Indigenous Knowledge Ethics for Climate Change Adaptation and Coloniality in Africa

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Dedication

This work is dedicated to the Creator of forests and all the life-sustaining 'stock' therein. Also to all capitalists who are ethically remodeling their lifestyle, consumption and production patterns to recognize the 'planet before profit', and to those who follow this divine instruction: "*When you besiege a city for a long time, while making war against it to take it, you shall not destroy its trees…if you can eat of them, do not cut them down to use in the siege, for the trees of the field is man's food"* (Deuteronomy 20:19).

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Preface

Even though the importance of indigenous knowledge is gradually being recognized in development studies, however, little attention had been given in research to the value of indigenous knowledge in climate change adaptation. Climate change adaptation projects and programmes in rural Africa can learn from experiences of other developmental projects by recognizing the value of indigenous knowledge for forest management. To fill this gap, this book recognizes the need to integrate indigenous knowledge into formal western science in order to build adaptive capabilities of communities in rural Africa to adequately adjust to impacts and stressors of climate change. This book certainly adds value to the current global advocacy on climate change adaptation and rural development; as well as boost the volume of literature that is beginning to build around indigenous knowledge and sustainable development in Africa.

The book is useful to academia, community development practitioners, government and non-governmental organizations, consultants and practitioners, students in the field of rural sociology and sustainable development to understand how to consider climate change and its adaptation strategies to being dynamic, multi-disciplinary, multi-sectoral and multi-dimensional. This book takes up many of the research challenges articulated in the Millennium Ecosystem Assessment. Given the fact that the Millennium Assessment was primarily an assessment, it did not generate new primary knowledge, but just highlighted many uncertainties that exist about climate change issues. This book attempts to address these challenges in a localized context by providing a robust evidence-base that supports improved implementation of climate change adaptation schemes in rural Africa. That is, to set up negotiations within the climate change adaptation agenda in ways that the 'western scientific' and 'local-traditional practices' and authorities can work ethically, seriously and respectfully to combat climate change in the African continent. The book recognizes that interactions between indigenous knowledge systems and climate change adaptation,

and resulting feedbacks are dynamic, location and time-specific, occurring at different scales, and responding to bunches of different drivers.

The study area wherein data for this book emerged consists of primary forests in Nigeria. Like other parts of forested and tropical Africa, the climate of forest-dependent Nigeria is controlled by the annual cycle of movement of two contrasting air masses. Within normal climatic conditions, the dry continental tropical air mass with its northeasterly winds (harmattan) usually dominates forest-dependent Nigeria between December and January; while from July to August, the warm humid maritime tropical air mass penetrates furthest inland, bringing abundant rainfall with its associated southeasterly winds. Tropical rain forest climate prevails in forest-dependent communities of Nigeria with monsoon rains and an annual rainfall that is over 3000mm. Most of the rainfall occurs between April and October while the dry season is from November to March with dominantly dry northeasterly winds. Temperatures show very little monthly variation in communities of forest-dependent Nigeria, the mean actual maximum and minimum temperatures being 30^0C respectively. In other regions of the country, the relative humidity has a monthly average of over 70 per cent throughout the year with a maximum of 85 per cent between July and September during the peaks of the rains. Sunshine duration in most communities of forest-dependent Nigeria in recent years has become low, from 50 per cent in the dry season to 30 per cent in the rainy season. The daily evaporation in these communities ranges from a minimum of about 3mm per day in July to a maximum of about 5mm per day in February.

Due to the fundamental importance of good governance for the maintenance and enhancement of forest resources-ecosystem services and climate change adaptation in Africa, this book examines indigenous practices and belief systems that prevail within forest-dependent Africa, highlighting how these are being shaped and transformed by forces of coloniality. The thrust of the book is to explain how indigenous knowledge for forest-management contest with forces of coloniality to guide and direct the robust adoption of

suitable behavioural patterns that promote sustainable use of forest resources among forest-dependent peoples of the African continent. Basically, the following underlying assumptions framed directly and indirectly arguments, evidence generation, and conclusions in this book:

(i) there are multiple understandings and interpretations of climate change and its adaptation measures among forest-dependent peoples of the African continent. Consequently, these disparate understandings and interpretations influence and determine how climate change adaptation programmes and activities are designed and implemented in Africa.

(ii) Decision-makers for climate change adaptation in Africa need the evidence to demonstrate how 'outsiders' and 'indigenous' knowledge systems impact on the success of climate change adaptation behaviour in the continent.

(iii) Forest governance reform requires strong partnerships founded on respect for the rights and active participation of forest-dependent peoples and communities. Key areas of concern are the clarification of land tenure rights and strengthening of indigenous practices and beliefs.

The book essentially argues that in the Anthropocene society, change occurs from two sources. The first source of change consists of factors that are random and unique such as impacts of climate change. The second source of change consists of systematic factors, which are usually institutional in character, involving changes in the knowledge system for example. Thus, development and social change in the book are a combination of systematic factors along with some random or unique factors. This explains why binding commitments and the language of climate change adaptation in the current climate regime appear unclear and imprecise. Even the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (KP) texts on adaptation focused mainly on planning rather than action. Compared to mitigation, for which there are legally binding commitments and compliance mechanisms; the

legal base of climate change adaptation is still weak particularly in the African continent. Thus, this book explains this vagueness in language and weakness in policy wthin the Africa through the lenses of coloniality, as negotiations for climate change adapation in the continent tend to only anticipate that climate change effects would have severe social repercussions in the continent only in a distant future. The book made attempts to correct these misunderstandings.

Innovative sustainable development initiatives are emerging in recent years within the African continent that are charting a new course for local communities in the continent. These efforts demonstrate that in many different settings and in many different sectors, integrated and longer-term approaches to restoring, protecting and sustainably using natural assets can lead to new livelihoods and economic opportunities with renewed environmental vitality. However, the challenge remains how to scale-up and mainstream these encouraging innovations in manners that create enabling social conditions for more sustainable and equitable alternatives to flourish. Equitable alternatives that need flourishing range from community and local initiatives, policy and governance reforms, solutions based on traditional and indigenous knowledge, sustainable business models and investment opportunities, initiatives inspiring ethical behaviours and innovative methods for integrating gender equity into conservation work, economic tools and markets that support the transition to sustainability by stimulating new production practices and consumption patterns. Given the scale of climate change effects in Africa, the book advocates that there is need to move beyond the 'markets versus funds' discussions and to accommodate portfolios that make optimal and coordinated use of indigenous sources of financing climate change adaptation in the continent. The book showed how climate change adaptation in Africa needs to be supported by transparent, inclusive and accountable forest management based on local processes. The book demands strong partnerships founded on respect for the rights and active participation of Indigenous Peoples and local communities in the continent.

Chapter one of the book provides conceptual clarifications on

climate change adaptation, coloniality of climate change adaptation, and Africa'spirituality in climate change adaptation. The chapter highlights that to fully understand the coloniality of climate change adaptation in Africa, it is essential to untangle how international actions on climate change adaptation in the continent are rooted in global shared values, commitments to poverty reduction and the liability of the Global North for climate change stressors. Chapter two discussed the theoretical foundations of climate change adaptation in Africa. The basic theoretical assumption of the book spins on the fact that environmental problems are a common concern, the solution of which requires the active and responsible involvement of the entire community.

Methodological issues in climate change adaptation in Africa formed chapter three of the book. These include issues around African indigenous philosophies and methods for knowledge production; and ethical issues in climate change adaptation research. Chapter four is devoted to evidences of climate change adaptation in Africa. These range from the impacts of climate change on rural livelihoods and vulnerability in the continent. The last chapter of the book is on policy recommendations for climate change adaptation in Africa. The chapter reiterates that expecting that a good man or woman going into politics in the African continent can change things from inside to favour reduction of carbon emissions is mistaken, wrong and misleading. This is because there are certain in-built and recurrent factors such as the level of production in the country, the nature of the productive forces and relations of production, the level of development of classes and class consciousness, the nature and intensity of the struggles between classes and among class factions within classes determine how far the good person can go in politics or force the person to embrace politics as usual.

The primary limitation of the book is related to the condition of some community records that were obtained during the fieldwork wherein data for the book emerged. Many of these records were undated, which made interpretation in a linear timeframe difficult. Also, some community stakeholders were unable to remember events that occurred as long as a century ago. For some of these participants, the

memories they recreated had not been articulated to anyone prior to their interviews. For some, this process was emotionally difficult. Considering the enthusiasm of forest-dependent peoples of Africa to cooperate with governments and development partners to improve livelihoods at the community-level, it is essential that further research focus on how indigenous knowledge systems and practices can be incorporated into national adaptation policies and legal frameworks and other sustainable development programmes. The incorporation of indigenous knowledge into development projects would definitely help governments to design workable programmes to attain sustainable development in the African continent.

Godwin Etta Odok, Ph.D
July, 2023

Chapter One

Understanding Climate Change Adaptation in Africa

1.1 Introduction to Climate Change Adaptation in Africa

It is widely acknowledged that climate change is the most critical environmental challenge facing humanity at present. In broad terms, climate change refers to any change in climate over time, whether due to natural variability or as a result of human activity. More specifically, this involves change in climate conditions that arise from human activity – resulting to the release of carbon dioxide and other greenhouse gases, such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) to the atmosphere. Climate change had indeed assumed a complex cross-cutting nature. This also means cutting edge actions are required to tackle it. An Assessment Report of the Inter-governmental Panel on Climate Change (IPCC) concluded that the earth is warming, and that this warming is mostly due to the burning of fossil fuels and deforestation (IPCC, 2007; Harrison, 2018). Ekah, Akwagiobe, Udo & Ewona (2023) reviewed the first to sixth reports of the Inter-Governmental Panel on Climate Change (IPCC) and identified the types of greenhouse gases, sources of greenhouse gases and the impact of climate change on man, animals and the environment. Accordingly, the Global Trend, a report that predicted where societies will be by the year 2025, identified several 'drivers' of change that will shape the future (National Intelligence Council, 2008). These include: population growth, environmental damage – including climate change, the power of science and technology, the global economy, national and international governance and conflicts. The underlying theoretical and sociological reality about these drivers and challenges is that society must respond to all these challenges simultaneously – meaning that the world now exists simultaneously in traditional, modern and post-modern eras – though at different paces and different degrees (Beck 1999; Achebe, 1958; Howell, 2012). In Africa, indigenous knowledge systems for forest management

have been recognized as playing a crucial role in lowering the impact of these challenges, especially as related to environmental damage and climate change (Iloka, 2016; IPCC, 2007). In spite of the potentials of these knowledge systems, the Millennium Ecosystem Assessment (2005) had bewailed that there is a substantial and largely irreversible loss of forests, mammals, birds and amphibian species, especially in the African continent due to human actions (Olorunnisola, 2013; Bhatia, 2002; Iloka, 2016; Sintayehu, 2018). The World Bank (2011) added that the earth is unable to keep up in the struggle to regenerate from the demands humans place on it. It is accounted that, every second, a parcel of rainforest, the size of a football field disappears, among other threats (IPCC, 2007). It is severally shown that rainforests play a vital role in climate adaptation and mitigation as carbon sinks (Oyebo, Bisong & Morakinyo, 2012; Bisong, 2007; Mason & Yadvinder, 2010).

Against these backdrops of accelerated and irresistible environmental damage, global attention has been focused on issues related to environmental sustainability especially in developing countries (Babalola, 2012; HDR 2011). Evidence for this trend is supported by a recent literature survey that showed that the environment is fast moving to the top of the world's agenda – meaning that the single most important problem of this century is that of making economic and social peace with the demands on the environment (UNDESA, 2010). Consequently, various schemes have been evolved to call for growth and development in environmentally sustainable manners. In this sense, The Forests Dialogue (TFD) had led intensive multi-stakeholder dialogues to understand, discuss and seek consensus on the most pressing issues related to the use of forests to mitigate and adapt to climate change (IUCN 2009). Some of the climate change adaptation schemes in Africa, among others, include the REDD scheme – which seeks to reduce emissions from deforestation and forest degradation (REDD); conservation; sustainable management of forests and carbon stock enhancements. These schemes envisage offering multiple environmental and social benefits, including biodiversity conservation, adaptation advantages in the form of restored ecosystem services and the equitable benefit-sharing for

forest-dependent and Indigenous Peoples' groups and communities (IUCN 2009; Sintayehu, 2018). These schemes glide with the goal of harmonizing climate change adaptation schemes with indigenous knowledge systems in a spirit of solidarity and cooperation (Ikhide, 2007). The nexus of this union lays on the fact that in Africa, indigenous practices and customs have been the major driving force of social and economic change in human societies for millennia. These practices and customs have been occurrences of ancient times (Odok, 2019; Olutayo & Omobowale 2007).

In broad terms, indigenous knowledge systems (IKS) are a body of knowledge of the indigenous people of a particular geographical area that have survived for a very long time (Morris, 2010; Vansina, 1985). They are knowledge forms that are unique to a given culture or society and have survived despite racial and colonial onslaughts that they have suffered at the hands of Western imperialism and arrogance. According to Mapara (2009), these forms of knowledge originate locally and naturally and are usually linked to the communities that produce them from which 'knowing' emanates. Indigenous knowledge systems manifest themselves through different dimensions in areas such as security, agriculture, medicine, zoology, craft skills, linguistics and botany (Odok, 2019).

Among communities of rural Africa, there have been indigenous ethical ways of climate or weather forecasting; water management; pest prediction and treatment; crop preservation; and seed preservation that have helped the people to plan their activities in advance (ERA/FoEN, 2011; Ihejiamaizu, 2002; Odok, 2019; Sintayehu, 2018; Iloka, 2016). These indigenous peoples have many natural resource management systems that are carried out as a communal activity with the participation of all members of the community, including women and youth (Muga, Onyango-Ouma, Sang & Affognon, 2021). For instance, they cut trees, hunt animals and fish during certain periods of the year as a communal activity. Individuals who violate these customs and practices were usually penalized. This is a kind of adaptation practice for sustainable use and management of natural resources, including forest regeneration, which is managed and governed by the community. These knowledge systems were also

very useful especially in harvesting seasons when crops like rice, beans, millet, yam, maize, melon, okro and cocoyam were preserved until the next planting season. Indigenous ways of knowing have always brought forth useful knowledge on the preservation of these crops all through the seasons. In retrospect, these forms of knowledge have survived among forest-dependent communities of Africa before the advent of the 'western-type' of knowledge and practices in adapting to extreme weather events (Odok, 2019; Iloka, 2016; Morris, 2010). Even the global scientific community had acknowledged the relevance of indigenous knowledge and had endorsed it at the World Conference on Science held in Budapest, Hungary, from 29 June to 1 July in 1999 by recommending that scientific and traditional knowledge should be integrated particularly in the field of environment and development (Keane, Khupe & Maren, 2017).

Although the main component of the climate change regime as advocated by the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (KP) is primarily mitigation of climate change; that is, reductions in greenhouse gas (GHG) emissions, it has been shown that climate change adaptation is as central to the Convention as mitigation; meaning that the potentials of adaptation must be addressed more specifically and strongly in research and action (Merkouris & Marie-Aure, 2017; Jerneck & Olsson, 2008). This is especially so in the context of the poorest of the poor in Africa who suffer the most, not only from the general weight of poverty but also from climate vulnerability (IPCC, 2007). The need for climate change adaptation has been shown to be urgent in the context of Africa, where adaptation programmes must be combined with efforts to improve rural livelihoods (Leal, Ulisses, Balogun, Andreiai, Serafino, Desalegn, Totin, Adeleke, Kalaba & Oguge, 2021; UNHABITAT, 2003). Similarly, while at the first Sustainable Development Summit in 1992, modern technologies were seen as crucial to solving environmental problems. At Rio+20 in 2012, global leaders and major groups realised the need to adapt lifestyle and knowledge production systems to address global environmental change (Mansyur, Iwa, Retty & Wawan, 2021; Sanchez, Luis & Croal, 2012). The disposition that modern technologies offer no lasting solutions

without fundamental social, political and economic changes have also been confirmed (Betancourt & Reusser, 2013; FAO, 1996; 2006; Hunter, Salzman & Durwood, 2021).

The outcomes of the UN Climate Change Conference in Glasgow (COP26) are believed to reflect the interests, conditions, contradictions and the state of political will in the world which are insufficient in ensuring collective political will to overcome some deep contradictions around climate change. This is as cuts in global greenhouse gas emissions are still far from where they need to be to preserve a liveable climate, and support for the most vulnerable people affected by the impacts of climate change is still falling far short (Haenssgen, Lechner, Sarobidy, Leepreecha, Mukdawan, Chu, Auclair & Vlaev, 2022). But the 26th meeting of the Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change (UNFCCC) held at Glasgow did produce new building blocks to advance implementation of the Paris Agreement through actions that can get the world on a more sustainable, low-carbon pathway (Haenssgen, et. al., 2022). The focus of COP26 was to secure agreement between all the Paris signatories on how to set out nationally determined contributions (NDCs) to reduce emissions. The finalized Rulebook includes agreements on an enhanced transparency framework for reporting emissions. Basically, COP26 goals focused at securing global net zero emissions by mid-century and keep 1.5 degrees within reach; adapt to protect communities and natural habitats; mobilize finance; and work together to deliver (Haenssgen, et. al., 2022). Also, the Glasgow meeting reaffirmed the Paris Agreement goal of limiting the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit it to 1.5 °C (Sun, Xiang, Liang-Chun & Can, 2022). The meeting expressed alarm and utmost concern that human activities have caused around 1.1 °C of warming to date, that impacts are already being felt in every region of the world. Regrettably, carbon budgets consistent with achieving the Paris Agreement temperature goal are believed to be getting smaller and being rapidly depleted (Hagen & Jan, 2022). COP26 recognized that the impacts of climate change will be much lower at a temperature increase of 1.5 °C compared with

2°C. Developed countries came to Glasgow falling short on their promise to deliver US$100 billion a year for developing countries (Teo, 2023). Voicing regret, the Glasgow meeting's outcome reaffirms the pledge and urges developed countries to fully deliver on the US$100 billion goal urgently (Naser & Pearce, 2022). Developed countries, in a report, expressed confidence that the target would be met in 2023.

However, the Glasgow Pact calls for a doubling of finance to support developing countries in adapting to the impacts of climate change and building resilience (Hagen & Jan, 2022). Although the pact will not provide all the funding that poorer countries need, but it would significantly increase finance for protecting lives and livelihoods, which so far made up only about 25 per cent of all climate finance (with 75 per cent going towards green technologies to mitigate greenhouse gas emissions) (Gonçalves & Virgilio, 2022). Glasgow also established a workable programme to define a global goal on adaptation, which will identify collective needs and solutions to the climate crisis already affecting many countries, especially countries of the developing world.

The Glasgow COP26 meeting reached agreement on the remaining issues of the Paris rulebook, the operational details for the practical implementation of the Paris Agreement. Among them are the norms related to carbon markets, which will allow countries struggling to meet their emissions targets to purchase emissions reductions from other nations that have already exceeded their targets (Depledge, Saldivia & Penasco, 2022). Negotiations were also concluded on an Enhanced Transparency Framework, providing for common timeframes and agreed formats for countries to regularly report on progress, designed to build trust and confidence that all countries are contributing their share to the global effort (Depledge, Saldivia & Penasco, 2022). Acknowledging that climate change is having increasing impacts on people especially in the developing world, countries agreed to strengthen a network, known as the Santiago Network, that connects vulnerable countries with providers of technical assistance, knowledge and resources to address climate risks (Depledge, Saldivia & Penasco, 2022). The Santiago Network on Loss

and Damage (SNLD) was established at COP25/CMA2 as part of the Warsaw International Mechanism for averting, minimizing and addressing loss and damage associated with the adverse effects of climate change, to support technical assistance of relevant organizations, bodies, networks and experts (Depledge, Saldivia & Penasco, 2022). A new "Glasgow dialogue" was launched at COP26 to discuss arrangements for the funding of activities to avert, minimize and address loss and damage associated with the adverse effects of climate change. In the meeting, about 137 countries took a landmark step by committing to halt and reverse forest loss and land degradation by 2030. This pledge is backed by $12bn in public and $7.2bn in private funding (Stoddart, Tindall, Brockhaus & Kammerer, 2023). In addition, chief executive officers (CEOs) from more than 30 financial institutions with over $8.7 trillion of global assets committed to eliminate investment in activities linked to deforestation (Stoddart, Tindall, Brockhaus & Kammerer, 2023). Interestingly, COP27 held in Sharm el-Sheikh, Egypt, addressed issues related to crop production, food security, and nutrition (Varyvoda & Taren, 2023). The information garnered from this conference provided impetus for actions that are believe to ensure a future with the resources needed for sustainable development and that support the health and nutrition for all the inhabitants on Earth (Varyvoda & Taren, 2023).

IPCC (2007) revealed that due to low adaptive capacity and potentially severe climate change impacts, forest-dependent communities in developing countries, especially in Africa, are more vulnerable to climate change impacts. This, in combination with certain other factors, makes their adaptation particularly important, as they hugely depend on agriculture and forest-related activities mainly at a subsistence level (Leal, et. al., 2021). Most agricultural and livelihood support systems among forest-dependent peoples in rural Africa are very vulnerable to extreme climate events (ERA/FoEN, 2011). And since most of these communities live in places with limited access to food markets, there is further stress on their already vulnerable livelihoods in cases of food emergency and other climate change related disasters (World Bank, 2008; Mwabu & Thorbecke, 2004).

In spite of their low adaptive capacity, forest-dependent communi-

ties have been recognized as being key in climate change adaptation in Africa (Sintayehu, 2018). This is because they are the defenders of food, agriculture, water, forests, biodiversity and the environment. By history, they are the traditional owners and custodians of forests and their resources. However, their roles and knowledge are hardly recognized in policy formulation as it relates to climate change adaptation and forest governance (ERA/FoEN, 2011). These very important and eco-friendly peoples, who have depended on the forest ecosystem for survival, are now the worst hit as community forest lands have experienced massive transformation in recent years (Okaba, 2005; Olutayo & Odok, 2011; Eguzozie, 2010). The dividend of such transformations has been painful, leading to cultural dislocations, starvation, sicknesses and diseases for the people (ERA/FoEN, 2011). Evidence prevail to demonstrate that entrusting community forest lands to international non-governmental and governmental agencies by most African governments for purposes of climate change mitigation and adaptation had further worsened and complicated the quality of life of forest-dependent communities in the continent (Olutayo & Odok, 2011; Ogidi, 2011; ERA/FoEN, 2011; IDS, 2007).

Even though there is growing literature in the field of indigenous knowledge systems in Africa, it is clear that most of these have been written within the mainstream of integrated rural development with priority not given to engagement of indigenous practices and beliefs in climate change adaptation and forest governance. This book recognized the vulnerability of forest-dependent communities in Africa to climate change and the need for them to be responsive in adapting to climate change through indigenous practices and beliefs. Existing literature on indigenous knowledge for climate change in Africa had only described climate, vegetation and land use patterns in rural Africa (Koo, Kleemann & Furst, 2019; Onweremadu, Asiabaka, Adesope & Oguzor, 2007; Burton, Lim, Pilifosva & Schipper, 2002; Petters, 1990; Codjoe, Owusu & Burkett, 2014); indigenous environmental and forest conservation practices (Malapane, Olgah, Musakwa, Chanza & Radinger-Peer, 2022; Ostrom, 2009; Parlee & Berkes, 2006; Kaganzi, Cuni-Sanchez, Mcharazo, Martin, Marchant

& Thorn, 2021); and complex kinship systems (Zuma-Netshiukhwi, Gugulethu & Sue, 2013; Li, Stringer & Dallimer, 2022; BNRCC, 2011). From the above, it is evident that there is dearth of literature and studies on the extent to which indigenous practices and beliefs (cultural factors) determine climate change adaptation behaviour of present-day forest-communities in Africa within realities of globalization and western hegemonies. This book attempts to locate indigenous knowledge for forests-management in the field of sociology of development in ways that climate change adaptation in Africa is explained as a form of endogenous development that seeks to make the people's worldviews the starting point of sustainable development.

Indigenous knowledge is unique to a given society and is usually embedded in the people's beliefs, practices, institutions, relationships and rituals (Magni, 2017; Ossai, 2010). It is culture and context specific. It is that aspect of culture that functions towards the long-term survival and adaptation of a group. Indigenous knowledge helps societies to cope with challenges of external adaptation and internal integration (Knorr-Cetina, 2007). Among communities of rural Africa, indigenous knowledge had been employed in managing forests and in adapting to extreme weather events since time immemorial. There are proverbs, idioms, festivals, songs, taboos, practices and beliefs that promote responsible environmental behaviour – entrenching the use of forests and other natural resources in sustainable and renewable manners (Ahmad, Ping, Majeed, Muhammad, Zeeshan & Muhammad, 2020). More specifically, these indigenous practices and beliefs have culminated to advance an epistemic culture that holds that 'people who will not sustain their forests will soon live in communities that will not sustain the inhabitants' (Anyaegbunam, Mefalopulos & Moetsabi, 2004).

Global climatic events in the last few years have settled all debates and uncertainties concerning climate change (Adelekan, 2011; Stoddart, Tindall, Brockhaus & Kammerer, 2023; Varyvoda & Taren, 2023). Within towns and communities of the African continent, there have been droughts, floods, extremes of temperatures (heat waves and cold spells), strong winds, weather-induced fires and tropical

storms of various types (Affe, 2012; Atwoli, Muhia & Merali, 2022). For instance, the year 2020 was believed to be the fourth-warmest year for the African continent since the year 1910. This is as rises in temperature and changes in rainfall patterns have led to the increase in frequency and intensity of extreme weather events across the continent (Ayanlade, 2022).

To fully understand climate change adaptation in Africa in this era of globalization, it is essential to probe to know why indigenous knowledge systems for forest management are being abandoned in the continent, even when the United Nations Environment Programme (UNEP) and Agenda 21, adopted by the United Nations Conference on Environment and Development (UNCED) recognized the pivotal role and relevance of these knowledge systems in the conservation of natural resources and climate change adaptation in modern times (Desai, 2015; Ahmad, Ping, Majeed, Muhammad, Zeeshan & Muhammad, 2020). This book is an attempt to explicate these intricacies. By expropriating indigenous knowledge systems for forest management in Africa, colonial knowledge, power, and being, have been sustained in the continent; thereby giving way to neoliberal climate change adaptation that compartmentalizes and severe the peoples' relationships with their natural environment (Odok, 2020).

In its simple form, climate change adaptation refers to longer-term strategies which deal with climate change – in contrast to short term coping strategies (Owen, 2020). Climate change in the context of this book involved any change in climate over time, whether due to natural variability (natural forcing) or as a result of human activity (anthropogenic forcing) (Stern & Kaufmann, 2014). The main concern here is on climate change resulting from human activity, specifically from the release of greenhouse gases (GHG), such as carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) to the atmosphere. More broadly, climate change adaptation as conceived in this book refers to adjustment in natural or human systems to a new or changing environment. Adaptation to climate change therefore implies adjustment in natural or human systems in response to actual or expected climatic change effects, which moderates harm or

exploits beneficial opportunities (Eisenack, Moser, Hoffmann, Klein, Oberlack, Pechan, Maja & Catrien, 2014).

There are various forms of climate change adaptation. These include anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation (Ung, Luginaah, Chuen-pagdee & Campbell, 2015). Effective climate change adaptation plan implies an adaptation action plan that is responsive to a wide variety of economic, social, political and environmental circumstances of the people (Desai, 2015). Effective adaptation plans help to cushion people's vulnerability to effects of climate change. It is noted here that effective adaptation to climate change cannot be accomplished in a single intervention; instead, it is a continuum that required the incorporation of interventions that range from those that address underlying drivers of vulnerability to those designed exclusively to respond to climate change impacts (Ireland and McKinnon, 2013). Thus, adaptation processes need to be location-sensitive, gender-and-context-specific, integrated and flexible (Ampaire, Mariola,-Sofia, Ritah, Muchunguzi, Muna & Jassogne, 2020). Vulnerability to climate change refers to the degree to which natural and social systems are susceptible to, and unable to cope with adverse impacts of the climate (Smit & Wandel, 2006). With the engagement of indigenous knowledge, societies, especially in the Africa continent, can better cope with the impacts of extreme climate events (Magni, 2017).

Although the importance of indigenous knowledge is gradually being recognized in development studies, however, little attention had been given in research to the value and ethics of indigenous knowledge in climate change adaptation in Africa. Climate change adaptation projects and programmes in the continent can learn from experiences of other developmental projects by recognizing the value and ethics of indigenous knowledge. To fill this gap and contribute to the body of knowledge in this field, this book recognizes the need to integrate indigenous knowledge into formal western science in order to build adaptive capabilities of communities in Africa to adequately adjust to impacts and stresses of climate change. This book certainly add value to the current global advocacy on climate change adaptation and rural development; as well as boost the

volume of literature that is beginning to build around indigenous knowledge and sustainable development in Africa.

This book took up many of the research challenges articulated in the Millennium Ecosystem Assessment (www.milleniumassessment.org). Given the fact that the Millennium Assessment (MA) was primarily an assessment, it did not generate new primary knowledge, but just highlighted many uncertainties that exist about climate change issues. This book attempts to address these challenges in a localized context by providing a robust evidence-base that supports improved implementation of climate change adaptation programmes and activities in Africa. That is, to set up negotiations within climate change adaptation agenda in ways that the 'western scientific' and 'local-traditional practices' and authorities can work seriously, ethically and respectfully to combat climate change stressors in the African continent.

This book is useful to academia, community development practitioners, government and non-governmental organizations, consultants and practitioners, students in the field of rural sociology and development studies to understand how to consider climate change and its adaptation strategies to be dynamic, multi-disciplinary, multi-sectoral and multi-dimensional. The book recognizes that interactions between indigenous knowledge systems and climate change adaptation, and resulting feedbacks are dynamic, location and time-specific, occurring at different scales, and responding to bunches of different drivers. Likewise, the book provides the rare opportunity for the documentation, dissemination, and preservation of indigenous knowledge systems for the benefit of present and future generations. This is because decision-makers for climate change adaptation in Africa need the evidence to demonstrate how outsiders' and indigenous knowledge systems impact on the success of climate change adaptation behaviour in the continent.

1.2 Coloniality of Climate Change Adaptation in Africa

Several agitations have expressed that without urgent mitigation actions the world cannot avoid dangerous climate change stressors

(IPCC, 2012; Depledge, Saldivia & Penasco, 2022). But even the most stringent mitigation will be insufficient to avoid major human development setbacks. The world is already committed to further warming because of the inertia built into climate systems and the delay between mitigation and outcome (NASPA-CCN, 2011; Depledge, Saldivia & Penasco, 2022). For the first half of the 21st Century there is no alternative to adaptation to climate change. Rich countries have already recognized the imperative to adapt. Many are investing heavily in the development of climate defence infrastructures (BNRCC, 2011; Depledge, Saldivia & Penasco, 2022).

In the same light, local strategies are being drawn up across countries of the world to prepare for more extreme and less certain future weather patterns (Stoddart, Tindall, Brockhaus & Kammerer, 2023). The United Kingdom government for example is spending about US$1.2 billion annually on flood defences. In the Netherlands, people are investing in homes that can float on water. The Swiss alpine ski industry is investing in artificial snow-making machines (Stoddart, Tindall, Brockhaus & Kammerer, 2023). However, Africa and other developing countries face far more severe climate change adaptation challenges (Stoddart, Tindall, Brockhaus & Kammerer, 2023). These challenges have to be met by the poor people themselves. In the Horn of Africa, 'adaptation' means that women and young girls have to walk further to collect water. In the Ganges Delta, people are erecting bamboo flood shelters on stilts. And in the Mekong Delta people are planting mangroves to protect themselves against storm surges, and women and children are being taught to swim. Globally, inequalities in capacity to adapt to climate change are becoming increasingly apparent (Sassen, 2010; (Stoddart, Tindall, Brockhaus & Kammerer, 2023). For one part of the world—the Global North – adaptation is a matter of erecting elaborate climate defence infrastructures, and of building homes that 'float on' water. In the other part of the world – the Global South – especially in sub-Saharan Africa, adaptation means people themselves learning to 'float in' flood water (Hamisi, Madaka, Kalumanga & Yanda, 2012). Unlike people living behind the flood defences of London and Los Angeles, young girls in the Horn of Africa and people in

the Ganges Delta do not have a deep carbon footprint (Cattaneo, Beine, Frohlich, Kniveton, Martinez-Zarzoso, Mastrorillo, Millock, Piguet & Schraven, 2019). As the late Desmond Tutu, the former Archbishop of Cape Town once argued, we are drifting into a world of adaptation apartheid (HDR, 2008).

Smit and Wandel (2006, p.285) point out that the whole point of the work on climate change adaptation processes is to have risks (and opportunities) associated with climate change (or other environmental changes) actually addressed in decision-making at some practical level. Planning for climate change adaptation confronts governments in Africa with challenges at many levels. These challenges pose systemic threats. In Egypt, delta flooding could transform conditions for agricultural production (Muzaffar, 2022). Changes to coastal currents in southern Africa could compromise the future of Namibia's fisheries sector; and hydroelectric power generation might be affected in many countries (Muzaffar, 2022). Hence, responding to climate change in an era of globalization and neoliberal markets require the integration of adaptation into all aspects of policy development and planning for poverty reduction within and outside the African continent (Muzaffar, 2022). However in Africa, planning and implementation capacity for climate change adaptation is seen to be limited by the following factors:

i) *Information.* Most of the world's poorest countries, which are in Africa, lack the capacity and the resources to assess climate risks. In sub-Saharan Africa, high levels of rural poverty and dependence on rain-fed agriculture makes meteorological information an imperative for adaptation. Regrettably, the region has the world's lowest density of meteorological stations. In France, the annual meteorological budget amounts to about US$388 million, compared with just US$2 million in a country like Ethiopia (Muzaffar, 2022). The 2005 G8 summit pledged actions to strengthen Africa's meteorological monitoring capacity. Since then, commitments to fulfil this pledge by the G8 countries have fallen far too short (Chevallier, 2010).

ii) *Infrastructure.* In climate change adaptation, as in other areas of development, 'prevention is better than cure'. Every

US$1 invested in pre-disaster risk management in Africa and other developing countries can prevent losses of US$7 (HDR, 2008). In Bangladesh for instance, research among impoverished populations living on *char* islands show that adaptation against flooding can strengthen livelihoods, even in extreme conditions (Cattaneo, Beine, Frohlich, Kniveton, Martinez-Zarzoso, Mastrorillo, Millock, Piguet & Schraven, 2019). Many countries, especially in sub-Saharan Africa lack the financial resources required for infrastructural adaptation. Beyond disaster prevention, the development of community-based infrastructure for water harvesting can reduce vulnerability and empower people to cope with climate risks. Partnerships between communities and local governments in Indian states such as Andhra Pradesh and Gujarat provide examples of what can be achieved through local actions to adapt to climate change. Most research has focused on the barriers to climate change adaptation in local areas, and little research exists that considers the conditions under which local authorities are able to initiate the process of mainstreaming climate adaptation in their localities. In their study, Pasquini, Ziervogel, Cowling and Shearing (2015) identified factors that enable climate change adaptation actions to be taken at the local government level. These include the presence of dedicated environmental champions, particularly within political leadership. Experiencing the costs of climate change often provides the strongest initial catalyst for action and is aided by the recognition that the local environment has value. Access to a knowledge base, the availability of resources, political stability and the presence of dense social networks all positively affect adaptation mainstreaming. Thus, it is these enabling factors that other government levels and stakeholders need to support with different interventions. Particularly, attention should be paid on the effect of political instability on the functioning of the local government system and the effects of social network characteristics on facilitating institutional change (Pasquini, Ziervogel, Cowling & Shearing, 2015).

iii) *Insurance for social protection.* Climate change is in various ways generating incremental risks in the lives of the poor. Hence, social protection programmes can help people cope with those risks while expanding opportunities for employ-

> ment, nutrition and education. In Ethiopia, the Productive Safety Net Programme is an attempt to strengthen the capacity of poor households to cope with droughts without having to sacrifice opportunities for health and education. Although the Nigeria National Social Safety Net Programme (NASSP) which seeks to provide access to targeted transfers to poor and vulnerable households under an expanded national social safety nets system seems to lack clear policy intentions of empowering poor households to cope with climate change stressors in the country. In Latin America, conditional cash transfers have been widely used to support a wide range of human development goals, including the protection of basic capabilities during a sudden crisis. In Southern Africa, cash transfers have been used during droughts to protect long-run productive capacity. While social protection figures only marginally in current climate change adaptation strategies, it has the potential to create large human development returns (Lomborg, 2004).

To fully understand the coloniality of climate change adaptation in Africa, it is essential to untangle how international actions on climate change adaptation in the continent are rooted in global shared values, commitments to poverty reduction and the liability of the Global North (rich nations) for climate change problems. Under the terms of the United Nations Framework Convention on Climate Change (UNFCCC), governments of countries of the Global North are obliged to support adaptation capacity development. Support for the Millennium Development Goals (MDGs) and Sustainable Development Goals (SDGs) provides another powerful rationale for action by countries of the Global North as climate change adaptation is a key requirement for achieving the 2030 targets and creating the conditions for sustained progress. Application of the legal principles of protection from harm and compensation for loss and damage constitutes further grounds for action by countries of the Global North. According to the European Parliament (2022), many consequences of climate change are already hard to reverse, and extreme weather events will become more frequent in the future. The European Parliament recognized that there are some climate impacts that would be difficult or impossible to adapt to; thus, there is a need to

address losses and damages associated with climate impacts. Loss and damage simply refer to impacts of climate change that have not been, or cannot be, avoided through mitigation or adaptation efforts. These losses and damages can result from both sudden-onset events such as heat waves, flooding, earthquake; and slow-onset events such as desertification, rising temperatures. All regions of the world will be affected by climate change, but the extent of loss and damage will vary from country to country (Rossi & Peres, 2023).

Expressed in diplomatic language, the international response on adaptation has fallen far short of what is required. Several dedicated multilateral financing mechanisms have been created, including the Least Developed Country Fund and the Special Climate Change Fund. Delivery through these mechanisms has been limited. Total financing to date has amounted to about US$26 million—a derisory response (HDR, 2008; Muzaffar, 2022). Although the concept of Loss and Damage (L&D) is not new, yet it is still vague and not well defined in climate policy. At the November 2021 United Nations framework Convention on Climate Change (UNFCCC) Conference of Parties (COP 26) in Glasgow, the European Union was open to discussing L&D but hesitant about creating a dedicated L&D fund. One of the biggest challenges with L&D is the framing of the concept itself. Developing and developed countries have differing views on its definition as well as its urgency. Nonetheless, the historic climate funding deal for L&D at Egypt 2022 COP27 implies that countries responsible for high carbon emissions will compensate vulnerable countries suffering from climate impacts.

The creation of L&D climate fund adds to several dedicated multilateral financing mechanisms which have been created in the past, including the Least Developed Country Fund and the Special Climate Change Fund. Developed countries have shown unwillingness to accept liability and payment of compensation for loss and damage. Developed countries' position for L&D as evident in the Warsaw International Mechanism for Loss and Damage focuses on research and dialogue, rather than liability or compensation. Importantly in Africa, it is not just the lives and the livelihoods of the poor African people that require protection through adaptation.