:

*At the subnational level, we have a good collaboration with the federal government in the implementation of our strategies, for instance, most of the emergency responses to victims of flood are being supported through the provision of financial and technical assistance by the federal government. More so, on emission reduction, at the subnational level, we are working towards achieving the reduction target set by the national government.*<sup>79</sup>

This result is in tandem with the view of polycentric theorists, that within a polycentric system, there are several governing units that cooperate and compete towards achieving a common goal (see Ostrom, 2009; Ostrom, 2010; Cole, 2015; Van der Heijden, 2018). In this study, the common goal is climate mitigation and adaptation. The management of floods is a crucial adaptation issue, and collaboration between the different levels of authority is needed to achieve a meaningful result. Likewise, on the question which seeks to know if the federal government is performing more than Lagos State government on flood management, 30.4 percent of the respondents disagreed, 50.6 percent disagreed strongly, 10.2 percent were uncertain, 5.4 percent agreed, and 3.3 percent agreed strongly. The majority of the respondents disapproved that the federal government of Nigeria is performing more than the Lagos State government on flood management in Lagos State. This result affirms another proposition by polycentric theorists that actions and initiatives would succeed more at the local stage. The Lagos State government is closer to the people of the state than the national government. Thus, governance initiatives closer to people are more likely to succeed (see Adelekan, 2016).

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<sup>79</sup>Interview with an official of Lagos State government

The collaboration between subnational actors is critical towards understanding how climate governance operates below the national level. The finding expresses that 2 percent of the respondents disagreed that Lagos State collaborates with community members in creating awareness on the causes and prevention of floods in the community, 4.6 percent disagreed strongly, 9 percent were not sure, 38.4 percent agreed, 46 percent agreed strongly (see Table 6.7 and Fig 6.3). This reveals that the majority of the respondents, representing (84.4 percent) affirmed that there is a collaboration between Lagos State and local communities in creating awareness on the causes and prevention of floods. The qualitative data confirmed the result; the interview with a government official stated that:

*We engage with members of the community through landlord associations, more so, we always community leaders to a stakeholder meeting on climate mitigation adaptation responses of the state government.*<sup>80</sup>

The finding demonstrates that apart from the partnership between national and subnational governments, there is a huge relationship between the city government and the community members. The relationship among the governing units within a polycentric system is essential for climate governance. This is because it will ensure strategic partnership for more climate initiatives like climate finance. The polycentric approach to climate governance puts into consideration multiple initiatives that either incentivise or discourage the actors of other actors involved in climate governance (Dorsch and Flachsland, 2017).

### **6.6.2. High level of trust in the climate change programmes of Lagos State government by local communities**

Trust has been elusive in the international climate change governance regime, which Barret (2003), has succinctly defined as a “free rider game”. Trust is different from blind faith, where parties sit and do the appropriate things based on the moral compass. Instead, trust is earned through mutual commitments and understanding that are not costly to monitor overtly (Ostrom *et al.*, 1994). Hence, verifiability is key to trust. In her writings, Ostrom (2009) emphasised the high level of trust that accompanies a polycentric system. Trust is seen as an important resource that enhances cooperation mostly when built across personal relationships, especially at smaller scales and lower scales. The face-to-face interactions at local levels increased the level of trust among actors at the local levels

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<sup>80</sup>Interview with an official of the Lagos State Special Climate Change Unit

if any climate governance mitigation and adaptation measures will succeed. In that case, there is a need for some level of trust of community members in the climate mitigation and adaptation programmes of the Lagos State government.

Table 6.7 and Fig 6.3 shows that the people at the local level have a high level of trust in the government and among one another. The result revealed that 1.5 percent of the respondents disapproved that the collaboration among community members and Lagos State government has ensured a higher level of trust, 3.8 percent strongly disagreed, 5.9 percent of the respondents were undecided, 37.9 percent agreed, while 50.9 percent strongly agreed (see Table 6.7 and Fig 6.3). This shows that majority of the respondents, representing (88.8 percent) affirmed that collaboration among community members and the Lagos State government had ensured a greater level of trust. This is in agreement with the significant proposition of polycentrism that trust is likely to be at a greater level if actors are allowed to organise at a local level. Cole (2015) corroborates this finding by arguing that a polycentric approach promotes communication of individuals directly and enhance trust levels. Therefore, mainstreaming trust in climate governance will benefit actors within and beyond international negotiations.

Another key assumption of the polycentric governance approach is that it facilitates local initiatives and experimentation at the local level. The data revealed that 2.3 percent of the respondents disagreed that efforts at the local level facilitate experimentation on the best way to tackle the impacts of climate change, 3.8 percent disagreed strongly, 9.2 percent were uncertain, 38.9 percent agreed, while 45.8 percent agreed strongly (see Table 6.7 and Fig 6.3). This reveals that majority of the respondents (85 percent) affirmed that initiatives at the local level are facilitating experimentation on the best way to tackle climate change. Similarly, data from the interview showed that community members do learn from adaptation measures undertaken by other communities for adoption. A community member stated that *“we do learn from flood management techniques from our neighbouring communities to know if we can adopt it in our community.”*<sup>81</sup>

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<sup>81</sup> Interview with a community member at Eti Osa

This implies that the result is in tandem with the proposition of polycentrism that local initiatives will facilitate experimentation which will encourage learning (see Ostrom, 2009; Dorsch and Flachsland, 2017).

### **6.6.3. Participation of community members in climate change policy formulation**

The involvement of community members in the process of planning and execution of climate change policies by the subnational government is critical if such a policy will meet their peculiar needs as a community. The result indicated that of all the respondents, 4.6 percent disagreed that members of the community take part in the formulation and implementation of climate change policies, 4.9 percent disagreed strongly, 10.2 percent were undecided, 43.2 percent agreed, and 37.1 percent agreed strongly (see Table 6.7 and Fig 6.3). This result indicates that the majority of the respondents representing (80.3 percent) affirmed that members of the community take part in the formulation and implementation of climate change policies. Several scholars have advocated the vigorous involvement and participation of local people in designing and implementing adaptation measures (Ayers, 2011; McClymont and Myers, 2012; Bele *et al.*, 2013; Dodman and Mitlin, 2013; Lasage *et al.*, 2015). More precisely, participatory tools such as risk and vulnerability assessments, appraisals and community participatory method will support government and communities to arrive at effective adaptation measures (Khan *et al.*, 2012; Lasage *et al.*, 2015). These tools allow communities to take active responsibility in the process of identification, prioritisation, developing and implementing adaptation measures, as appropriate and relevant to the local context (Ayers, 2011; Bele *et al.*, 2013; Driscoll *et al.*, 2013). This will make local people active agents in promoting their adaptive capacity and resilience. The participation of the people will also increase the level of awareness on the impacts of climate change (Lasage *et al.*, 2015).

## **6.7. Conclusion**

Any feasible solution to the challenges constituted by climate change in Lagos State requires the involvement of several actors at different levels of governance because of their varying degrees of power and influence on climate governance. This chapter examined the roles of subnational actors in climate mitigation and adaptation in Lagos State and the influences of polycentrism on climate governance architecture in the state. It discovered that mitigation and adaptation initiatives by the Lagos State government perform two primary purposes. One, it contributes towards the actualisation of international and national climate objectives at the local level. Two, it aims to reduce the people's

vulnerability and strengthen the adaptive capacity of the state. The local community members also design coping strategies and measures to manage flood incidences, which are prevalent in their community.

The chapter discovered the efficacy of polycentrism to climate governance in Lagos State. It pointed out that there exists a significant effect of polycentric initiatives (national, subnational, and local) on the impacts of climate change in Lagos State. This chapter argued that given the involvement of several actors at the different levels of governance on climate change in Lagos State, adopting polycentrism as an analytical approach ensures efficient and effective climate change policies. This is because polycentrism offers a unique opportunity for innovation, testing and learning at the local level. The chapter maintained that the closer a governance unit is to the people, the more effective its initiatives are at the local community level. The chapter found that the climate governance initiatives of the Lagos State government are designed in accordance with international and national climate change mitigation and adaptation goals. Thus, the city government is implementing the national target of the federal government of Nigeria whilst prioritising the adaptation needs of the local people. Unlike other cities such as California, New York and Cape Town which have emission reduction targets higher than that of their national government, Lagos State has proven to have adopted the emission reduction target set by the federal government of Nigeria. The chapter empirically corroborated the polycentric governance assumption that climate change is a polycentric problem that should be addressed at multiple levels with actors acting independently and interdependently. The chapter concludes that the initiatives of each governance level have a significant effect on the challenges of climate change in Lagos State, but at different degrees.

## CHAPTER SEVEN

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 7.1. Introduction

This chapter summarises the study's major findings, draws conclusion based on the findings, and offers recommendations and areas for further research. The study is a single-case study that utilises a mixed method approach to investigate the impacts of climate change and the efficacy of a polycentric governance approach to climate change governance in Lagos State, Nigeria. While it interrogates each polycentric actor's roles (international, national, subnational, and local), the study examines each governance domain's effectiveness on the challenges posed by climate change. This chapter is divided into four major parts. Section one summarises each chapter of the study; section two presents the summary of the study's major findings. Section three highlights the study's conclusions, while the last section proffers policy recommendations and areas for further research.

#### 7.2. Summary of each Chapter

This study examined the impacts of climate change and the efficacy of a polycentric governance approach to climate governance in Lagos State, Nigeria. The study consists of seven chapters. Chapter one presented the background of the study and the statement of the research problem; it also provides the rationale for the study and the contribution of the present study to the body of knowledge. Chapter two situates the research within a body of literature by examining themes and sub-themes relevant to the study. The chapter reviewed works of literature on climate governance from three dominant schools of thoughts. The first is the international regime approach, which views climate change as a global problem that requires a global solution by establishing international regimes. The inadequacies of the regime approach spurred the global governance approach. The global governance approach recognises non-state actors' role and the weakening role of nation-states in regulating emission generation activities due to the advent of globalisation and neoliberal economic principles. The third approach is the multilevel approach which recognises the roles of diverse actors in climate governance. The roles of cities as a site for climate governance was explored, and literature on the polycentric governance approach was reviewed.

The chapter identified that literature on polycentric climate governance is still evolving, and most of the existing scholarly works had given much attention to the global North, while countries from the global South received less scientific attention. This gap in the literature justifies the present study. Chapter three positioned the study within a theoretical framework; it presented the evolution of polycentric theory, its basic assumptions, its relevance to the study, and its limitations. The chapter showed that the polycentric theory offers a unique opportunity for dealing with collective action problem such as climate change. Its application to climate governance will enhance local initiatives, trust, experimentation, and learning, which seems complicated under the international regime approach.

Chapter four discussed in detail the methodology of the study. The chapter analysed major research paradigms in social science research, and the strengths and weaknesses of each of the paradigms were identified. The study adopted the pragmatic paradigm as the study's philosophical orientation; the rationale for choosing it is to have a holistic understanding of the research problem. Two research designs were adopted: case study and survey research designs. While the former was used to collect qualitative data from policymakers and key stakeholders responsible for climate policy formulation and implementation in Lagos State, the latter was utilised to collect quantitative data on the impacts of the policies in six selected local government areas of the state. The simple random sampling technique was adopted for the quantitative data while the purposive sampling technique was adopted for the study's qualitative aspect. The quantitative data were presented and analysed with the use of two statistical tools, descriptive and inferential statistics. Content analysis was used for the analysis of the qualitative data. The study adopted a concurrent mixed methodology by presenting and analysing the quantitative and qualitative data concurrently.

Chapter five addressed the first and second objectives of the study by examining the impacts of climate change and investigated how national and international climate policies have addressed the challenges posed by climate change in Lagos State's local communities. The chapter discovered that the effects of climate change in Lagos State are enormous, and national and international climate change policies have not adequately addressed the challenges. Chapter six dealt with the study's third and fourth objectives by investigating subnational initiatives and polycentric governance in Lagos State. The chapter found out that climate governance in the state is polycentric

due to the involvement of diverse actors operating at different levels with varying degrees of influence on climate mitigation and adaptation.

### **7.3. Summary of Major Findings**

The research objectives guide the summary of this study's major findings. The rationale for this is to delineate the essential findings and the extent to which the study has achieved the research objectives. For clarity purposes, the objectives of the study are to:

- i. examine the impacts of climate change in local communities in Lagos State;
- ii. investigate how national and international climate change policies have responded to climate change challenges in the country and Lagos State;
- iii. investigate the role of subnational governments in climate change governance;
- iv. critically appraise the effects of polycentrism on climate change governance in Nigeria and Lagos State.

- **The Impacts of Climate Change in Local Communities in Lagos State**

The socio-demographic characteristics of the participants revealed that more females participated in the study. This does not mean that there are more females in the Lagos population because the National Bureau of Statistics report shows that 52 percent of the Lagos population are male, and 48 percent are female (NBS, 2018). The rationale for the participation of more females in the study is because women and girls are more vulnerable to climate change impacts than their male counterparts. The findings revealed that smallholder women farmers who engage in subsistence farming for their family's survival are finding it difficult to farm due to the adverse effects of climate change. The respondents' age distribution showed that most of the participants were between the ages of 18 and 40 years and their educational qualification disclosed that majority of them have post-secondary school education. This connotes that most of the respondents who participated in the study are young, and they are more conversant with contemporary issues such as climate change. They are more informed about the policy responses on climate mitigation and adaptation by different actors at various levels, which enhances the credibility and validity of the research findings.

The findings indicated that the geographical features of Lagos State, which include flat topography with an elevation that is above sea level with less than 1.5m, wetlands and water bodies cover of approximately 40 percent of the land area, make the city to be highly vulnerable to the adverse impacts of climate change. The impacts of climate change that are already manifesting in the state include an increase in temperature, sea level rise, increase in the duration and intensity of rainfall, coastal erosion, loss of biodiversity, flood incidence, increase in thunderstorm, and windstorm. Data emerging from both the qualitative and quantitative section revealed a convergence among the respondents on the socio-economic effects of climate change on the different sectors of the state's economy. The findings specified that climate change impacts affect all areas of the economy including agriculture and food security, water, energy, ecosystem services and biodiversity, transport, industry, land use, human health, and human settlements. The rainfed agricultural sector is at a greater risk because flood incidence affects the soil quality, destroys farmland, and causes crop failure. The people living in coastal communities experience an outbreak of flood-induced diseases such as typhoid, meningitis, and malaria. Saltwater intrusion also affects the quality of drinking water, and aquatic resources are also in danger, with some species already going into extinction. Floods destroy buildings, water pipelines, roads, and drains. The findings revealed that while Lagos State is highly vulnerable to climate change, poor people living in coastal communities are at greater risk due to their socio-economic conditions.

- **International and National Policy Responses to Climate Change in Lagos State**

The study investigated how national and international policy responses to climate change have addressed climate change impacts in Lagos State. The study found that Nigeria is a signatory to key international agreements on climate change, and the country was among the first country to ratify the Kyoto Protocol in 2004. To show its commitment to the UNFCCC, Nigeria submitted its first communication to the UNFCCC in 2003. Nigeria developed its first national policy on climate change in 2012 and a Nationally Appropriated Mitigation Action (NAMA) in 2015 with a 45 percent conditional and 20 percent unconditional reduction of GHGs. The country has mitigation and adaptation goals for each sector of the economy to strengthen the country's adaptive capacity to climate change at the national level, enhance low carbon and sustainable economic growth, create awareness, and encourage public-private partnership. However, the findings revealed a sharp contrast and divergence between the qualitative and quantitative data on how national and

international policies have addressed climate change impacts in the study area. The majority of the quantitative data respondents, which are community members in the six selected local government areas, submitted that Nigeria's federal government does not have any programme on climate change or environmental protection in their community.

On the other hand, for the qualitative data, the Lagos State government officials who participated in the interview said that the international and national policies set the pace for subnational governments to develop climate policy. The study revealed that the role of international and national climate change policies include agenda-setting for other levels of government. One of the Lagos State climate change programmes' objectives is to support the realisation of the international and national climate governance goals on one hand, while taking into consideration their local peculiarities on the other. For instance, the study indicated that Lagos State does not have an emission reduction target but adopted the emission reduction target of 20 percent conditional and 45 percent unconditional set by Nigeria's federal government. The finding discovered that the subnational government could not adequately provide climate financing without support from the international and national governance domain. The findings showed that although Nigeria's federal government has several policies and measures on climate mitigation and adaptation, they have not adequately addressed the local communities' adaptation needs, which justifies the subnational government's involvement in climate governance.

- **Subnational Initiatives and Climate Governance in Lagos State**

The study examined the role of subnational actors in climate governance in Lagos State. It identified three subnational actors working on climate governance, which included the Lagos State government, local community members and non-governmental organisations. The findings disclosed that Lagos State's government involvement in climate governance is due to the national government policy's inadequacy in addressing the challenges posed by climate change impacts. Lagos State has three measures for climate governance. One is the institutional measures, which is the establishment of institutions to deal with climate change issues specifically. Secondly, the development of climate change policy, notably, the Lagos State Climate Change Adaptation Strategy in 2011 and the Lagos State Climate Change Policy in 2014. The third measure includes developing innovative adaptation and mitigation measures to strengthen the state's adaptive

capacity to climate change. The study discovered that Lagos State is the first subnational state in Nigeria to develop a climate change policy and establish institutions for climate change issues. However, the study showed that despite the climate change mitigation and adaptation measures rolled out by the Lagos State government, funding for the environmental protection unit experienced a downward review between 2011 and 2019 (see LSMEPB, 2020). The impact of lack of adequate financing was shown in the absence of sufficient support for victims of climate-related disasters by the Lagos State government. The majority of the respondents stated that they did not receive any funding support from the Lagos State government after experiencing flooding that destroyed their properties.

On the contrary, the government agency claims that they provide minimal support to victims of climate-related disaster due to the agency's financial constraint. With the use of Multiple Regression Analysis, the findings indicated that some of the measures and programmes of the Lagos State government had a significant effect on the impacts of climate change, while some had a lesser effect. The failure of some of the Lagos State government's measures to adequately address the local people's adaptation needs drives the local community members' involvement in climate adaptation. The community members developed their coping strategies through community landlord associations'. Some community strategies are clearing of drains, planting trees, proper disposal of wastes, and construction of wooden bridges. Non-governmental organisations also work with the local community to implement adaptation measures, most especially on waste management. The findings discovered that the two major recycling programmes in Lagos State, namely the Recycles Pay Education project and the Value for Waste Initiative, are funded by local NGOs with local communities at the heart of its implementation.

- **Effect of Polycentrism on Climate Governance in Lagos State**

The involvement of international, national, and subnational actors in climate governance in Lagos State illustrates some degree of polycentrism. The study revealed that each governance units involved in climate governance in Lagos State have some level of effects on climate change impacts. The findings specify the efficacy of a polycentric approach due to the involvement of different actors operating at different governance levels. The study also showed that a robust relationship exists among the different actors involved in climate governance in the state. This is

because trust, which seems to be elusive in the international climate governance framework, is found obvious in the governance of climate change in Lagos State. The findings indicate that face-to-face interactions among the different levels of governance involved in Lagos State's climate governance have facilitated and engendered trust.

The findings indicated a collaboration among the different governance units on the management of flood in Lagos State. This is revealed in the provision of financial and technical assistance by the federal government to the Lagos State government as a form of support towards achieving the subnational climate adaptation and mitigation goals. The findings corroborate the polycentric assumption of cooperation among the different governance units involved in governance. It showed that polycentrism had enhanced the development of local climate initiatives in the state. This is revealed by the various innovative adaptation and mitigation actions by subnational actors in Lagos State, most especially on alternative energy, waste management and urban planning. This illustrates that rather than relying solely on the international agreements under which developing countries have minimal mitigation goals, the involvement of multiple actors has led to the development of several mitigation programmes which will contribute towards the global target of emission reduction of 2 percent by 2030.

#### **7.4. General Conclusion**

This study argues that the impacts of climate change vary depending on geographical, social and economic factors. The study revealed that the geographical features of Lagos State make it to be highly vulnerable to the adverse effect of climate change, which is already manifesting in sea level rise, increase in temperature, increase in the duration of rainfall, flood and loss of biodiversity. These impacts pose a huge threat to crucial sectors of the state economy and the realisation of SDGs. The study concluded that if an increase in global temperature persists, it poses a great danger to Lagos State's existence.

The study discovered that the international governance domain performs four functions in climate governance, which include agenda-setting by facilitating nation-states' attention to climate change. It provides an avenue for policies and best ideas from other countries; it offers informed scientific findings on climate change through the IPCC. It creates an avenue for governments to develop

informal networks for climate governance. However, the study concludes that local communities where the adverse impacts of climate change are being felt are not adequately represented in the international climate change conference. This is because the international climate governance framework views nation-states as the key actors in negotiating binding agreements and places enormous power on sovereign states to regulate their country's GHGs by setting emission reduction targets. The study showed that globalisation and neoliberal principles, which led to the privatisation of high emissions generation sectors such as energy, transport and oil and gas, had revealed the weakening roles of nation-states in regulating emission activities. Thus, there is the need to recognise the roles of other actors operating at different levels. The study concludes that international policies shape nation-states' behaviour and action towards climate governance by ratifying international climate treaties. Still, the international climate change policies have not adequately addressed the needs of the local communities, and little has been achieved in terms of global emission reduction.

The thesis discovered that Nigeria's federal government has several policies on climate change and environmental protection, which are designed to achieve the nation's commitment under the Kyoto Protocol and Paris Agreement. The study concludes that most of these policies are just on paper without a concrete implementation plan. They do not adequately reflect the climate adaptation needs of Lagos State, which, as predicted, will be inundated by water by the year 2100 if the sea level rises by 1m. The lack of adequate national policy response to its peculiarities drives the Lagos State government to be involved in climate governance by establishing institutions, developing climate change policies, and innovative mitigation and adaptation measures.

The study contends that subnational actors are an important site for climate action because of their emission generation activities. Most high emission generating activities are being carried out at the subnational level, which gives subnational governments the power to regulate high emissions generating sectors such as energy, waste, transportation, land use, and urban planning. Subnational governments offer a unique opportunity for climate mitigation and adaptation because they control some of these activities. The study argues that the climate mitigation and adaptation measures by the Lagos State government is not sufficient to address the challenges posed by climate change in local communities; this necessitates the involvement of local community members in developing

climate adaptation strategies. The study showed that the local community is an essential site for climate action because climate change is a local issue. Any national and international climate change policy that is not backed with local action is doomed to fail. People affected by floods, drought, hurricane, and other extreme weather events are at the local level, and this gives local people a more significant role in climate change adaptation. The study revealed that local community members in Lagos State design and implement their coping strategies, most especially in flood management. The study concludes that government at all levels should work closely with local community members on community-based adaptation measures that have proven to reduce people's vulnerability to climate change.

The thesis's central argument is that since the causes of climate change are from human activities operating at diverse levels, responses to climate change should also be from diverse levels. Hence, the study questioned the efficacy of international, national, or regional approaches to climate governance. The study argues that the framing of climate change as a global problem often ignores other levels of decision-making. Thus, rather than considering climate change as a global problem that requires a global solution only, it should be regarded as a multilevel problem that requires a multilevel solution. The involvement of different actors operating at different governance levels to tackle the collective action problem of climate change is described as a polycentric approach to climate governance.

The study maintains that climate change is a polycentric issue that should be dealt with at diverse levels by multiple actors cooperating and competing with one another, with the ultimate goal of climate change mitigation and adaptation. Each actor's efforts relating vertically and horizontally will culminate into significant efforts with enduring impacts on climate mitigation and adaptation. The study concludes that the involvement of multiple actors in climate change governance in Lagos State has resulted in multiple benefits at diverse levels.

## **7.5. Recommendations**

The research findings informed the following recommendations:

**The international governance domain should recognise subnational governments as formal actors in the negotiation of global climate change agreements**

The international climate governance regime recognises nation-states as the principal actors in the negotiation of climate change agreements. The Paris Agreement recognises the unique position of subnational governments as an avenue for ambitious climate action, by referring to them as country-driven processes (Van Der Heijden, 2018). Subnational national governments have seen themselves as an important site for the implementation of climate action by developing several climate mitigations and adaptation measures both locally and through transnational networks. Despite the roles of subnational governments in climate adaptation and mitigation, they are not recognised as formal actors in the UNFCCC COPs. They only participate in side events that do not have any impact on the international agreement negotiating process. Recognising subnational actors as formal actors in the global climate change agreement negotiating process will allow them to negotiate and ratify international agreement irrespective of their national government's position. This will eliminate the blame game by nation-states and facilitate more climate action plan rather than waiting for nation-states which, in most cases, are considering economic interest more than climate action.

### **Local communities should be adequately represented at the UNFCCC climate change conferences**

Since, inception, the international climate change conferences have been dominated by representatives of nation-states, diplomats, career negotiators, ambassadors and NGOs. Local community members who are the worst hit by climate change impacts are not adequately represented. If, by any means, local community members are present, they are funded by NGOs and not by their national governments. Local leaders always participate inside events and not part of the discussion room where the major decisions on international climate agreements are taken. Participation of local community members in the main event will allow them to contribute meaningfully to the debate, and it will make the agreements to reflect the adaption needs of local communities.

### **National policies on climate change should be location-specific**

The national policy of environment in Nigeria does not specify the country's areas and location in which each of the policy goals will be implemented; this makes the policy's performance to be poor. Given that the impacts of climate change differ in each region of the country, the policy ought to

specify the goal for each part of the country; this will make tracking of progress easy and enhance implementation. For example, the northern region of the country is experiencing drought and desertification, while the southern part is experiencing coastal erosion and floods. The target of the policy for each region should be clearly stated in the policy objectives by reflecting the mitigation and adaptation needs of each part of the country.

### **National climate change policies should have a timeline for implementation**

The federal government of Nigeria has several policies on climate change but with no timetable to monitor the process of implementation. This makes these policies to be poorly implemented, and some are not implemented at all. A timeline for implementation will enhance the achievement of the policy objectives and goals.

### **The local community should be at the centre of climate change policy formulation and implementation**

The government at all levels in Nigeria should ensure that the local community members are at the centre of climate policy formulation and implementation. In Nigeria, both the national government and subnational government appear to be too far from the people at the grassroots, not because the people choose to be far from the government, but the government chooses to be far from the people. As election materials get to every nook and cranny of the country during elections, so should dividends of governance. Local community members should be adequately represented in the process of formulation and implementation of climate change policies. This will ensure that climate change policies reflect the climate adaptation needs of the people.

### **Government at all levels should commit more funds to environmental issues**

It appears that the different levels of government in Nigeria are not giving climate change issues the emergency response that it deserves. At the same time, the people, especially the poor, are left to bear the brunt of climate change impacts. It is important for government to commit more funds to environmental issues. This could be done through a gradual increment in the budgetary allocation for environmental protection and emergency funding for climate-related disaster. The establishment of institutions and policies without adequate funding will not achieve the desired mitigation and adaptation goals.

### **Donor agencies should support community associations**

Donor support for climate change issues is currently being given to the government and NGOs with the aim that such funding should be used to support adaptation at the local level. However, the reality shows that accountability becomes an issue while the local communities, in most cases, do not receive any form of support. Community Associations have proved to be more effective in terms of adaptation support to their members than government agencies and NGOs. Meanwhile, their only source of income is through members' contribution. Support to community association by donor agencies will facilitate and enhance more community-based adaptation initiatives at the local level.

### **Public Education and Awareness Campaign on causes and impacts of climate change**

Government at all levels must deepen their awareness campaign on climate change causes and impacts. Public education will enable people to know how their daily energy consumption contributes to climate change and the importance of adopting green and renewable energy. The benefits that will accrue through awareness creation will increase the number of people informed about climate change, and it will aid the preparedness of people for potential climate change impacts. Public education will also enhance the achievement of the climate change mitigation and adaptation goals of the state.

### **Investment in Renewable Energy**

The study showed that the use of renewable energy in Nigeria is poor due to its non-affordability. The country has abundant solar power, but it is yet to be converted to solar energy for use by the people. The few private investors in Nigeria's renewable energy market are the primary reason renewable energy is not affordable. The federal government's huge investment in renewable energy will make it affordable for the citizens, and the government's mitigation goals of 20 percent conditional and 45 percent unconditional by 2030 will be achievable.

### **7.6. Areas for Further Research**

The study investigated the impacts of climate change in Lagos State and the efficacy of a polycentric governance approach by unravelling the initiatives of the different governance units involved in climate governance and the effect of the different governance measures on climate

change impacts in Lagos State. Hence, this study is more concerned about how polycentric actions have met local communities' climate adaptation needs in Lagos State. Future research can investigate the effect of polycentric initiatives on climate mitigation by focusing on the long-term effect of polycentric initiatives on global emission reduction target. Studies on polycentric climate governance are still growing, and studies from the global South are few. Further research can also investigate how polycentric climate governance is playing out in other countries in Africa.

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## APPENDIX A: Gate Keeper's Letter



LAGOS STATE GOVERNMENT

MOE/8178/VOL.1/8

16<sup>th</sup> May, 2019

The Chairperson  
Humanities and Social Research Ethics Committee  
University of Kwa - Zulu Natal,  
Durban South Africa.

**RE: APPLICATION FOR PERMISSION TO CONDUCT PhD RESEARCH -  
ADEKUNLE AKINOLA (218086246)**

I am directed to acknowledge the receipt of a letter on above subject heading from one Mr. Adekunle Akinola (218086246), a PhD student at the University of Kwa - Zulu Natal, Durban, South Africa.

2. After careful consideration of his request, I am to inform you of the approval of the Permanent Secretary, Ministry of the Environment, Lagos State for the requisite interview to contribute to his research work on "Climate Change in Lagos State, Nigeria: A polycentric Governance Approach" whenever he is Lagos, Nigeria.
3. In view of the above and for purpose of follow-up, he should contact the Directors - in - charge of the Environmental Management Department and the Climate Change Unit with details as follows respectively:
  - i. Mr. Sheriff Savage  
E-mail: [ssavage943@yahoo.com](mailto:ssavage943@yahoo.com)  
Tel No: +234-1-8023144183
  - ii. Mr. Bankole Michael  
E-mail: [kibat12012@gmail.com](mailto:kibat12012@gmail.com)  
Tel No: +234-1-8022909780
4. Thank you.



MINISTRY OF THE ENVIRONMENT

## APPENDIX B: Ethical Clearance Letter



08 October 2019

Mr Adekunle Akinola (218086246)  
School of Social Sciences  
Howard College Campus

Dear Mr Akinola,

Protocol reference number: HSSREC/00000438/2019

Project title: Climate change in Lagos State, Nigeria: A Polycentric Governance approach

### Approval Notification – Expedited Application

This letter serves to notify you that your application received on 06 September 2019 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL**.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid for one year from 08 October 2019.

To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 – 3 months before the expiry date. A close-out report to be submitted when study is finished.

Yours sincere

Dr Rosemary Sibanda (Chair)

/ms

Humanities & Social Sciences Research Ethics Committee  
Dr Rosemary Sibanda (Chair)  
UKZN Research Ethics Office Westville Campus, Govan Mbeki Building  
Postal Address: Private Bag X54001, Durban 4000  
Website: <http://research.ukzn.ac.za/Research-Ethics/>

Founding Campuses: Edgewood Howard College Medical School Pietermaritzburg Westville

INSPIRING GREATNESS

## APPENDIX C: Renewal of Ethical Clearance



09 September 2020

Mr Adekunle Akinola (218086246)  
School of Social Sciences  
Howard College Campus

Dear Mr Akinola,

Protocol reference number: HSSREC/00000438/2019

Project title: Climate change in Lagos State, Nigeria: A Polycentric Governance approach

### Approval Notification – Recertification Application

Your request for Recertification dated 27 August 2020 was received.

This letter confirms that you have been granted Recertification Approval for a period of one year from the date of this letter. This approval is based strictly on the research protocol submitted and approved in 2019.

Any alterations to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study must be reviewed and approved through the amendment /modification prior to its implementation. Please quote the above reference number for all queries relating to this study.

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years

All research conducted during the COVID-19 period must adhere to the national and UKZN guidelines.

HSSREC is registered with the South African National Research Ethics Council (REC-040414-040).

Yours sincerely,



Professor Dipane Hlalele (Chair)

/dd

Humanities & Social Sciences Research Ethics Committee  
UKZN Research Ethics Office Westville Campus, Govan Mbeki Building  
Postal Address: Private Bag X54001, Durban 4000  
Tel: +27 31 260 8358 / 4557 / 3587  
Website: <http://research.ukzn.ac.za/Research-Ethics/>

Funding Campus: Edgwood Howard College Medical School Pietermaritzburg Westville

INSPIRING GREATNESS

## APPENDIX D: Informed Consent Letter

### Informed Consent Document

Dear Participant,

My name is Adekunle Akinola with student number (218086246). I am a PhD candidate studying at the University of KwaZulu-Natal, Howard Campus, Durban, South Africa. The title of my research is: **Climate Change in Lagos State, Nigeria: A Polycentric Governance Approach**. The aim of the study is to explore the policies of Lagos State government on climate change mitigation and adaptation and the impacts of such policies on climate change governance. I am interested in interviewing you so as to share your experiences and observations on the subject matter.

Please note that:

- The information that you provide will be used for scholarly research only.
- Your participation is entirely voluntary. You have a choice to participate, not to participate or stop participating in the research. You will not be penalised for taking such an action.
- Your views in this interview will be presented anonymously. Neither your name nor identity will be disclosed in any form in the study.
- The interview will take maximum of 1hr.
- The record as well as other items associated with the interview will be held in a password-protected file accessible only to myself and my supervisor. After a period of 5 years, in line with the rules of the university, it will be disposed by shredding and burning.
- If you agree to participate please sign the declaration attached to this statement (a separate sheet will be provided for signatures)

I can be contacted at: School of Social Sciences, University of KwaZulu-Natal, Howard Campus. Email: 218086246@stu.ukzn.ac.za ; Cell: +27848458387 My supervisor is Dr N. Magam who is located at the School of Social Sciences, Pietermaritzburg Campus of the University of KwaZulu-Natal. Contact details: email [magamn@ukzn.ac.za](mailto:magamn@ukzn.ac.za) Phone number: +27760644696. The Humanities and Social Sciences Research Ethics Committee contact details are as follows: MsPhumeleleXimba, University of KwaZulu-Natal, Research Office, Email: [ximbap@ukzn.ac.za](mailto:ximbap@ukzn.ac.za) , Phone number +27312603587.

Thank you for your contribution to this research.

Adekunle Akinola

**DECLARATION OF CONSENT**

I..... (full names of participant)  
hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire. I understand the intention of the research. I hereby agree to participate.

I consent / do not consent to have this interview recorded

SIGNATURE OF PARTICIPANT

DATE

.....

.....

## APPENDIX E: Questionnaire

Dear Respondent,

This questionnaire is designed to elicit information on Climate Change in Lagos State, Nigeria: A Polycentric Governance Approach. I assure you that the research is to determine the impacts of climate change and the efforts of various levels of governance on climate change mitigation and adaptation in Lagos State, Nigeria. The information you give shall be held in confidence and be used for research purpose only.

Thank you for your anticipated cooperation.

### SECTION A

#### PERSONAL INFORMATION (Please tick as appropriate)

1. Sex: Female ( ) Male ( )
2. Age: 18-30 ( ) ; 30-40 years ( ) ; 40 years and above ( )
3. Marital Status: Single ( ) ; Married ( ) Divorced ( ) Separated ( ) Widow ( )
4. Educational Background: Primary ( ) SSCE ( ) ; ND ( ) ; HND: ( ) ; BSc ( ) ; PGD ( ) ; MSc ( ) ; None ( ) .
5. Are you employed? Yes ( ) , No ( )
6. If yes, what is the nature of your job? Civil Servant ( ) Trader ( ) Student ( ) Others ( )

### SECTION B

Kindly answer the following questions by ticking (√) any of the following options: Agree (A), Strongly Agree (SA), Undecided (UN) Disagree (D), Strongly Disagree (SD).

What are the impacts of climate change in Lagos State?

| S/N | Questions   | A | SA | UN | D | SD |
|-----|---|---|----|----|---|----|
| 1.  | There is an increase in the duration and intensity of rainfall in your community. |   |    |    |   |    |
| 2.  | There is an increase in temperature (heat) in your community.                     |   |    |    |   |    |
| 3.  | There is an increase in sea level rise in your community.                         |   |    |    |   |    |
| 4.  | There are heavy thunderstorm and windstorm in your community.                     |   |    |    |   |    |
| 5.  | Flood is a common incident in your community.                                     |   |    |    |   |    |
| 6.  | Soil erosion is very prevalent in your community.                                 |   |    |    |   |    |
| 7.  | Some species of fish are no longer found in the water in your community.          |   |    |    |   |    |

To what extent have the national policies addressed climate change impacts in Lagos State?

| S/N | Questions   | A | SA | UN | D | SD |
|-----|---|---|----|----|---|----|
| 8.  | The federal government of Nigeria has several programmes on environmental protection in your community.                             |   |    |    |   |    |
| 9.  | Members of your community do participate in the implementation of these programmes.   |   |    |    |   |    |
| 10. | These programmes by the federal government have reduced the vulnerability of your community to the effects of climate change.       |   |    |    |   |    |
| 11. | There is awareness campaign by federal government of Nigeria on the causes and impacts of climate change in your community.         |   |    |    |   |    |
| 12. | The federal government of Nigeria has green and resilient cities programme in your community.                                       |   |    |    |   |    |
| 13. | The federal government of Nigeria does provide financial support for victims of extreme weather events such as flood and windstorm. |   |    |    |   |    |
| 14. | The federal government of Nigeria has a rural electrification programme in your Community   |   |    |    |   |    |
| 15. | The federal government of Nigeria has a tree planting campaign in your community  |   |    |    |   |    |
| 16. | The federal government of Nigeria has a programme for promoting the use of animal waste as manure in your community                 |   |    |    |   |    |
| 17. | The federal government of Nigeria has a law of management of forest reserve in your community                                       |   |    |    |   |    |

What role has been/ can be played by Lagos State government on climate mitigation and adaptation governance?

| S/N | Questions   | A | SA | UN | D | SD |
|-----|---|---|----|----|---|----|
| 18. | The Lagos State government has several programmes on climate change in your Community |   |    |    |   |    |
| 19. | Members of your community are involved in the implementation of these policies        |   |    |    |   |    |
| 20. | The Lagos State government has a law against bush burning                             |   |    |    |   |    |
| 21. | The Lagos State government has a law against indiscriminate disposal of wastes        |   |    |    |   |    |
| 22. | The Lagos State government has a law against cutting of trees                         |   |    |    |   |    |

|     |   |  |  |  |  |  |
|-----|---|--|--|--|--|--|
| 23. | The Lagos State government has awareness programme on climate change                |  |  |  |  |  |
| 24. | The Lagos State government encourages the use of renewable energy                   |  |  |  |  |  |
| 25. | The Lagos State government provide means for waste disposal                         |  |  |  |  |  |
| 26. | There is good drainage system in your community                                     |  |  |  |  |  |
| 27. | The Lagos State government assists victims of flood incidence                       |  |  |  |  |  |
| 28. | Lagos State government has a massive Bus service using CNG                          |  |  |  |  |  |
| 29. | There is improvement of water transportation in your community                      |  |  |  |  |  |
| 30. | The Lagos State government has a tree planting awareness campaign in your Community |  |  |  |  |  |

What role has been / can be played by local communities in climate change mitigation and adaption?

| S/N | Questions  | A | SA | UN | D | SD |
|-----|--|---|----|----|---|----|
| 31. | There is a coping strategy for managing negative impacts of climate change in your Community |   |    |    |   |    |
| 32. | Community members design and implement their own coping strategy                             |   |    |    |   |    |
| 33. | There is awareness campaign on climate change by members of your community                   |   |    |    |   |    |
| 34. | Community members know of the effects of their daily energy consumption on the Environment   |   |    |    |   |    |
| 35. | Community members do encourage the use of renewable energy                                   |   |    |    |   |    |
| 36. | Community members do encourage proper disposal of wastes                                     |   |    |    |   |    |
| 37. | Community members do encourage tree planting   |   |    |    |   |    |
| 38. | Community members know the adverse effect of bush burning on the environment                 |   |    |    |   |    |

How can polycentrism be employed to address climate governance in Lagos State, Nigeria

| S/N | Questions  | A | SA | UN | D | SD |
|-----|--|---|----|----|---|----|
| 39  | There is collaboration between federal, state and local communities on climate governance in Lagos State                               |   |    |    |   |    |
| 40  | Federal government is performing more than Lagos State government on managing flood in your community.                                 |   |    |    |   |    |
| 41  | Lagos State collaborate with members of your community in creating awareness on the causes and prevention of climate related disasters |   |    |    |   |    |

|    |   |  |  |  |  |  |
|----|---|--|--|--|--|--|
| 42 | Collaboration among community members and Lagos state government has ensure greater level of trust in government policy |  |  |  |  |  |
| 43 | Initiatives at local level has facilitate experimentation on best way to tackle the impacts climate change              |  |  |  |  |  |
| 44 | Members of your community participate in the formulation and implementation of climate change policies                  |  |  |  |  |  |

## **APPENDIX F: Interview Schedule: Government officials at the Lagos State Ministry of Environment**

1. I will like you to please introduce yourself and the responsibility of your office.
2. What drives Lagos State government to engage in climate change governance?
3. What is the mandate of the Special Climate Change Unit?
4. What are the policies of the Federal government of Nigeria on climate change?
5. Are these policies being implemented in Lagos State?
6. If (5) is yes, which of these policies are being implemented and how?
7. What are the impacts of these policies on emission reduction in Lagos State?
8. How do these policies reduce the vulnerability of the people of Lagos to climate change impact?
9. What major climate change policies have been initiated by Lagos State government?
10. What are the processes involved in the formulation and execution of these policies?
11. How are these policies being implemented?
12. How do these policies affect emission reduction in Lagos State?
13. How do these policies shape the consumption of energy among the people of Lagos?
14. Are members of the community part of the formulation and implementation of climate change policies?
15. If (14) is yes, how are they being involved?
16. How do your office coordinate government departments and local communities involved in climate governance?
17. Who are the major external partners that Lagos State government interact with on climate governance and why?
18. What has been the most symbolic activities undertaken by Lagos State government on the governance of climate change?

19. What is the relationship between Lagos State and Federal government on the governance of climate change?
20. What are the challenges of climate policy formulation and implementation in Lagos State?
21. How are these challenges being overcome?

## **APPENDIX G: Interview Schedule with Community Leaders**

1. I will like you to please introduce yourself and the name of your community
2. How does climate change affect your community?
3. What are the programmes of federal government of Nigeria on climate change in your community?
4. How do these programmes affect your community?
5. What are the programmes of Lagos State government to tackle the effects of climate change in your community?
6. Do you participate in the process of the formulation and implementation of these climate change programmes?
7. How do these policies of Lagos State government affect your community?
8. During and after floods, do you receive any form of support from the federal government of Nigeria?
9. Which agency of the federal government does provide the support?
10. During and after floods, do you receive any form of support from Lagos State government?
11. Which agency of Lagos State government does provide support for you during flood?
12. How does your community cope during flood?
13. List some of the ways that members of your community respond to flood?
14. Between Federal government of Nigeria and Lagos State government, who do you enjoy more support from during floods?
15. Is there any campaign on the causes and impacts of climate change in your community?
16. Who is responsible for this awareness campaign?
17. How do members of community dispose their wastes?
18. What is the major source of electricity in your community?
19. Is bush burning common in your community?
20. Can describe any environmental offence in Lagos State?

21. How will you rate the performance of Lagos State government in response to floods in your community?

22. How will you rate the performance of the federal government of Nigeria in response to floods in your community?

## **APPENDIX H: Interview Schedule with Non-governmental Organisations**

1. I will like you to please introduce yourself and the name of your organisation
2. What drives your organisation to work on climate change issues in Lagos State?
3. What are the major programmes on climate change that your organisation is implementing?
4. Who are your key partners in the implementation of these programmes?
5. Who are your external partners on these programmes?
6. How do you work with members of the community in implementing your programmes?
7. How do you work with the Lagos State government in implementing your programmes?
8. How do you measure and determine the outcome of your programmes?
9. How do these programmes reduce the vulnerability of Lagosians to the impacts of climate change
10. How do your programmes enhance climate mitigation and adaptation in Lagos State

# EKITI STATE UNIVERSITY, ADO-EKITI

P.M.B. 5363, Ado-Ekiti, Ekiti-State, Nigeria



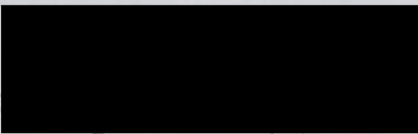
## FACULTY OF ARTS DEPARTMENT OF ENGLISH & LITERARY STUDIES

Your Ref:.....Our Ref:.....Date: 5/21/21

### CERTIFICATE OF EDITING

This is to certify that I, Professor Victor Ogbeide of the Department of English and Literary Studies, Ekiti State University, Ado-Ekiti, Nigeria have edited the Ph.D Thesis titled "**Climate Change in Lagos State, Nigeria: A Polycentric Governance Approach**" belonging to AKINOLA, Adekunle of the School of Social Sciences, University of Kwazulu-Natal, South Africa.

Thank you.

Prof. 

08062159450

Ogbeide\_v@yahoo.com

0446

# Climate Change in Lagos State, Nigeria : A Polycentric Governance Approach

by Adekunle Akinola

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