

**INDIGENOUS KNOWLEDGE FOR FOREST-
MANAGEMENT AND CLIMATE CHANGE
ADAPTATION IN FOREST DEPENDENT
COMMUNITIES OF CROSS RIVER, NIGERIA**

BY

Godwin Etta ODOK

Matriculation Number: 146869

B.Sc. Sociology (Jos), M.Sc. Sociology (Ibadan)

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CERTIFICATION

I certify that this study was carried out by Godwin Etta ODOK (Matriculation Number: 146869) of the Department of Sociology, University of Ibadan, Nigeria, under my supervision.

Date

Professor A.O. Olutayo
Supervisor

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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 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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‘Where a runner reach, the person walking will also reach...’

A Butatong proverb

An African Elegy

We are the miracles that God made
To taste the bitter fruit of Time.
We are precious.
And one day our suffering
Will turn into the wonders of the eart.

There are things that burn me now
Which turn golden when I am happy.
Do you see the mystery of our pain?
That we bear poverty
And are able to sing and dream sweet things

And that we never curse the air when it is warm
Or the fruit when it tastes so good
Or the lights that bounce gently on the waters?
We bless things even in our pain.
We bless them in silence.

That is why our music is so sweet.
It makes the air remember.
There are secret miracles at work
That only Time will bring forth.
I too have heard the dead singing.

And they tell me that
This life is good
They tell me to live it gently
With fire, and always with hope.
There is wonder here

And there is surprise
In everything the unseen moves.
The ocean is full of songs.
The sky is not an enemy.
Destiny is our friend.

Ben Okri, from: An African Elegy

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DECLARATION

The following publications have been produced as a direct or indirect result of the research discussed in this thesis:

1. **Odok, G. E. 2013.** North-South Migration. *The Encyclopedia of Global Human Migration*. Oxford OX4 2DQ: Blackwell Publishing. (Britain)
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ABSTRACT

Climate change is a major global human development challenge. Modern technologies have been largely unsuccessful in tackling this challenge, thus indigenous knowledge for forest-management is being considered as an alternative solution. There is dearth of knowledge on the effects of cultural factors on climate change adaptation in forest-communities of Cross River, hence, this study examined the extent to which beliefs and practices of forest-management in forest-dependent communities of Cross River are engaged in addressing challenges of climate change.

Ecological modernisation served as the theoretical framework while the research design was Participatory Rural Appraisal. A semi-structured questionnaire was used to collect information from 459 respondents purposively selected from three forest-dependent communities representing mangrove forest (Iko-Esai, 153), Ekuri forest (Agoi-Ibami, 191), and Mbe/Afi forest (Butatong, 115) blocks. Quantitative data collected was on socio-demographic characteristics, indigenous beliefs and practices, and their influence on climate change adaptation behaviour. Indigenous knowledge was assessed with an 8-item instrument which categorised indigenous forest-management practices into: zero-tilling, soil-mulching, bush-fallow, crop-rotation, green-manure, mixed-cropping, tree-felling, hunting taboos, and tree planting. Key Informant Interviews were conducted with 12 officials of the Ministry of Environment, and 33 In-Depth Interviews with 18 community leaders, seven forest managers, five academics, and three policy makers on forest-related traditions and practices. Climate change and transforming social structures were assessed through reviews of archives, reports and maps. Transects were used to identify similarities and differences of paths. Seasonal calendars assessed sequences of events and their relationship with the people; while institutional analysis assessed communities' interests, layout, infrastructures, health and wealth patterns. Quantitative data were analysed using descriptive statistics and linear regression at $p < 0.05$, while qualitative data were content analysed.

The age of respondents was 40.5 ± 4.5 years while 61.7% were males. Over 75.0% had lived in communities since birth, while 88.0% had a monthly income of less than ₦50,000. Effect of indigenous knowledge on climate change adaptation behaviour was significant ($F=17.04$; $R=0.61$; $R^2=0.37$, $\text{Adj } R^2=0.35$). Climate change adaptation behaviour was influenced by indigenous knowledge thus: use of fuel efficient cooking devices ($\beta=0.34$), seed exchange of early maturing crops ($\beta=0.32$), planting trees ($\beta=0.27$), poultry farming ($\beta=0.13$), bee keeping ($\beta=-0.47$), planting special species of crops ($\beta=-0.30$), migration to another community ($\beta=-0.20$), storing enough rainwater ($\beta=-0.14$), change period of planting crops ($\beta=-0.13$), fish farming ($\beta=0.11$). Indigenous forest-management practices occurred as: bush fallow (88%), mixed cropping (86%), green-manure (62%), tree-felling and hunting taboos (58%), tree planting (55%), soil mulching (53%), zero tilling (47%), and crop rotation (46%). Indigenous practices used to manage forests such as preservation of special species of trees, folklore on appeasement of forest gods, non-hunting of certain animals considered as agents of the gods, and non-sale of land were at risk of extinction. Oral tradition was the main source of disseminating indigenous knowledge, beliefs and practices.

Indigenous knowledge and practices are useful in forest-management. Predominant climate change adaptation measures within forest-dependent Cross River are biased towards modern worldview. Therefore, the use of indigenous knowledge in forest-management should be strengthened in the policy process of climate change adaptation.

Keywords: Forest-management, Forest-dependent communities, Indigenous knowledge, Climate change adaptation

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LIST OF ABBREVIATIONS

BNRCC	Building Nigeria's Response to Climate Change
CBA	Community based adaptation
CCA	Climate Change Adaptation
CCASTR	Climate Change Adaptation Strategy Technical Reports
CERCOPAN	Centre for Education, Research and Conservation of Primates and Nature
CIDA	Canadian International Development Agency
CITES	Convention on International Trade in Endangered Species
COP	Conference of Parties
CRNP	Cross River National Park
CRS	Cross River State
CRSCFP	Cross River State Community Forestry Project
CRSFC	Cross River State Forestry Commission
CSO	Civil Society Organizations
DFID	Department for International Development
DIN	Development in Nigeria
DIY	Do-it-yourself
EMT	Ecological Modernisation Theory
ERPA	Emissions Reduction Purchase Agreement
FAO	Food and Agriculture Organization of the United Nations
FAO	Food and Agriculture Organizations
FCPF	Forest Carbon Partnership Facility
FDF	Federal Department of Forestry
FFI	Fauna and Flora International
FIP	Forest Investment Programme
FMC	Forest Management Committees
FMENV	Federal Ministry of Environment
FOEN	Friends of the Earth Nigeria /Environmental Rights Action
FORMECU	Forest Monitoring and Evaluation Coordinating Unit
FRIN	Forestry Research Institute of Nigeria
GAD	Gender and Development
GHG	Green house gas
GIS	Geographical Information System

HDR	Human Development Report
ICEED	International Centre for Energy, Environment and Development
IDs	Indepth Interviews
IKS	Indigenous Knowledge System
IMCCC	Inter-Ministerial Committee on Climate Change
IPCC	Intergovernmental Panel on Climate Change
ITTO	International Tropical Timber Organisation
IUCN	World Conservation Union
KIIs	Key Informant Interviews
KP	Kyoto Protocol
LG	Local Government
LULUCF	Land Use, Land Use Change and Forestry
MRV	Measurement, Reporting and Verification
NAPA	National Adaptation Programmes of Actions
NASPA-CCN	National Adaptation Strategy and Plan of action on Climate Change for Nigeria
NCF	Nigerian Conservation Foundation
NESREA	National Environmental Standards and Regulations Enforcement Agency
NFDC	National Forest Development Committee
NGO	Non-Governmental Organization
NGOCE	NGO Coalition on Environment
NGOs	Non-governmental Organizations
NIMET	Nigerian Meteorological Agency
NOSDRA	National Oil Spillage Detection and Response Agency
NPS	National Parks Service
NTDP	National Tree Nursery Development Programme
NTFP	Non Timber Forest Product
ODA	Overseas Development Agency (now DFID)
PAR	Participatory Action Research
PES	Payments from Ecosystem Services
PLA	Participatory Learning and Action
PNI	Pro-Natura International

PRA	Participatory Rural Appraisal
REDD	Reduce Emissions from Deforestation and forest Degradation
REDD+	Reduced Emissions from Deforestation and forest Degradation Plus
SCCU	Special Climate Change Unit
SLM	Sustainable Land Management
SNR	Strict Nature Reserve
SPACE	Sustainable Practices in Agriculture for Critical Environments
TFD	The Forests Dialogue
THF	Tropical High Forest
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United National Framework Convention on Climate Change
UNFCCC	United Nations Framework Convention on Climate Change
UNFCCC	United Nations Framework Convention on Climate Change
UN-REDD	UN REDD programme
USAID	United States Agency for International Development
VCS	Voluntary Carbon Standard
VLA	Village Liaison Assistant
WB	World Bank
WCFSD	World Commission on Forests and Sustainable Development
WCS	Wildlife Conservation Society
WFN	Worldwide Fund for Nature
WID	Women in Development

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

It is widely acknowledged that climate change is the most critical environmental challenge facing humanity at present (Chokor, 2012). 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 (CO₂), methane (CH₄) and nitrous oxide (N₂O) 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, 2007a). 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; Park and Han, 2014; Achebe, 1958; Howell, 2012). Forests have been recognized as playing a crucial role in lowering the impact of these challenges, especially as related to environmental damage and climate change (IPCC, 2007b). In spite of the potentials of forests, the Millennium Ecosystem Assessment (2005) had bewailed that there is a substantial and largely irreversible loss of forests, mammals, birds and amphibian species due to human actions (Olorunnisola, 2013; Bhatia, 2002). The World Bank (2008) 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, 2007a). Even though rainforests play a vital role in climate adaptation and mitigation

as carbon sinks (Oyebo, Bisong and Morakinyo, 2012; Bisong, 2007; Mason and Yadvinder, 2010; Beck, 2014).

Against these backdrops of accelerated and irresistible environmental damage, global attention has been focused on issues related to environmental sustainability especially in developing countries including Nigeria and Cross River State in particular (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, 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). These schemes glide with the goal of harmonizing climate change adaptation schemes with indigenous knowledge systems in a spirit of solidarity and cooperation (Ikhede, 2007). The nexus of this union lays on the fact that 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 (Olutayo and 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 (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.

Among forest-dependent peoples of Cross River State, there have been indigenous 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). 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. 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 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 before the advent of the 'western-type' of knowledge and practices in adapting to extreme weather events. 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.

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 (Jerneck and Olsson, 2008). This is especially so in the context of the poorest of the poor who, especially in developing countries, suffer the most, not only from the general weight of poverty but also from climate vulnerability (IPCC, 2007a). The need for climate change adaptation has been shown to be urgent in the context of rural Cross River,

where adaptation programmes must be combined with efforts to improve rural livelihoods (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. The disposition that modern technologies offer no lasting solutions without fundamental social, political and economic changes have also been confirmed (Betancourt and Reusser, 2013; FAO, 1996; 2006).

IPCC (2007b) revealed that due to low adaptive capacity and potentially severe climate change impacts, forest-dependent communities in developing countries 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. Most agricultural and livelihood support systems among forest-dependent peoples in Cross River 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 and Thorbecke, 2004).

In spite of their low adaptive capacity, forest-dependent communities have been recognized as being key in climate change adaptation in Cross River State. 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 and 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 the Cross River State Government for purposes of climate change mitigation and adaptation had further

worsened and complicated the quality of life of forest-dependent communities in the State (Olutayo and Odok, 2011; Ogidi, 2011; ERA/FoEN, 2011; IDS, 2007).

Even though there is growing literature in the field of indigenous knowledge systems in Nigeria, 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 study recognized the vulnerability of forest-dependent communities 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 in forest-dependent communities of Cross River had only described climate, vegetation and land use patterns in these communities (Onweremadu, Asiabaka, Adesope and Oguzor, 2007; Burton, Lim, Pilifosva and Schipper, 2002; Petters, 1990); indigenous environmental and forest conservation practices (Owan, 2011; Parlee and Berkes, 2006); and complex kinship systems (BNRCC, 2011; Erim, 1990). 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 Cross River State. This study has attempted to locate indigenous knowledge for forests-management in the field of sociology of development in ways that climate change adaptation in forest-communities of Cross River State had been explicated as a form of endogenous development that seeks to make the people's worldviews the starting point of sustainable development.

1.2 Statement of the Problem

Indigenous knowledge is unique to a given society and is usually embedded in the people's beliefs, practices, institutions, relationships and rituals. 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 forest-communities of Cross River State, 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. 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'*.

At present, the defining human development problem is climate change (HDR, 2011; Adelekan, 2011; Cock, 2013). Issues such as global warming, environmental change, and natural disasters due to human-induced events have emerged as matters of critical concern to sustainable development at both global and local spheres. Climate change simply refers to changes in either the average state of the climate (example, with regards to temperature - places may, on average, become hotter or colder) or in its variability (example, change in rainfall seasons), persisting for an extended period (typically decades or longer) (Vincent, Cull, Kapoor, Aggarwal, Bhatta, Lau, Kristjanson, Phartiyal, Parvin, Bisht and Nilormee, 2013). Climate change results from an increase in the earth's temperature caused by a build-up of carbon dioxide and other greenhouse gases in the atmosphere mostly due to human activity, such as the burning of fossil fuel for energy and transportation; deforestation; and various agricultural and industrial practices (anthropogenic forcing) or as a result of natural variability (natural forcing). Global climatic events in the last few years have settled all debates and uncertainties concerning climate change (Adelekan, 2011). Within forest-communities of Cross River State, there have been droughts, floods, extremes of temperatures (heat waves and cold spells), strong winds, weather-induced fires and tropical storms of various types. Between June 2010 and June 2012 for instance, no fewer than half-a-million people had been displaced, and roofs of over one hundred thousand public and private houses blown off in the various forest-communities of Boki, Akampka, and Yakurr Local Government Areas of Cross River State after torrential downpour and windstorms (Affe, 2012). The affected public buildings included health centres, markets, churches and schools - secondary and primary - where students and pupils were forced to learn under trees. Within the same period, coastal storms and storm-generated surges have also increased in frequency and intensity within coastal communities of the State.

Appallingly, the burning of fossil fuels, the clearing and the destruction of forests, which are all human-induced activities, have been identified as the foremost sources of climate change (World Bank, 2008). In retrospect, sustainable forest management based on an ecologically sustainable culture had also been identified as the suitable solution to climate change (Srang-iam, 2013; IPCC, 2007a; Chaos, 2012). However, at present, there is an exacerbated disappearance of values and norms that promote an

ecologically sustainable culture within forest-communities of Cross River State as there is accelerated destruction of forestlands in these communities even when these forestlands had been preserved in the past by these same communities.

More worrisome is the fact that these communities are seen to be courageously abandoning core behavioural patterns (indigenous practices and beliefs) that promote sustainable forests-management at a time when these behavioural patterns are most needed to tackle challenges of climate change. Some indigenous adaptation practices and beliefs seen as being abandoned relate to food preservation and storage methods such as drying or smoking of food items during food sufficient period; non-felling of immature trees; change of strategies for hunting and gathering fruits and fish to correlate with animal migration and fruiting periods. Furthermore, there appears to be loss of knowledge of local crop varieties that are tolerant to extreme climatic conditions. These conditions, in earnest, portend a severe structural dislocation in understanding and implementing effective climate change adaptation plans within the context of rural Cross River. In addition, the condition debilitates planned social change – thereby making sustainable development and effective climate change adaptation in the area difficult and impossible.

1.3 Research Question

The overarching question that guided this study sprawled in uncovering narrations on why forest-communities of Cross River are abandoning their indigenous knowledge for forest management, even when the United Nations Environment Programme (UNEP) and Agenda 21, adopted by the United Nations Conference on Environment and Development (UNCED, 1992) recognized its relevance in the conservation of natural resources and climate change adaptation.

1.4 Objectives of the Study

This study described indigenous practices and belief systems for forests-management in forest-communities of Cross River and how these systems influenced the people's behaviour and interaction with actual and expected climatic conditions.

The following were the specific objectives of the study:

1. Identify and document indigenous practices and beliefs for forests management in forest-dependent communities of Cross River State.
2. Analyze trends of climate change within forest-dependent communities of Cross River State.

3. Describe how forest-dependent peoples of Cross River State respond to climate change and its inherent challenges.
4. Assess the possible merger of traditional practices based on the people's perception and outsiders' know-how in forging common solutions to adapting to climate change within forest-dependent Cross River.
5. Examine how indigenous knowledge for forest management is disseminated and preserved for future use among forest-dependent communities of Cross River State.

1.5 Significance of the Study

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 forest-dependent communities can learn from experiences of other developmental projects by recognizing the value of indigenous knowledge for forest management. To fill the gap and contribute to knowledge, this study recognizes the need to integrate indigenous knowledge into formal western science in order to build adaptive capabilities of forest-dependent communities to adequately adjust to impacts and stresses of climate change. The study had certainly added value to the current global advocacy on climate change adaptation and rural development; as well as boosted the volume of literature that is beginning to build around indigenous knowledge and sustainable development in Nigeria.

This study took up many of the research challenges articulated in the Millennium Ecosystem Assessment (www.millenniumassessment.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 study had addressed these challenges in a localized context by providing a robust evidence-base that supports improved implementation of climate change adaptation schemes in rural Nigeria. 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 now work seriously and respectfully to combat climate change.

This study is useful to (academia, community development practitioners, government and non-governmental organizations, consultants and practitioners) in the

field of rural sociology and sustainable development to understand how to consider climate change and its adaptation strategies to be dynamic, multi-disciplinary, multi-sectoral and multi-dimensional. The study had recognized the interactions between indigenous knowledge systems and climate change adaptation, and that the resulting feedbacks are dynamic, location and time-specific, occurring at different scales, and responding to bunches of different drivers. This study had also stimulated and advanced understanding about cultural and historical dynamics and how they influence and determine forest-governance and the implementation of climate change adaptation projects and programmes in rural Cross River. Likewise, the study had provided the rare opportunity for the documentation, dissemination, and preservation of indigenous knowledge systems for the benefit of present and future generations.

1.6 Scope of the Study

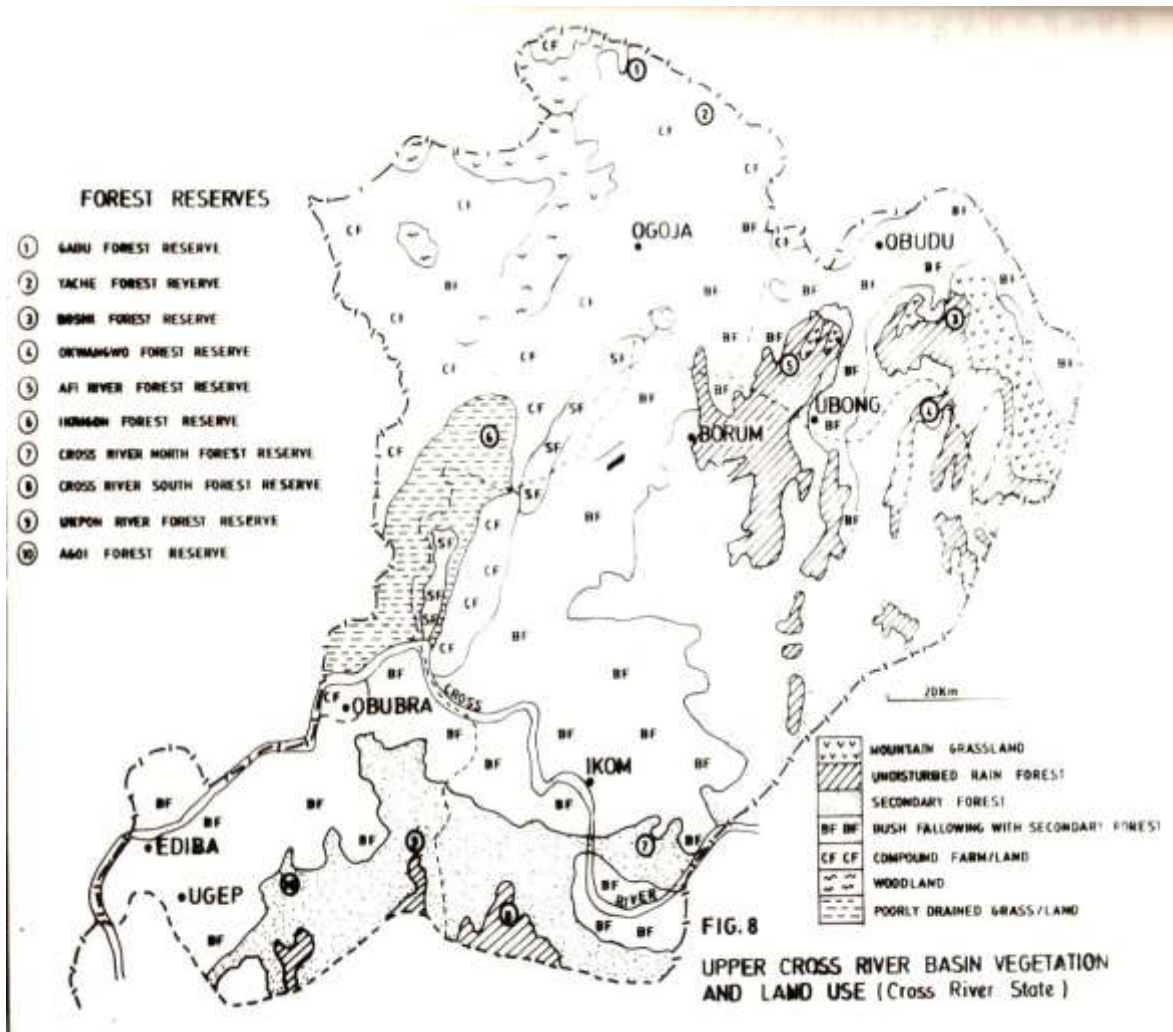
The study focused on climate change adaptation activities in primary forests of Cross River State, Nigeria - a part of a natural region known also as forest-dependent Cross River. As a natural region, the identity of forest-dependent Cross River is evident from its physical setting which defines both lowland and highland surrounded by watersheds of varying elevation and prominence. Like other parts of forested Nigeria and tropical Africa, the climate of forest-dependent Cross River is controlled by the annual cycle of movement of two contrasting air masses (Petters, 1990). Within normal climatic conditions, the dry continental tropical air mass with its northeasterly winds (harmattan) usually dominates forest-dependent communities of Cross River 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 Cross River with monsoon rains and an annual rainfall that is over 3000mm (Petters, 1990). Most of the rainfall occurs between April and October while the dry season is from November to March with dominantly dry northeasterly winds. In forest communities of Cross River State, unlike other communities, temperatures show very little monthly variation, the mean actual maximum and minimum temperatures being 30⁰C respectively (Petters, 1990). In other parts of the State, 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 forest-dependent Cross River is 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 (Petters, 1990).

For the purpose of this study, forest-dependent Cross River is delimited to the primary rainforest in Boki, Yakkur, and Akamkpa local government areas. Most of the forest-communities in these areas are under forest reserves. Of particular interest for this study are three forest-dependent communities – Butatong (Boki), Agoi-Ibami (Yakkur), and Iko-Esai (Akamkpa). The rich stock of plants and animals in Iko-Esai, Agoi-Ibami and Mbe Mountain (Butatong) has been documented by John and Yadvinder (2010). Map 1.1 showed other rainforests reserves in Cross River State Nigeria since the nation's political independence in 1960.

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Map 1.1: Forest Reserves locations in Cross River State, Nigeria since 1960



Source: Petters, 1990:13

Due to the fundamental importance of good governance for the maintenance and enhancement of forest resources-ecosystem services and climate change adaptation, this study focused on indigenous practices and belief systems that prevail within forest-dependent communities of Cross River State. Specifically, the study focused on: (i) assessment and diagnosis of indigenous practices and beliefs for forest-management within forest-dependent Cross River; (ii) demonstration activities of climate change adaptation; and (iii) institutional framework for the preservation and dissemination of indigenous knowledge for the purpose of addressing climate change challenges within forest-dependent Cross River. The unit of analysis and target group in this study consisted of forest-dependent communities in Cross River State, Nigeria.

1.7 Assumptions

The thrust of the study was to investigate how indigenous knowledge for forest-management had guided and directed the robust adoption of suitable behavioural patterns that promote the use of forests in sustainable manners among forest-dependent peoples of Cross River. Investigations were primarily guided by the following assumptions:

- (i) There are multiple understandings and interpretations of climate change and its adaptation measures among forest-dependent communities. These disparate understandings and interpretations influence and determine how climate change adaptation programmes and activities are designed and implemented.
- (ii) Decision-makers for climate change adaptation need the evidence to demonstrate how the ‘outsiders’ and ‘indigenous’ knowledge systems impact on the success of climate change adaptation behaviour.
- (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.

1.8 Conceptual Clarification of Terms

The following terms are operationally defined as used in the context of this study:

1.8.1 Forest-Management:

This is the science, art and craft of creating, managing, using, and conserving forests and associated resources in a sustainable manner to meet desired goals, needs, and values for human benefit. Forest management practices of interests in this study involve forest-management practices of communities with ties to forest-lands and wildlife of ancestral domain, whose main source of income and livelihood is derived from forest resources. The importance of forest management as discussed in this study resides on the premise that trees actually take in carbon-dioxide when they grow, and store it. And once trees are cut down, they no longer store carbon-dioxide; hence, there is more carbon dioxide left to heat the Earth than there used to be. Burning forests, therefore, helps to release stored carbon dioxide into the atmosphere, further adding to the greenhouse effect and raising the temperature on Earth.

1.8.2 Tropical Rain Forests:

Forests of interest in this study are tropical rainforests, not temperate rainforests. Temperate rainforests are found in cooler regions that are not on the equator, they contain coniferous or broadleaf trees. Tropical rainforests on the other hand are found in the countries near the equator. It is estimated that tropical rainforests cover a small percentage of the earth surface – about 6%, but contain over half the species of plants and animals in the world. Tropical rainforests in Cross River State have the following layers: emergent layer – this layer contains only a few trees that grow very large; higher than any of the other trees in the forest. They need this kind of structure in order for them to be able to survive in very hot temperatures and strong winds that occur above the rest of the forest. Butter flies, bats, and monkeys all visit this layer. Canopy layer – this layer of the forest contains most of the trees in the forest and is where the highest number of animals lives. This is the most diverse layer of the forest. Understory layer – this layer lies between the canopy layer and the forest floor. Only 5% of the sunlight that hits the canopy reaches down to the understory layer. Many seedlings are found in this layer that later grow to become canopy species. This layer is also home to many birds, snakes, lizards and predators. Forest floor layer – this layer only receives 2% of the sunlight reaching the earth's surface so it is often bare of plants with just a few species specially adapted for low light. Dense vegetation is usually found wherever a gap opens in the canopy as a result of a tree falling or around permanent features such as rivers.

1.8.3 Climate Change Adaptation (CCA):

This refers to longer-term strategies which deal with climate change - in contrast to short term coping strategies. Climate change in the context of this study involved any change in climate over time, whether due to natural variability or as a result of human activity. Concern is focused here on climate change resulting from human activity, specifically from the release of greenhouse gases (GHG), such as carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂ O) to the atmosphere. More broadly, climate change adaptation 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.

There are various forms of climate change adaptation. These include anticipatory and reactive adaptation, private and public adaptation, and autonomous

and planned adaptation. 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 forest-dependent peoples. Effective adaptation plans help to cushion people vulnerable 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. 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.

1.8.4 Indigenous Knowledge (IK):

This relates to any form of knowledge held collectively by a community upon which practices, beliefs, institutions, relationships and rituals in that community are designed. It is a system of thoughts composed of ideas, beliefs, attitudes, actions and practices. It is the local knowledge that is unique to a given culture or society. In this sense, indigenous knowledge (IK) contrasts with the western knowledge system generated by universities, research institutions and private firms. It is the basis for local-level decision making in agriculture, health care, food preparation, education, natural-resource management, settlement planning, and a host of other activities in rural communities. In this study, IK also refers to the information base for a society, which facilitates communication and decision-making (Battiste, 2010). Recognition is given to the fact that indigenous knowledge is held to be dynamic, and is continually influenced by internal creativity and experimentation as well as by contact with external systems.

Indigenous knowledge is further conceptualized here as the cumulative and complex bodies of know-how, practices, beliefs and other representations that are maintained and developed by peoples with extended histories of interactions with the natural environment. It refers to any aspect of culture that is concerned with how communities tackle challenges of external adaptation and internal integration. It is acquired through the accumulation of experiences, informal experiments and intimate understanding of the environment in a given culture. It leads to the formation of an ecologically sustainable culture where its values are incorporated into sustainable

development programmes. An ecologically sustainable culture that indigenous knowledge promotes refers to a way of life that meets the needs of the present generation without threatening environmental legacy of future generations. The relevance of indigenous knowledge as applied in this study is expressed within the perspective of the current global knowledge economy – where a society's ability to build and mobilize knowledge capital is equally necessary and essential for sustainable development as the availability of physical and financial capital.

The basic component of any country's knowledge system therefore is its indigenous knowledge; and this encompasses the skills, experiences and insights of people applied to maintain or improve livelihoods. It was conceived in this work that indigenous knowledge is not fully utilized in the development process as development processes are often required to depend on technology transfers from locations that are perceived as more advanced. The researcher held that this situation has led to the underestimation of the potentials in local experiences and practices. On the whole, indigenous knowledge is considered relevant in this study on three levels for the development process. First, it is most important for the local community in which the custodians of such knowledge live and produce. Second, development agents, such as governments, non-governmental organizations, donors, local leaders and private sector initiatives, need to recognize IK, value it and appreciate it in their interaction with local communities. However, before incorporating IK in climate change adaptation initiatives for instance, development agents need to understand it. Lastly, IK forms part of the global knowledge - in this sense, it has a value and relevance in itself. This means IK can be acquired, documented, transferred, or adopted and adapted elsewhere.

In sum, indigenous knowledge reflects many generations of experience and problem-solving by ethnic groups at the local level, and no experience of one country can exactly replicate another. Although most scholars have made a distinction between 'indigenous knowledge' and 'local knowledge'; where 'indigenous knowledge' refers to the knowledge possessed by the original inhabitants of an area, while 'local knowledge' refers to the knowledge of any people, not necessarily indigenous, who have lived in an area for a long period of time. The researcher preferred to use the overlapping concept of 'indigenous and local knowledge', defined as 'specific systems of knowledge, practice, and belief developed and accumulated over generations within a particular cultural group and region, and as such are unique

to that group and region' (Haverkort and Reijntjes, 2010). This means that in this study, the term 'indigenous knowledge' is used to cover all those concepts of knowledge systems.

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CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Review of Related Literature

In this section, an extensive review of literature related to the study is presented. The literature review was intended to streamline the study and situate it within the existing body of reliable knowledge. The review occurred in three major parts: conceptual, methodological, and empirical review. The presentation is organized under the following sub-headings:

- 2.1.1 Indigenous Knowledge, Tradition, and Social Order
 - 2.1.2 The Indigenous Knowledge Approach and Sustainable Development
 - 2.1.3 Documentation, Dissemination and Preservation of Indigenous Knowledge
 - 2.1.4 Endogenous Development in Modernity: Potentials and Challenges
 - 2.1.5 Oral Traditions and Indigenous Knowledge Systems
 - 2.1.6 African Indigenous and Western Environmental Protection Philosophies and Methods
 - 2.1.7 Climate Change Adaptation in Forestry: A Post-development Perspective
 - 2.1.8 Social Capital, Communities Responses and Climate Change Adaptation in Rural Nigeria
 - 2.1.8.1 Evidence of observed climate change in rural Nigeria
 - 2.1.8.2 Evidence of expected climate change in rural Nigeria
 - 2.1.8.3 Climate change adaptation: relevance and significance
 - 2.1.8.4 Reducing Emissions from Deforestation and Degradation (REDD) Principles
 - 2.1.9 Endogenising global climate change adaptation dynamics within forest-dependent Cross River
 - 2.1.10 Rural Livelihoods and Vulnerability to Climate Change in Nigeria
 - 2.1.11 Empirical Studies
 - 2.1.12 Appraisal of Literature
- #### **2.2 Theoretical Framework**
- 2.2.1 Ecological Modernisation Theory
 - 2.2.2 Conceptual Framework

2.1.1. Indigenous Knowledge, Tradition, and Social Order

In recent time, the term '*indigenous*' had acquired a meaning that connotes a group of people defined by ancestral territory and common cultures (Wiessner, 2008). This has greatly influenced research as this emphasized on the differences between different societies in their transition to modernity. The basic assumption as outlined by Eisenstadt (1973) – that the less 'traditional' a society, the more capable it is of sustained growth and social order - requires re-examination. This section looked at indigenous knowledge, tradition, and social order. It became clear that the mere abandonment or destruction of traditional forms did not necessarily assure the development of a new, viable, and modern society. Instead, the mere disruption of traditional settings tended to lead to disorganization, and chaos rather than a modern social order.

In defining and describing indigenous knowledge, (Mapara, 2009) showed that when the term '*indigenous*' is combined with the term '*knowledge*', these come to signify a methodology, a perspective, and even a philosophical and ideological position that recognizes the place of knowledge in perpetuating inequality in power relations. In specific terms, indigenous knowledge (IK) is described as a systematic body of knowledge acquired by local people through the accumulation of experiences, informal experiments and intimate understanding of the environment in a given culture (Purcell, 1998). According to Purcell, indigenous knowledge in this sense represents local or traditional knowledge that is unique to every culture or society. A basic feature of indigenous knowledge therefore is that it was *supposed* to influence development-planning as well as decision-making in local areas (Battiste, 2010). By this description, indigenous knowledge is, hence, a problem solving mechanism to rural communities. It is recognized as being relevant to the daily life of rural communities in terms of poverty reduction, economic development, culture preservation and political transformation (Haverkort and Reijntjes, 2010). Battiste (2010) and Purcell (1998) showed that indigenous knowledge had played a substantive role in poverty eradication among communities in different parts of Africa. Though their works did not demonstrate how this knowledge is systematically transferred across the African communities, as indigenous knowledge is characteristically embedded in local practices, institutions, relationships and rituals.

Again, Harvey (2011) and Harvey (2009) have described indigenous knowledge in terms of its effectiveness in helping local communities access

information as, in most cases, it is the only information they control and certainly the one which they are familiar with. They traced and concluded that the origin of indigenous knowledge is as old as the human race itself. They upheld that once local communities are empowered with indigenous knowledge, they can use it to solve critical community problems, including climate change related problems. In describing indigenous knowledge, Purcell (1998) went further to highlight the following scope and features as typical of indigenous knowledge. He emphasized that indigenous knowledge has the following features:

- i. It is locally bound; that is, it is indigenous to a specific geographic area.
- ii. It is culture and context specific.
- iii. It is non-formal knowledge.
- iv. It is orally transmitted, and generally not documented.
- v. It is dynamic and adaptive - it is not static - it changes as society changes socially, economically, and culturally.
- vi. It is holistic in nature.
- vii. It is closely related to survival and subsistence of the local or community people; and,
- viii. the knowledge is communally owned, that is, it belongs to the whole community; no single individual can lay claims to its ownership.

Based on these features and scope, Purcell (1998) contended that indigenous knowledge is in all forms *scientific knowledge* since it is obtained and generated through many years of '*practicing*' and '*practicing*'. He stressed that this knowledge system had been employed since time immemorial to solve problems that confront communities. In authorship, he jolted that this system of knowledge belongs to the community; thus, it is communally shared, and it is there to solve the peoples' problems. This implies that those who possess the knowledge are expected to always utilize it for the benefit of the entire community. Indigenous knowledge in this sense is supposed to benefit all members of the community.

Haverkort and Reijntjes (2010) in their work argued that since the epistemological revolution of the 17th century, legitimate knowledge in the Western sense of the word has been associated with the process of generating and disseminating scientific information. In this sense, knowledge is understood as that

which carries the attributes of incontrovertibility, objectivity, rationality, testability, and replicability or verifiability, even though at times such knowledge is considered to be probabilistic rather than being absolute. Verifiability and replicability, the bedrock of the scientific tradition, emphasized that not only may something be known, but that the method(s) of discovery must also be known, and that the 'knowledge' must contain the element of explanation (Mapara, 2009; Mazrui, 2004). This means that the causal, or at least, the correlational-relations associated with that knowledge must be known. Impliedly, this suggests that, at a minimal level, any proposed link between phenomena and knowledge should rest on a testable hypothesis, and the requirement for testable hypotheses partly defines the quality or type of explanation that is acceptable. In this regard, Haverkort and Reijntjes (2010) believed that the knowledge of a 'spiritual' healer who, for instance, explains a persistent stomach-ache not as resulting from physiological phenomena but from neglect of an ancestor is considered *non-scientific* as this knowledge does not really rest on a testable hypothesis that is verifiable and replicable. According to them, the acceptability and credibility of this form of knowledge by the 'spiritual healer' should rest on the intuitive understanding within the symbolic structure of the healer's culture. In an earlier rendition, Purcell (1998) had insisted that what defines scientific knowledge is that that knowledge is demonstrable outside of any unique symbolic structure. This means that such knowledge must have universality under specified empirical methodological conditions, independent of the practitioner's cultural beliefs and history.

Consequently, from the *Western-scientific* point of view, the concept of knowing, therefore, excludes that which is known *intuitively*, even if such knowledge had been deduced from long-term experience or uncontrolled observation (Wiessner, 2008). In their view (Haverkort and Reijntjes, 2010), the *western-scientific* knowledge cannot invalidate other knowledge systems found within a specific cultural narrative world. Some examples are rules of specific cultural practices, origin stories, or folk aphorisms. This is because, within this specific cultural narrative world, causal or correlational links are postulated, but may not be testable. In this sense, we can see that the western-scientific knowledge generation process had not traditionally blended with the indigenous knowledge of the people, which is largely based precisely on 'subjective' historical-cultural experiences and uncontrolled, undocumented observations. To them, this suggests that the line between indigenous knowledge and

western knowledge is not clear-cut. Thus, much of the distinction of the two knowledge systems depends on how one defines the scientific method and its object(s).

Haverkort and Reijntjes (2010) acknowledged that it is deceptively difficult to define indigenous knowledge and who indigenous peoples are. They made it clear that it is so because the categorization of indigenous knowledge and indigenous peoples is an invention of colonial history and has continued to be affected by the on-going unequal global processes. Deciding who is indigenous depends on specific political systems and policies (Olutayo and Bankole, 2002; Haverkort and Reijntjes, 2010). Haverkort and Reijntjes (2010) have further argued that, in recent times, the usage of the term '*indigenous*' has gradually superseded the terms '*primitive*' and '*tribal*' – terms that have been loosely used to describe and designate all seemingly culturally homogenous, non-Caucasian, groups encountered as Europeans expanded into the so-called non-Western world. Comparatively, they upheld that an ethnographic equivalent of the term '*indigenous*' is the term '*aboriginal*', used briefly in India by the British to refer to what is now called *Scheduled Tribes* (Haverkort and Reijntjes, 2010).

In reviewing what the term 'indigenous' means, the United Nations (2007) added another interpretation to the term. They expounded that the term '*indigenous*' always acquires substance when there are other populations in the same region that can reasonably be described as '*settlers*' or '*aliens*'. The term *indigenous* is therefore believed to be more encompassing than the term *tribal*. Although the term *tribal* was used to refer to all peoples who permanently occupied a territory at the point of colonial intervention. Wiessner (2008) concluded by buttressing that in spite of inherent cultural dynamism and its resultant boundary-blurring character, culture is central to the description and definition of the term '*indigenous*'. According to him, this is so because without it the concept of indigenous knowledge would be meaningless.

With respect to western knowledge, it is worthy for us to ask at this point whether 'western' knowledge can also be considered 'indigenous'. In answering this question, Purcell (1998) had raised some few pertinent points in this regard. He showed that western knowledge implies a set of understandings that include scientific knowledge and methodology as well as what is regarded as 'western common-sense'. But while scientific knowledge and methodology can claim a degree of cultural

transcendence, common sense is essentially culturally particular. Even if we assume, for the sake of argument, that the common sense systems of the West constitute a single cultural domain, we would still have to distinguish between the domain of common sense which construes the world through 'natural' cognition and symbolic constructions and science. The latter, though historically founded on 'common-sensical' understandings, expands on those understandings by codification, experimentation, and empirically-based theoretical explanations.

Having made that distinction, we must recognize that scientific knowledge, the authoritative knowledge of the West, is gaining increasing dominance in ordering all aspects of social life, including climate change adaptation interactions at forest-communities level in Cross River State. But since science is not culturally relative, it would appear that we cannot grant the existence of a 'western' indigenous knowledge system - except to the extent that we could delineate a 'culture' of science that is unique to the West. In exploring this issue, we might take as a point of departure the question of whether such a science, 'culture', may be premised on the distinction between scientific methodology, the universal, and the specific practice or object of science, the particular.

It is our opinion that whatever the answers to the above question, attempts to define indigenous knowledge must consider its political status, that is, its distorted location within the international, intercultural, and interclass relations of power that define and legitimize social, political, ideological and economic practice in the world. Wiessner (2008) had noted that the location of indigenous knowledge, whether 'Western' or non-Western, has subjugated knowledge in relation to the dominant discourse about 'truth' - in Foucaultian-terms has had, and will continue to have, far-reaching implications for global transformation.

In a 1987 global survey of the condition of indigenous peoples, Burger (1987) examined definitions used by the United Nations, and by indigenous people themselves, including the World Council of Indigenous Peoples (Purcell, 1998). All these definitions culminate to form the working definition of indigenous knowledge as applied in this work. Indigenous people had been described as existing descendants of non-Western peoples who, in general, continue to occupy their ancestral lands even after conquest by Westerners, or who have been relocated forcibly in the process of colonization. In specific terms, indigenous people maintain a cultural system that sets them apart from the Western cultural tradition (Borrini-Feyerabon, Pimbert, Favara,

Kothari and Renard, 2004; Masoga, 2007; Warren, Egunjobi and Wahab, 1996). Indigenous people are therefore standing in a historical relationship of conflict and asymmetry vis-a-vis Europeans in that the construction of capitalism was largely achieved through the exploitation of land, labour and symbolic resources previously controlled by the indigenous people of non-European origin. This description of indigenous peoples according to Purcell (1998), largely take into account two key historical and political factors: first, indigenous peoples' drive for self-determination which has contributed to the new emphasis on the application of *non-Western knowledges* in addressing 'local problems'; and second, the location of the process within a global historical conflict of domination and struggle, and the challenge to Western cultural hegemony which inhered in that conflict.

As stated earlier, it can be seen that indigenous knowledge relates to a particular people. Hence, it is specific in both time and space, and it is often associated with the original inhabitants of a particular geographic location who have a distinct culture and, by implication, belief system. Such *original* inhabitants are often referred to as the indigenous people. The pygmies of the equatorial forests in central Africa and the Aboriginals of Australia are good examples of indigenous people (UNEP, 2011). On the other hand, peoples who may not have been indigenous to an area, but are believed to have migrated from elsewhere, and have lived long enough in an area are also considered to be indigenous as well. UNEP (2011) had noted that most communities in Africa fall under this category. However, they also observed that the term 'indigenous' has in recent times become so politicized as expressed in campaigns on 'the rights of indigenous peoples' that it tends to exclude local communities that may have lived in an area for a long period of time and have developed their own system of local knowledge but are not the original inhabitants of the area. This explains why some writers (Vlaenderen, 1999; UNEP, 2011) prefer to use other terms to describe indigenous knowledge, such as 'local knowledge' or 'traditional knowledge', which are broader concepts referring to the knowledge possessed by any group of people living in a particular area for a long period of time. Langill (1999) had stated that in using the term 'indigenous peoples', it is not necessary to know if the people in question are the original inhabitants of an area or not. However, the focus should be on how people - aboriginal or non-aboriginal - in a particular area view and interact with their environment.

The concept of 'indigenous knowledge', especially its aspect of 'agricultural and environmental knowledge', is believed to have gained international recognition after the United Nations Conference on Environment and Development (UNCED) held in June 1992 in Rio de Janeiro. Agenda 21, one of the environmental agreements signed at UNCED, emphasized that governments and intergovernmental organizations should respect, record, and work toward incorporating indigenous knowledge systems into research and development programmes for the conservation of biodiversity and sustainability of agricultural and natural resource management systems (UNEP, 2008). Other international documents, such as the 1980 'World Conservation Strategy' by the International Union for the Conservation of Nature and Natural Resources (IUCN), also paved the way for the recognition of the important role of indigenous knowledge in biodiversity and human development. However, the value of indigenous knowledge systems in facilitating development is now gradually being recognized by governments and development agencies.

Most concerns (USNC/IUHPS, 2001) in recent times have been based on the notion that the promotion of indigenous knowledge is tantamount to the promotion of pseudoscience and anti-science. The African continent, for instance, one of the world's strongholds of indigenous knowledge, has always been regarded as 'backward, static and a hindrance to modernization'. What came clear in the literature was the fact that indigenous knowledge is actually different from pseudoscience or anti-science.

All renditions blended to project that while 'pseudoscience' constitutes an attempt to be perceived as scientific, 'anti-science' connotes an opposition to science. Nonetheless, indigenous knowledge is neither 'pseudoscience' nor 'anti-science. Rather, it is developed with different intent and in a context different from pseudoscience and anti-science in that it neither attempts to masquerade as science nor sets itself in opposition to science. UNEP (2008) has pointed out that how indigenous knowledge can best be integrated with scientific knowledge is one of the important questions facing indigenous communities. They argued that modern science is more acceptable to the indigenous communities if it is integrated with what they already know. Scientific weather forecasts, for example, may be more credible to forest-dependent communities of Cross River if they are integrated with indigenous knowledge that they have relied on for generations to predict and cope with droughts, floods, and other natural hazards. A good example is the experience of local farmers

in Agoi-Ibam and Iko-Esai who would listen to weather forecasts on radio during the 7.00am network news but still prefer to rely on their own traditional knowledge of when to start planting. This therefore means that the more the 'scientific' forecasting deviates from traditional knowledge, the less it is used for planning purposes by indigenous communities. This experience can be said to be similar with the story of the Kikuyu farmers in Kenya who rejected European farming techniques at the turn of the 20th century that were being promoted by British agricultural officers. The Kikuyu farmers preferred their own agricultural knowledge which had stood the test of time. They saw no need to interfere with what had served them so well for generations (Pradhan and Ayombi, 2014).

Consequently, the definition of indigenous knowledge, as distinct from the definition of indigenous people, follows logically, to a degree, the definition of indigenous people. More precisely, indigenous knowledge is described as the body of historically constituted (emic) knowledge instrumental in the long-term adaptation of human groups to their bio-physical environment. According to Moronkola (2006), the interaction of the human group with the bio-physical environment mediated by indigenous knowledge is what constitutes the human ecology. Based on the history of its usage in applied sociology, the term knowledge here has a more delimited meaning than the term culture. Knowledge denotes that which is directly functional in long-term survival. This conception of knowledge likewise places indigenous knowledge on an equitable epistemological plane with - but in analytic contrast to - Western instrumental scientific knowledge. Sociologists have understood culture to be a relatively integrated whole (Purcell, 1998). Thus, depending on the circumstances, any aspect of culture that functions toward the long-term survival of a group is theoretically treated as indigenous knowledge.

By this description of indigenous knowledge, there is therefore a tendency for one to apply the word '*indigenous*' to all that pertains to or is initiated within local, national or regional populations in less developed countries and societies. Impliedly, the term has come to take on aspects of the word '*native*' in the sense of being born in a particular place, and without any specific historical parameters. In such a context, it may be appropriate to describe this kind of knowledge as '*folk*', '*traditional*' or '*local*' knowledge even though its historical roots may be relatively shallow. This popular usage can be said to have direct academic relevance as indigenous people can be seen as assuming relative autonomy (Purcell, 1998). The practice where

indigenous communities are allowed the autonomy to act on their own behalf, in accordance with the dictates of their own history and political culture is generally referred to as the indigenous perspective (Wahab, 1996). While the positions of scholars may vary on what an indigenous perspective may mean to different actors; however, the undoubted common assumption in the literature is that indigenous/traditional/folk/local groups have a duty to determine, informed by their cultural knowledge, their own historical destiny - with the sociologist as the facilitator or broker (Battiste, 2010; Purcell, 1998). The indigenous perspective, then, advocates and represents the meeting point between the evolution of a research agenda and wider historical forces.

2.1.2 The Indigenous Knowledge Approach and Sustainable Development

The 1970s and 1980s marked the period in which a growing number of researchers turned their attention to exploring how indigenous knowledge and institutions could contribute to more culturally appropriate sustainable development (Sayer and Campbell, 2004; Boedihartono, 2010). Although much of the path-breaking work centred around issues of agricultural and environmental practices (Oladimeji and Ademola, 2010; Sillitoe, 2002); nonetheless, this body of work was based on the recognition that capitalist-modernist transformations threatened local communities and ecological systems and this therefore makes development at this level unsustainable (Seth, 2009; Olutayo and Odok, 2011). These works were also based on the realization that indigenous people are not only more keenly aware of their needs than are outside 'developers', but that those needs are culturally defined, demanding a substantive, instead of a formal assessment and solution (HDR, 2011). The recognition of a culturally relative definition of the satisfaction of needs emerged from these works as being essential. And, the recognition that land resources are resources on which the survival of Indigenous Peoples and their indigenous knowledge depend on comes to the fore. In this process, two tendencies have become clear. One is emphasis on the study and use of indigenous knowledge itself, and the other is an ecological-sustainable development perspective (Purcell, 1998). Some of the pioneers of the indigenous knowledge approach are represented in an anthology as shown by Purcell (1998) – where authors covered a range of ethnographic settings - from Latin America to Africa to Asia - and a variety of theoretical and methodological positions. The common theme that emerged however; was that

knowledge and experience are viewed as correlating with local ecology, human geography, age, gender, and class conditions.

As noted earlier, indigenous knowledge is no longer confined to knowledge systems associated with people whose indigenous status is defined by ancestral territory. As colonialism uprooted Indigenous Peoples, it also uprooted their knowledge systems. A basic characteristic of indigenous knowledge is that it adjusts and persists in new environments (Purcell, 1998; Ekong, 2003; Chambers, 1983). One of the objectives of indigenous knowledge, therefore, now includes a more general examination of local culture and its role in planned social change (Purcell 1998; Anyaegbunam, Mefalopulos and Moetsabi, 2004; Chambers, 1983). This means that indigenous knowledge likewise helps to build folk institutions, based on traditional solidarity, that aid traditional societies' adjustment to modernity. Giddens (1990) had argued that these folk institutions would, however, wither away once integrated into modernity, as the integration often makes cultural solidarity unnecessary. The researcher here criticizes this position – arguing that folk institutions and cultural solidarity have important lessons for sustainable development and planned social change.

On September 13, 2007, the UN General Assembly, in an overwhelming vote of 144 States in favour to 4 States against, adopted the UN Declaration on the Rights of Indigenous Peoples (United Nations, 2007). Though there were celebrations across the globe yet, there are still some unanswered questions on exactly what the adoption of these rights means to the Indigenous People themselves and to others. Clarity needs to be made if indigenous communities have accomplished their long way back from what seemed to be assured extinction. Or if they have, in effect, managed to reverse colonialism; or, are they now sovereign again, that is, are they masters of their own fate? Answers to all these concerns reside in the reality that, in broad terms, modern society has tried its best to extinguish the indigenous voice, as its language, institutions, and rituals have become dominant over that of the indigenous people. Giddens (1990) illustrated that modernity's law, in particular, has imprinted itself on indigenous peoples. Its domination of indigenous ways of life was indeed anticipated. Modernity's aggressive use of the earth and its resources, combined with sanctions to punish perceived transgressions, and its emphasis on the individual, all contradict with indigenous concepts of oneness with Mother Earth and Father Sky, and the focus

of the indigenous on peace and reconciliation, and on faith, and on not leaving anybody behind – and on community (Wiessner, 2008).

In his defence of the resilience of the indigenous, Purcell (1998) noted that the onslaught on the indigenous by modernity has not been completely successful. That all the military, economic, and materialistic might of the modern world has not succeeded in silencing the indigenous voice. Just like tender water ultimately erodes the hardest of rocks, indigenous cultures, peoples, and their values have persisted all the way. Purcell (1998) gave a description that, just like many oppressed communities, Indigenous Peoples have had to adapt and to avoid open confrontation with modernity. Most of the time, according to Purcell (1998), these peoples withdrew into niches of survival, areas not initially desired by the more dominant and aggressive part of humanity; and at other times, they engaged in religious syncretism, a practice involving the mixture of different religious thoughts. At this time, they often transform their own indigenous gods into saints of the dominant faith. Purcell (1998) further asserted that as a measure of surviving the onslaught of modernity, Indigenous People even participate in the dominant economic activities, and they even enlist in the armed forces of the conqueror.

In mobilizing themselves to survive modernity's onslaught, Mitra and Mishra (2011) revealed that modern communication technologies have helped Indigenous Peoples to come together, sharing their stories across the world. They also upheld that, as a matter of principle, honouring the land rights of Indigenous Peoples is indeed the first step toward the preservation of their culture. Second to this, according to Wiessner (2008), is to respect the structures of decision-making within indigenous communities - a distant variant of the modern processes of decision-making which, in modern times, is widely known as 'democracy'. Cultural differences provide the basis upon which Indigenous Peoples' claims to self-government arise. Unlike the claims of other groups, Indigenous Peoples' claims are often contained in the realm of 'sovereignty'. Let us briefly discuss the notion of sovereignty as it relates to Indigenous People.

In the ordinary parlance, the concept of sovereignty reinforces every legal system, be it international or national. The sovereign may either be a king or queen or the people, but, in its original sense, sovereignty is derived from the Latin phrase - *legibus solutus* – meaning being free from the bonds of law (Honey, 2008). The sovereign holds the power to force compliance with its commands within its

community, creating domestic law in a hierarchical or vertical sense. Also, the sovereign has the power to extend its authority beyond the borders of its community via agreements or concurrent practice with the sovereigns of external communities - thus creating international law, which is law in a horizontal sense.

The parallel of the sovereign in the modern world is the nation-state. The nation-state is an abstract concept empirically understandable only through the notion that authorized persons can effectively control certain territory. In his analysis, Wiessner (2008) had posited that the concept of the nation-state replaced the feudal idea of a personal community constituted of the feudal lord and his subjects, who are related by the very tangible concept of perpetual allegiance, that is, the inescapable duty of obedience of the subject toward the lord, and the lord's duty to protect the subject, even in the lands of another lord.

Wiessner (2008) went further to establish that one key concept at the wake of World War II was the principle of self-determination. He showed that the legacy of colonial conquest was supposed to be dealt with by offering colonized peoples a UN-supervised process of decolonization through which they could arrive at their preferred solutions to their political status. That is to say, whether they desired independence or integration into the colonizing state, association, or any other status in between? Wiessner identified the problem with the UN's decolonization process as the choice to the political future of colonized peoples was not given to the individual peoples who were colonized or conquered. Rather, this was given to inhabitants of territories colonized by European conquerors, within the boundaries of the lines of demarcation drawn by the colonizers. Thus, the colonizers, by constituting the new country's 'people' under the new sovereign's control, continued to rule the colonized even from their graves.

2.1.3 The Documentation, Dissemination and Preservation of Indigenous Knowledge

Among indigenous communities and peoples, exploiting the environment for purposes of meeting the basic need for food ranks high and this has surely been the main reason for wanton deforestation at this level (Onyeneke and Madukwe, 2010). It is commonly said that *'a hungry man is an angry man'*. In most African cultures, there are popular sayings or proverbs emphasizing the importance of food to human existence. Among the Boki people of South-South Nigeria for instance, there is a popular saying to the effect that *'no other matter can arise or be entertained in the*

presence of hunger'. Even as this consciousness of exploiting the environment exists among this people, there is also a cultural awareness that the environment must be exploited in a sustainable manner. Thus, knowledge systems exist to ensure that this environmentally-friendly behaviour is transmitted from generation to generation. Consequently, the World Bank (2008) has initiated strategic programmes and activities at different levels to tackle challenges of documentation, dissemination and preservation of indigenous knowledge. The United Nations Food and Agricultural Organization (FAO) had also championed most of these programmes and activities. One of the strategies adopted by FAO to document, disseminate and preserve indigenous knowledge was through indigenous agricultural knowledge (AIK) which gained recognition in many quarters including the 1992 United Nations Conference on Environmental Development (CIESIN Thematic Guides) and whose potential contribution towards achieving the millennium development goals (MDGs), particularly the eradication of poverty and hunger and the ensuring of environmental sustainability, has been acknowledged (United Nations, 2007).

Although the literature did not provide a single description of what constitutes AIK and indigenous knowledge. Nonetheless, the various descriptions have some common features which provide that both AIK and indigenous knowledge is:

- (i) Generated within communities (IDS, 2007).
- (ii) It is location and culture specific (Msheliza, 2011);
- (iii) It is the basis for decision making and survival strategies (Donehower, 2008);
- (iv) It is not systematically documented;
- (v) It is concerned with critical issues of human and animal life: primary production, human and animal life, natural resource management;
- (vi) It is dynamic and based on innovation, adaptation, and experimentation; and
- (vii) It is oral and rural in nature.

According to Wiessner (2008), both AIK and indigenous knowledge is an unwritten body of knowledge. It is held in different brains, languages and skills, in as many groups, cultures and environment as are available today. According to Purcell (1998), AIK and indigenous knowledge covers a whole range of human experience. It is closely related to survival and subsistence. It provides a basis for local-level decision making in food security; human and animal health; education; natural resource management; and various other community-based activities.

However, it has been widely recognized by the World Bank that both AIK and indigenous knowledge is threatened by the development process (Donehower, 2008). Mapara (2009) opined that given that both AIK and indigenous knowledge is threatened with extinction, its documentation, dissemination and preservation is therefore justified.

In recent times, it is encouraging to observe that there has been a dramatic increase in interest in the role that indigenous knowledge can play towards sustainable development. It may not be accidental that the growing interest in the potential contribution of indigenous knowledge to development is becoming manifest at a time when current development models have failed in several ways. The growing literature addresses indigenous environmental knowledge and argues that rural or indigenous peoples throughout the developing world understand their environment well, particularly its possibilities for sustaining livelihoods. Recent researches (Kalipeni, Opong and Ofori-Amoah, 2006; UNEP, 2008) affirm the valuable place of locally generated knowledge in changing and improving livelihoods at the community level, especially through the sustainable management of natural resources. The agricultural sector provides a good example – where farmers usually adopt a wide range of indigenous agricultural practices based on generations of experience, informal experiments and intimate understanding of their environments in managing their forests. The application of indigenous knowledge for farming, for example in forest-dependent communities in Cross River, has reflected in the following:

- (viii) Indigenous soil preparation and planting materials;
- (ix) Indigenous methods of controlling pests and diseases;
- (x) Indigenous methods of maintaining soil fertility;
- (xi) Indigenous methods of controlling weeds;
- (xii) Indigenous methods of harvesting and storage

This section is more concerned with the ways by which indigenous knowledge is being documented, disseminated and preserved in forest-dependent communities of Cross River State, Nigeria. The idea of documentation of indigenous knowledge in the context of climate change adaptation is based on the fact that carefully documented case histories provide excellent guidelines for policy making and project planning for climate change adaptation behaviour in rural Nigeria. Yemiru, Roos, Campbell and Bohlin (2010) had posited that indigenous knowledge has become valuable not only to those who depend on it for day-to-day survival, but to modern industry. He

observed that research libraries have not been particularly active in documenting indigenous knowledge. This was why probably; Wiessner (2008) had earlier asserted that libraries must consider indigenous knowledge not simply as only a part of a historical archive, but also as a contemporary body of relevant knowledge. The International Institute of Rural Reconstruction (IIRR) suggested the following ways and methods as being appropriate in documenting and preserving indigenous knowledge (Chisenga, 2002). These include identifying specialists in indigenous knowledge systems, case studies, field observation, in-depth interview, participant observations, participative technology analysis, surveys, brain storming, games, group discussions role play, SWOT analysis, village reflections, village workshops, flow chart, mapping, taxonomies, participatory video and photo/slide documentation. The IIRR also reported that indigenous knowledge could also be documented and preserved in the form of descriptive texts such as reports, inventories, maps, matrices and decision trees; audio-visuals such as photos, films, videos or audio cassettes as well as dramas, stories, songs, drawings, seasonal pattern charts, daily calendars and so on.

Anaya (2004) pointed out that the verbal style of documenting and preserving indigenous knowledge does not always yield satisfactory results. In this regard, he proposed that observation is important in especially the documentation of indigenous knowledge. He added that real insight could be obtained by prolonged observation. Accordingly, indigenous knowledge could also be stored in local communities' databases, card catalogues, books, journals and other written documents, audio-visuals and museums. Yemiru, Roos, Campbell and Bohlin (2010) on his part reported that surveys and interviews also help in documenting and preserving indigenous knowledge. Mapara (2009) reported that there are several methods such as the case study method, the oral history method, key informant means, diagrams-making, case histories, critical incidents, preference ranking and inventory of farmers' indicators that could be used for documenting and preserving indigenous knowledge. In the same vein, Purcell (1998) identified methods like dialogues, field observations and joint interpretations to arrive at conclusions, as suitable means of documenting and preserving indigenous knowledge. Wiessner (2008) again added the use of participatory methods such as participant observations and unstructured exchanges as another way of documenting and preserving indigenous knowledge. Supporting this view, Sillitoe (2002) vehemently held that the participatory approach is the most

appropriate method through which indigenous knowledge is documented and preserved. In his work, Nhemachena, Rashid and Kurukulasuriya (2010) concluded that individual and group interviews, participant observations and agro-ecosystem analysis play a vital role in the documentation and preservation of agricultural indigenous knowledge in particular and indigenous knowledge in general.

So far, one critical point that emerged from the literature is the fact that indigenous knowledge does not flow on its own accord. It depends on owners or originators with the vision or motivation to create, adapt, document, disseminate and preserve it. This therefore means that these owners need to have the creative, technical and peoples' skills to transform an idea, an artifact, knowledge, belief, value, norm, art, moral, law, custom, language, human institutions, technology and tradition into something that can be disseminated or exchanged. Principally, disseminating indigenous knowledge, especially for forests management, within and across forest-dependent communities, indeed, has potentials of enhancing cross-cultural understanding and promoting the cultural dimension of development (Kalipeni, Oppong and Ofori-Amoah, 2006). Anyaegbunam, Mefalopulos and Moetsabi (2004) have stated that conducting village level workshops and group discussion with farmers and community people, publishing newsletters in local language for the exclusive communication of traditional technologies are some of the effective ways of documenting, disseminating and preserving indigenous knowledge.

2.1.4 Endogenous Development in Modernity: Potentials and Challenges

"It may be that what we call modern is nothing but what is not worthy of remaining to become old".

- Dants Alighieri.

The notion of endogenous development has emerged in contemporary society to complement the inadequacies of previous development models (UNEP, 2008). According to Chambers (1983) and Anaya (2004) endogenous development is based on local peoples' own criteria of development, and takes into consideration the material, social and spiritual well-being of the people. The World Bank (2008) added that the importance of participatory approaches and of integrating local or indigenous knowledge into development interventions has become broadly recognized. Haverkort and Reijntjes (2010) had noted that many of these participatory approaches that were supposed to integrate indigenous knowledge often experience difficulties in overcoming an implicit western bias. They canvassed that the main objective of

endogenous development is to overcome this bias by making the peoples' worldviews and livelihood strategies the starting point for development. The peoples' worldviews and livelihood strategies according to them reflect sustainable development in terms of a balance between material, social and spiritual well-being.

Purcell (1998) revealed that the main difference between endogenous development and other participatory approaches is in its emphasis on including spiritual aspects of development in the development process that is in addition to the ecological, social and economic aspects. Gallopin (2003) emphasized that endogenous development is mainly based on local or indigenous strategies, values, institutions and resources. This therefore means that priorities, needs and criteria for development may differ in each community and may not always be the same as those of the development worker. In describing endogenous development, Freire (1970) identified the following key concepts of endogenous development. These include local control of the development process, the taking of cultural values seriously, the appreciation worldviews, and the finding of a balance between local and external resources. He further stressed that the main aim of endogenous development is to empower local communities to take control of their own development process. In this sense, while revitalizing ancestral and local knowledge, endogenous development helps local people to select those external resources that best fit their local conditions. This therefore means that endogenous development has potentials of increasing bio - and cultural diversity, reducing environmental degradation, and maintaining a self-sustaining local and regional exchange.

2.1.5. Oral Traditions and Indigenous Knowledge Systems

It is commonly held that scientific local history is the only means of verifying the validity of old ideas and propositions, or of discovering new problems and hypotheses (Goubert, 1971). Clearly, there is an admission that the Western world has no monopoly of wisdom and, as Mazrui (1976) noted, that we all have a '*shared humanity*', and that the proper understanding of our respective values may lead to '*cultural convergence*'. It is interesting to note that contemporary challenges that confront the world demonstrate that Indigenous Peoples' groups have histories worth reconstructing. And this means that we must turn to oral traditions or what the Hova people of Madagascar euphemistically call '*the heritage of the ears*' (Uzoigwe, 1990). It is stressed that oral tradition is the total heritage of a people which include their

cosmology, customs, beliefs, history, literature, opinions – transmitted by word of mouth through the ages (Vansina, 1985). Vansina (1985) has severally shown that each age has its own truth, and that no human account can universally stand valid throughout history at all times. Harvey (2009) in his work relayed Evans-Pritchard, who, after comparing written and oral sources acknowledged the fact that traditions could indeed contain historical information. Jan Vansina largely committed his work to trying to tackle both the theoretical and practical problems of historical data collection in non-literary societies. In 1961, he provided a working definition of oral as ‘oral traditions consist of all verbal testimonies which are reported statements concerning the past (Vansina, 1965). So far, it can be seen that this definition of oral tradition obviously excludes some oral reports such as rumours, eyewitness reports; but only includes hearsay accounts - that is, ‘testimonies that narrate an event which has not been witnessed and remembered by the informant, but which has been learnt about by the informant through hearsay’. In this context, Vansina advised a narrow scrutiny of the ways in which traditions are transmitted, as this would constitute an important means of testing their historical reliability (Anaya, 2004).

Apart from defining oral tradition, Vansina devised a typology to determine the different appearances of oral traditions, distinguishing them according to their purpose, significance, form, and according to the manner of transmission of the testimony (Vansina, 1965). On this basis, Vansina identified five types of sources of oral tradition. These include formulae, poetry, list (names, place names), tales and commentaries (Vansina, 1985). Prose and mythology for instance according to Vansina, are of little value in generating oral tradition because they only possess a small amount of historical information. More precisely, myths are only useful for the study of cosmological concepts. Nonetheless, it is argued that one of the weak spots in Vansina’s approach to oral tradition is his *a priori* disqualification of certain types of testimonies such as myths, personal recollections, as historical sources (Vansina, 1965).

Another point worth mentioning concerns the methodological problems arising from the context in which traditions are both performed and collected. Vansina pointed out that to listen and collect tradition from the field requires an intricate contextual study. He contended that questions have to be asked on the performer’s status. That is who is he or her? What is his or her function in society? How do we define the person’s relationship with the tradition? Is the person a specialist? Is he or

she paid for the performance and by whom? This interrogation goes on and on. The same applies to the performance as such, and to the contents of the tradition performed in relation to the performance (Vansina, 1985).

Given the fact that the demand for clarity of terms and issues is growing rapidly in development studies (Sillitoe, 2002; Purcell 1998); let us abruptly probe again what constitutes indigenous knowledge or in other words, when is knowledge indigenous? This clarity is inevitable and necessary given the blurred nature of the concept of development. Furthermore, the need for this clarity is necessitated due to the range of alternative terms used for indigenous knowledge by different writers vying for prominence and claiming to be more representative as they argue over the content and approaches to this concept (Sillitoe, 2002). These terms include 'local knowledge', 'rural people's knowledge', 'insider knowledge', 'indigenous technical knowledge', 'traditional environmental knowledge', 'peoples' science' and 'folk knowledge' (Sillitoe, 2002). Practically, it is challenging to draw lines between these terms; even the words 'indigenous' and 'local' are laden with murkiness or obscurity. Nonetheless, according to Sillitoe (2002), one feature that all these terms share is a common semantic stack which describe the same broad issues in which they address. Some scholars contrast 'indigenous knowledge' with 'scientific knowledge', even implying that it applies only to non-Western knowledge (Sillitoe, 2002), prompting others to query the status of 'non-scientific' Western beliefs and the implications of contemporary accelerating globalizing trends like climate change and other environmental issues. These differences, no doubt, take us into difficult eggshell terrain with a contentious political edge which has interpretations and connotations of superiority and inferiority between 'indigenous' and 'scientific' knowledge respectively (UNEP, 2008). The absence of any consensus of what constitutes the meaning of these terms intimates the fluctuations that characterize this fast-moving and exciting concept of indigenous knowledge in development practice.

Thus, we need a working definition of what constitutes the concept of indigenous knowledge. In simple terms, indigenous knowledge in the context of development studies relates to any knowledge held collectively by a population, informing their understanding of the world (Seipel, 2000). It pertains to any domain, particularly natural resource management, which is community based and is embedded in and conditioned by local tradition. It is culturally informed understanding inculcated into individuals from birth onwards, structuring how they

interface with their world and environment – though it is also informed continually by outside intelligence (Sillitoe, 2002). Its distribution is usually fragmentary and it is more widely shared locally. Candidly, no one person, authority or social group knows it all. There may be asymmetries existing here and there, this therefore calls for the galvanizing of clusters of knowledge within populations, for instance by gender, age and so on, or according to specialist status, perhaps reflecting political or ritual power, in order to achieve common objectives and aspirations. Sillitoe (2002) had firmly argued that no knowledge system or framework can claim to be a grand repository that provides universal explanations that all societies and cultures unarguably subscribe to its tenets of veracities. He disparaged any attempt for a knowledge framework or theoretical model to claim omniscience to provide universally agreed understandings to global issues in manners that achieve overall coherence in cosmologies, rituals and symbolic discourse. Indigenous knowledge is regarded equally as skilled conscious knowledge, transmitted orally and through experience and repetitive practice, characterized in learning between generations. It is the heritage of practical everyday life of a community. To make climate change adaptation effective at community-levels, Sillitoe's position suggests that the tenets that drive the climate change activities must be fluid and constantly changing, meaning that these activities must be dynamic and subject to ongoing local, regional and global negotiation between local people and their environments (Spittlehouse and Stewart, 2003).

According to foregoing definitions and interpretations, indigenous knowledge equates with sociological inquiry and research. This equation in reality assuages the debate that challenge whether it is justifiable to talk of indigenous knowledge when talking about climate change adaptation (Uzoigwe, 1990). UNEP (2008) have argued that to suffuse others' knowledge traditions into an indigenous category and contrast it with Western scientific knowledge is intolerable because it overlooks differences within and similarities between various local and scientific perspectives. Vail (2008) had criticized this position on four concrete grounds. First, he argued that these different knowledge systems may be similar in essentials and content. Second, he showed that there are certain equivalents or parallels in the methods they use to investigate reality. Third, that science is no less culturally located than other knowledge traditions. And fourth, and perhaps most disturbing, he argued that mixing others' knowledge traditions into an indigenous category and then contrasting it with

Western scientific knowledge privileges the scientific perspective to others' knowledge traditions.

The question now arises, should we abandon an attempt to discuss indigenous knowledge and scientific knowledge in relation to environmental issues like climate change adaptation, given the perceived differences within and similarities between, these knowledge traditions? Of course not. These dichotomies indeed cannot ignore sociological investigation which sits uneasily between the scientific and indigenous perspectives. The sociological perspective challenges any attempt to disregard notions of the scientific and indigenous or the global and local (Macionis and Plummer, 2005). One can affirm that there are substantial similarities and overlaps in the substantive contents of various knowledge systems; if this was not so, it is difficult to conceive how we could communicate with one another. Second, it is undeniably questionable to attempt to distinguish scientific from any other knowledge on formal grounds. Third, scientific knowledge is indisputably anchored culturally in Western society, where it largely originated, although with the contemporary communications revolution and associated cultural globalization processes; hybridization is occurring and blurring distinctions between it and other knowledge on socio-cultural grounds. And fourth, any privileging that occurs in distinguishing between different knowledge traditions, whether indigenous or scientific is not necessary.

One cannot deny the fact that scientific knowledge has underpinned great technological change across societies, allowing human beings to interfere with, and to a large extent have control over nature. The desire of populations in developing countries is also to share in this intellectual pomposity, not just for the sake of technological advancement, but to build up connections with cultural and historical origins. We can find people making real progress if we put them first and listen to them as contemporary participatory approaches advocate (Spittlehouse and Stewart, 2003). It is not helpful in striving to meet this demand to argue in effect that we should not distinguish between different cultural traditions of which knowledge systems are a part. Well-intentioned arguments to the contrary, seeking to redress the power imbalance between scientific and other perspectives have in real terms open up to charges of ethnocentrism, for implying that the 'they' of contemporary cultural discourse are the same as 'us' (Rohloff, 2012). This means that 'their policy' is not 'our policy'; 'their interest' is not 'our interest'. We are not all the same, even though

the current trend towards a global culture and history is eroding the distinctions between different culturally specific knowledge systems.

In allowing local populations to inform climate change adaptation plans with their own knowledge and aspirations, we must open up the prospect ultimately of a redefinition of the meaning of climate change. This is where indigenous knowledge in climate change adaptation agenda inexorably leads, although until now we have avoided speaking of it because of the anxiety as regards the reaction of international funding agencies (UNEP, 2008). It represents the reduction of foreign hegemony, the promotion of what some call endogenous development (Stamoulis and Zezza, 2003). Development agencies are likely to see it as subversive because it will diminish their control. When we interpret indigenous knowledge in this sense, we have local stakeholders contributing equally to the determination of development objectives alongside foreigners.

The definition of indigenous knowledge, just like development, is no straightforward endeavour (Purcell, 1998). Currently, in different parts of the world, we find people with unique cultural traditions and histories, which continue to condition in significant ways their views of the environment, life and issues of climate change. Their views take precedence over different issues and priorities, reflect different experiences and interests, and are codified in different idioms and styles, which we come to understand to varying degree. While not replicating one another, individuals share a sufficient but indeterminate amount in common to comprise a distinct cultural order with common historical tradition, values, idioms and so on. They are informed by different cultural repertoires that have evolved over generations, albeit not in isolation, being influenced by others, having some points of similarity and overlap, yet maintaining a distinctiveness, with the contrast between different traditions correlating closely, until recently, with geographical distance. So long as different cultures have differently formulated and expressed understandings of the world, the tussle for prominence - of which the indigenous versus scientific knowledge debate is an aspect that appear to be on-going with continuing battles over the 'big' intractable issues of climate change which are now defining the proper way to live our lives.

It follows that the high-tech 'we' and indigenous 'them' dichotomy is inescapable in some measure and to argue in effect that we should not distinguish between different intellectual traditions is unrealistic, however laudable the grounds

to overcome intellectual imperialism. The distinction between indigenous and scientific, local and global knowledge is defensible, differences within, and similarities between knowledge traditions notwithstanding. What is made of the differences between scientific-technical and indigenous knowledge depends on one's view and interpretation of climate change. The transfer of technology, 'normal science' and 'normal professionalism' approaches all emphasize difference; whereas the 'farmer first', 'action research', and 'new professionalism' approaches all downplay difference, encouraging an open, intercultural approach (Harvey, 2009). The stark discrimination between the scientific and indigenous that characterizes current development literature is inadequate, if not misleading, as to the relationship between the two, even where it is used to argue for a reversal of the relationship in favour of participation and local knowledge. All knowledge potentially passes into the local pool and blends with what is known to inform today's understanding and practice. Rural peoples' understanding of natural resource management issues is a blend of knowledge from various sources, which is difficult to disentangle.

Advocates of local knowledge in development discourses usually argue that we should aim to play off the different perspectives, the strengths and weaknesses, advantages and disadvantages of different knowledge traditions to improve our overall understanding of issues and problems by generating synergy between them (Ireland and McKinnon, 2013. World Bank, 2010). Indigenous knowledge research attempts to facilitate some communication from local people to policy makers and all those stakeholders in between (UNEP, 2008). But conflict is inherent in the process too because we are not just talking about furthering understanding or advancing more rounded views, but of employing the knowledge to effect some action, and sometimes the values that underpin them are not readily reconcilable. The aim, we argue, should be equitable negotiation, a central tenet of local knowledge in participatory policy implementation. The negotiations may become far more complex but the development initiatives are more likely to be appropriate for more people, and hence more sustainable.

2.1.5 African Indigenous and Western Environmental Protection Philosophies and Methods

Every human society has its own means of preserving or managing its natural resources for the benefit of both present generation and future generations (Parlee and Berkes, 2006). This attribute of protecting the environment is fundamental to all human societies. No doubt, Africans too have established knowledge frameworks rich in understanding local plants, animals and ecological relationships (Knorr-Cetina, 2007). It is indisputable that indigenous African communities have evolved well-developed traditional or indigenous knowledge frameworks and systems for the management of the environment and also coping strategies to cushion effects of environmental hazards. The operational structure of these indigenous knowledge frameworks works in ways that incorporate all community members into a network and partnership that seeks the common good of the entire community (Okaba 2003). The frameworks also have in-built mechanisms to enforce non-compliance (USAID 2005).

The western model of conservation was introduced in Africa during the colonial period when selected areas were set aside for conservation purposes and human exploitation within such areas was prohibited (Agbola and Ademola, 1996). This led to a situation where community-based natural resources management and local knowledge frameworks were neglected and undermined (Borrini-Feyerabend, Favara and Renard, 2004). Mol and Sonnenfeld (2000b) showed that environmental protection or natural resources management systems in pre-colonial Africa were more effective and sustainable. As Africans fully understood that their livelihood and dependence largely is on biological resources for food, fuel, housing materials, medication and economic security. It is of great importance to briefly examine the principal functions of the environment to local communities as shown by Eugene, (2006);

- (i) Long-term ecological security, and
- (ii) Production of goods and services for human survival.

The first function of the environment as stated by Eugene (2006) is conservational in character; whilst the second function is exploitative. It is within the purview of the second function that we can say that there is increased intensity of agricultural production among forest-dependent peoples of Cross River State, which has resulted

to increase in farming-areas but with the consequence of loss of biodiversity and degradation of some regulating, supporting ecosystem services (UNDESA, 2010; Garnaut, 2008; IPCC, 2007b, 2012). This makes it conspicuous that there is great dependence on the environment for various needs. Africans are believed to be also fond of traditional religious practices that attach strong spiritual meanings to the components of the ecosystem and the environment (UNEP, 2008; Wahab, 1996). They believe that natural endowment needs to be made sacrosanct rights of the people; thus, there must be harmonious partnerships with all concerns to ensure mutual enforcement and implementation of environmental protection programmes and policies. Notably, within forest-communities, there are an avalanche of traditional media to disseminate environmental issues and programmes. These entrenched the utilization of natural resources in sustainable and renewable manners (Okaba 2003). Town criers were used in disseminating environmental protection information. There are also festivals that have environmental connotations embedded in them. Local folklores warn of the misfortunes that befall those who would violate environmental laws and degrade the environment (Knorr-Cetina, 2007).

Pointedly, knowledge generation has many faces. In the western academic tradition, knowledge generation involves hypothesis testing and peer review. In African societies, knowledge building is part of an intuitive and spiritual process that connects individuals with their families and the environment around them (Jerneck and Olsson, 2008). All through the literature, there was no refute of the fact that at the foundational level, knowledge generation in African societies also follow the process of empirical observation and individual and collective interpretation as advocated in the western 'scientific method' (Mapara, 2009). However, the fundamental character of knowledge generation in traditional African societies did not follow a linear or one-directional process; rather, it depended upon endless responses between what is observed and what is interpreted in different places, by different people and over a long period of time (Harvey, 2011). In this sense, the knowledge generation process in African societies was strongly connected with a particular social, cultural, and ecological context. In many other African societies as found in Kenya, Tanzania, Swaziland and South Africa, there are important interconnections between the knowledge generated about ecological conditions and the rules-in-use governing resource utilization practices (UNEP, 2008; IUCN, 2009). In the literature (Haverkort and Reijntjes, 2010; IUCN, 2008; Warren, 1992; Knorr-Cetina, 2007; Marston, Jones

and Woodward, 2005; Stamonlis and Zezza, 2003; HDR, 2011; UNEP, 2008; IDS, 2007) evidence prevails to show the significance of sustainability of common traditional institutions in managing the implications of ecological variability.

The decline in forest areas is one of the basic essences of forestry development in Nigeria (Babalola, 2012). Evidence prevails to indicate that forest areas have been steadily on the decline, this has been since the inception of forest reservation policies by colonial governments (Faleyimu and Agbeja, 2010). The policy thrust of forest reservation from 1870 – 1960 was to preserve biological diversity in perpetuity, and to meet domestic and export requirements for forest products (Egboh, 1985). The original intent of forest conservation in Nigeria was to manage forest reserves on *sustained yield principles* (Onyekwelu, Mosandl and Stimm, 2008). This is meant to keep the conservation values reasonably intact.

The new interest in forestry development is largely a response to current social and economic realities. Universally, forest protection is recognized as an indispensable task for the achievement of environmental health and sustainable development (World Bank, 2008; Yemiru, Roos, Campbell and Bohlin (2010). Nonetheless, evidence abound in the literature (Anaya, 2004; Battiste, 2010; Ireland and McKinnon, 2013; BNRCC, 2011; Boedhihartono, 2010; IPCC, 2012; Borrini-Feyerabend, 2004; Wahab, 1996) to demonstrate that forest protection activities or programmes that are void of the people’s involvement and indigenous practices surely amount to failure. Consequently, sustainable forest management (SFM), defined as the practice of allowing multiple objectives and needs to be met without degrading the forest resource (IPCC, 2007a), is said to be the goal of foresters. On the contrary, ‘bad forest management’ usually leads to loss of livelihoods, loss of cultural assets and knowledge (World Bank, 2008).

On their part, IDS (2007), IITO (2009) have defined sustainable forest management as ‘the process of managing permanent forestlands to achieve one or more clearly specified objectives of management with regard to the production of a continuous flow of desired forest products and services without undue reduction in its inherent values and future productivity and without undue desirable effects on the physical and social environment’. Accordingly, sustainable forest management also implies the management that maintains and enhances the long-term health of forest

ecosystems for the benefit of all living things while providing environmental, economic, social and cultural opportunities for present and future generations (Oriola, 2009). In other words, sustainable forest management therefore refers to the management that meets the needs of the present demand and at the same time catering for the needs of future generations. Its aim in every context is to maintain adequate supply of forest produce, first for internal consumption and then for exports (World Bank, 2008).

Historically, forestry activities started in Nigeria in late 18th century with the establishment of regional forestry authorities (Adeyoju, 1975). It was revealed that forestry practice in Nigeria is owed to the then Governor of Lagos, Sir Alfred Moloney, who in 1887, wrote and drafted the “Sketch of the Forestry of West Africa” (Oriola, 2009). Accordingly, Okafor (1977) claimed that forestry practice in Nigeria actually started in 1889 with the creation of the Forestry Department of the Colony and Protectorate of Lagos. In 1897, Mr. Cyril Punch was appointed the Superintendent of Forests to the Colony and Protectorate of Lagos. With the reassignment of Punch in 1899, Mr. Peter Hitchens was appointed Inspector of Forests of Southern Nigeria with Headquarters in Old Calabar in 1899 (Oriola, 2009). Mr. Hitchens worked with a Curator of the Botanical Garden at Onitsha and a Second Inspector of Forests.

On January 3, 1903, Okafor (1977) and Oriola (2009) asserted that the first professional officer, Mr. H.N. Thompson of the Indian Forest Service, was appointed as Conservator of Forests for Southern Nigeria and was saddled with the responsibility of overseeing a Department which includes Botanical and Agricultural sections. On June 28, 1905, the Southern Nigerian Forest Department and that of the Colony and Protectorate of Lagos were merged, with Dr. Thompson as the Conservator of Forests. Thompson worked in the Forest Service for about twenty-six and he is credited for being the person that lay the solidly foundation for a sound administrative and scientific management of forests in Nigeria. He proposed and drew up the rule of procedure for forestry organization in 1905, and in 1908, a new Ordinance for Forestry was enacted which for the first time gave full provision for the constitution of Forest Reserves. Also, this led to the separation of the Agricultural Department from the Forestry Department in 1910.

Following the amalgamation of the protectorate of Northern Nigeria with the Colony and Protectorate of Southern Nigeria in 1914, the Forestry Department of

Southern Nigeria absorbed that of the Directorate of Agriculture in Northern Provinces. The first specialists appointed for forestry research duties were two silviculturists (Mrs. F.D. Kennedy and M.D. Megregor); a utilization officer, Mr. W.B.G. Mitchell, and a Wood Seasoning Officer, Mr. J.C. Mallam, as well as a Forest Engineer (Oriola, 2009). It was accounted that as at the time of their respective appointments in the 1920s, the scene was not yet set for forestry research because of inadequate forest management staff, incomplete reservation of forest estate and the irregular and inadequate forest exploitation to justify silvi-culture and management research. By 1951, the Nigerian Forest Department had been organized into three regional departments, and a forest research unit created. The Forest research unit or branch later transformed to the Federal Department of Forest Research (now Forest Research Institute of Nigeria) in 1954 (Oriola, 2009).

This was followed by a period of about sixty years of forest reservation – which introduced timber licensing systems, royalty determination systems, and silvi-culture and silvi-cultural systems in natural forests, reliable regeneration methods, establishment of plantations, the development of fire protection practices and the building up from scratch of forestry and forestry education at technical and tertiary levels (Onyekwelu, Mosandl and Stimm, 2008). As stated earlier, the main objective of forest management generally is the attainment of self-sufficiency in forest produce, particularly wood (World Bank, 2008). In Nigeria, organized forestry is believed to have started in 1887 (Adeyoju, 1975; Onyekwelu, Mosandl and Stimm, 2008). The broad policy objectives of forest management at the time include sustainable forest management, forest conservation and environmental protection.

Specifically, the policy thrust of forest reservation in Nigeria before 1960 was to preserve biological diversity in perpetuity, and to at the same time meet domestic and export requirement for forests products on sustained-yield principles (Onyekwelu, Mosandl and Stimm, 2008). Accounts prevail to demonstrate that up to the 1960s, some success was achieved in such management using natural regeneration and selection systems aimed at sustained yield. However, Kalipeni, Oppong and Ofori-Amoah (2006) argued that the establishment of forest reserves in the African continent generated land insecurity at the local levels and had resulted in continuous struggles between indigenous land owners and government over the use of forestlands. Indigenous land owners were granted limited user rights within the reserves to hunt, collect minor forest products for domestic use, rights of way to

water-sources, burial of the dead and right to grazing of animals (Egboh, 1985). So far, it can be argued that these user rights undermined the social and economic survival of the indigenous people and hugely failed to promote indigenous knowledge systems and practices for forests management in terms of the period for resource exploitation and intensity of exploitation, extent of land where the user rights should be exercised and the population density of which resources exploitation was allowed. Because the user rights ignored indigenous knowledge for forest management, forest reservation was conflicting and contradictory to sustained management of forests to the grass root (Onyekwelu, Mosandl and Stimm, 2008).

With this failure of forest reserves not meeting the objectives for their creation, both indigenous landowners and governments are scrambling to convert reserves into alternative uses, and this is at variance with principles of biological and environmental conservation (Kalipeni, Oppong and Ofori-Amoah, 2006). To maintain balance, forest managers and governments evolved a viable alternative to supplement the production from natural forest with artificial forest plantations and this marked the beginning of plantation forest development in Nigeria (Onyekwelu, Mosandl and Stimm, 2008). Forest plantation establishment started in Nigeria in the early years of the 20th century with the establishment of teak plantations around the forestry headquarters at Olokemeji (Egbeda, Oyo State, Nigeria) in 1906 (Onyekwelu, Mosandl and Stimm, 2008).

The most significant developments of man-made forests in Nigeria were achieved through the Forestry I and II projects. The Forestry I project was implemented between 1978 and 1983 with coverage of three states: Anambra, Ogun and Ondo States. About 12,638 hectares (ha) of *Gmelina* and 600ha of Pines were cultivated (Onyekwelu, Mosandl and Stimm, 2008). The second phase of Forestry II project was funded by the African Development Bank (ADB). This phase focused on maintaining the plantations established during the first phase with provisions for amendment where there have been failures. This project was able to establish about 4,910.2 ha of new plantations, comprising of *Gmelina*, *Teak* and *Eucalyptus* in states such as Kaduna, Benue and Kogi. Much of the industrial plantations under the Forestry I and II projects were geared towards the supply of pulpwood for Oku-Iboku, Iwopin and Jeppa paper mills (Onyekwelu, Mosandl and Stimm, 2008).

In Nigeria, information on private sector participation in forestry and sustainable forest-management is still very scanty (World Bank, 2008). The natural

forests and plantations in Nigeria are publicly owned and managed; while exploitation, conversion and sale of products from these forests are privately planned and executed. This contrasts sharply with forestry in developed countries like the United States of America where private owners hold about seventy per cent (70%) of the forestland (World Bank, 2008).

Several factors had been identified in the literature (World Bank, 2010) as being responsible for the failure of the private sector to invest in forestry in Nigeria. First, the long gestation period of forests often discourage private investors; this explains why majority of private investors prefer wood processing and marketing of forest products to forest or plantation cultivation and establishment. Second, due to complications in land-hold tenure system in Nigeria, most private investors cannot meet the large area demand of forestry. Third, the refusal of credit houses to provide credit facilities to private investors in forestry. The World Bank (2008) had argued that the major reason for this refusal usually skulks on the fact that due to the high risk involved, and also the vagaries of weather conditions, and the uncertainty of future demand and prices of forest products; most financial institutions are hesitant in providing loans and other credits to private investors interested in forestry investment.

2.1.7 Climate Change Adaptation in Forestry: A Post-development Perspective

Deforestation is identified as a key area for international cooperation in the fight against climate change (IPCC, 2007b; UNDESA 2010; World Bank, 2008; NASPA-CCN, 2011; Tickell, 2008). It is reported that the world is currently losing the carbon assets contained in rainforests at a fraction of the market value they would have even at low carbon prices (HDR, 2008). In Indonesia for instance, every US\$1 generated through deforestation to grow palm oil would translate into a US\$50–100 loss if the reduced carbon capacity could be traded on the European Union's Emission Trading System (ETS) or carbon market (HDR, 2008). Beyond these gains, the loss of rainforests also represents the erosion of a resource that plays a vital role in the lives of the rural poor who depend on it for the provision of ecosystem services and in sustaining biodiversity. Thus, carbon markets are creations that serve as incentives to avoid deforestation (World Bank, 2010). More broadly, carbon finance is arranged to mobilize support for the restoration of degraded grasslands, generating benefits for climate change mitigation, adaptation and environmental sustainability.

Tessa and Kurukulasuriya (2010) showed that climate change adaptation can occur at any level, from plant, field or farm, to national or international policy; that it is a multifaceted decision-making process. In this context, a good example could be a change from crop production to livestock, which involves a change in agricultural practices at the niche level – this level refers to individual actors (or groups of actors), technologies and practices. Adaptation also occurs at the regime-level, this involves changes in markets and infrastructure; and this level involves the web of institutions governing predominant practices at the niche level - in this instance it could represent regional markets, local credit systems and government services. The last level of adaptation according to Tessa and Kurukulasuriya (2010) is the landscape level - it involved changes in the global sphere. This refers to slowly changing social, physical and natural structures, such as physical infrastructure, international political institutions, macro-economic conditions and the natural environment - it includes transportation constraints, agricultural trade policies and subsidies, structural adjustment programmes, and global climate change. These three levels of adaptation represent a useful heuristic element for understanding technological and social change in forest-dependent communities of Cross River State (Olutayo, 2008; Mitra and Mishra, 2011; Odok, 2010).

Let us briefly look at how postdevelopment perspectives examine the formulation of climate change adaptation approaches within forest-dependent Cross River, and the developing world in general. Most contributions on climate change adaptation and development aid has reflected developmentalist paradigms. That is, the literature is often framed within a logic that places the idea of development aid or the development sector, the development sector as being legitimate, natural and necessary. Examples of this kind of thinking include arguments to mainstream climate change adaptation into development (Huq and Reid, 2004; Klein, Eriksen, Naess, Hammill, Tanner, Robledo, 2007; Sietz and Klein, 2011; UN/ISDR, 2008; Venton and Trobe, 2008). Guidelines for the monitoring and evaluation of emerging adaptation efforts, especially through forestry, are often framed in terms of what the development sector could do 'better'; instead of examining and questioning problematic aspects of existing development aid frameworks (Lamhauge, Lanzi and Agrawala, 2012; McGray and Spearman, 2011). So far, it can be seen that these literatures, while making a contribution to adaptation theory and practice, missed out important political and ideological dimensions of development aid (Ireland and

McKinnon, 2013). As shall be seen shortly, tenets of postdevelopment actually offers a unique set of perspectives on development aid that are critically mindful of dominant development discourses. These helped us to scrutinized climate change adaptation in forestry within forest-dependent Cross River, and the developing world in general.

Pointedly, it is worthy to note that postdevelopment as treated in this work is a field of debate rather than a cohesive body of knowledge with core principles and approaches. However, there are a shared set of concerns and interests that characterized postdevelopment contributions to the literature. The first concern or interest is to engage in a critical re-examination or rethinking of the concept of development drawing on poststructural and postmodern perspectives. Ireland and McKinnon (2013) had argued that in some sense, development has never been subjected to critical rethinking, that much of the criticism of development fall under the purview of alternative development and Marxist inspired analyses of uneven relationships between the 'First World' and 'Third World'. According to them, from World Systems Analysis and Dependency theory to Women in Development (WID), Gender and Development (GAD) and Participatory Learning and Action (PLA) - development theory and practice has been constantly under scrutiny for how well broad goals of development are being achieved. In addition, the nature of those goals has also been the subject of debate. That is in terms of whether development is intended to help impoverished regions of the world '*catch up*' with the relative wealth and privilege of the developed world; whether development should be all about diminishing global inequities and empowering the poorest of the poor; or whether it is about meeting the Millennium Development Goals (MDGs), eliminating poverty, or creating new sustainable livelihoods for all (IUCN, 2008). To Ferguson (1990), debates about development tend to focus more on what development is and what it really does – in this sense, it measures its successes and failures on the central assumption that development ought to be in the business of making life better for poor, marginalized, and disadvantaged people (Ireland and McKinnon, 2013). In whatever form the argument is presented - that is whether development is in fact exploitative and destructive, or that it is badly carried out, or structured around the wrong kinds of interests (those of consultants and elites, rather than the 'poorest of the poor', Chambers, 1997) "the argument is still organised around the politically

ingenuous question: ‘Do aid programmes really help poor people?’(Ferguson, 1990:12).

Conversely, the scrutiny to which postdevelopment has put development thinking can be said to be slightly different. Rather than question what development is ‘*really doing*’, postdevelopment criticism of development is focused on how development functions as a discourse. That is how it was imagined into being, how it became a ‘thing’ that people did, with its own set of rhetoric, practices, literatures, and interventions - all taking shape around the problematization of poverty (Ferguson, 1990; McGregor, 2007). The postdevelopment perspective asks how development as a mode of understanding, and a set of practices, came into being? How does it continue to be sustained and reshaped in the world? And what does it do - how does it shape ‘us’ and how are ‘we’ shaped by it (Underhill-Sem, 2002). This critical rethinking no doubt deliberately avoids the question of value and whether development is actually doing what it ought to do. Peirtese (2010); Gibson-Graham (2005); and (McKinnon, 2010) had argued that this rethinking about the whole idea of development should be more usefully understood as a first step towards thinking differently and this might open and foster new possibilities as a result of seeing things differently. This rethinking therefore involves the ‘seeing’ beyond the assumed naturalness or neutrality of development’s worthwhile and altruistic goals, which include “the single humanitarian project of producing a far better world” (Peet, 1999:1).

In this sense, many postdevelopment scholars are now particularly attentive to the relations of power that are embedded in development in, for instance, the ways that development discourses brought into being a world of underdevelopment, occupied by ‘the poor’ and in desperate need of assistance from the developed world; or how professional subjectivities have been shaped by expectation of doing good and making a difference in the world (McKinnon, 2006, 2007, 2011). In specific terms, postdevelopment draws upon postcolonial analysis to examine how colonial relations of inequity and oppression have been re-legitimized through the language and mechanisms of development (Simon, 2006; Sidaway, 2007).

Going to Tessa and Kurukulasuriya’s (2010) description of the level within which climate change adaptation occurs, it is essential to highlight that it is at the niche level that symptoms of the problem are actually identified - in this case, the risks of damage from climate change impacts on livelihoods among forest-dependent

Peoples of Cross River State are identified. The regime level is often characterized by resistance to changes, due to internal interactions, alliances and linkages (Takasaki and Coomes, 2004; Timsina, 2003). The landscape level promotes incremental change. In all these levels, forests play important roles in mitigating and adapting to the effects of climate change (World Bank, 2008).

2.1.8 Social Capital, Communities Responses and Climate Change Adaptation in Rural Nigeria

Within rural Nigeria, observed climate change already has direct impacts on the rural economy, the ecosystem, and human health (Anuforum, 2010). Projections suggest the increasing rates of the changing climate will have profound consequences in the future in all of these arenas within rural Nigeria, including forest-dependent Cross River. Observed climate change had been acknowledged and expressed in climate parameters such as temperature (heat waves and cold waves), rainfall and other extreme weather events.

Generally, the primary aim of adaptation to climate change is to reduce vulnerability and increase resilience to impacts (Smit and Pilifosova, 2001). In adaptation processes, it is important to stress that communities are often confronted with external risks within a social landscape of inequality and collective resources. For instance, Kinney, O'Neill, Bell and Schwartz (2008) had explored the different methods for assessing future health impacts of heat and emphasized the need to better understand what role adaptation can play in reducing morbidity and mortality. At present, public health efforts across countries tend to focus primarily on reactive measures to cope with heat waves for example; instead of long term adaptation to recurring heat waves (Wolf, Adger, Lorenzoni, Abrahamson and Raine, 2010).

From the literature (Adger, 2003; Pelling and High, 2005), it was stressed that social capital represented the presence of bridging social capital, that is links between distinct groups; and bonding, which entails relationships between individuals who share social identity – that all these usually lead to an increase in resilience in societies, and they are associated with survival and recovery from natural disasters. Cumulated public health evidence (example, Ferlander, 2007; Szreter and Woolcock, 2004) from Europe for instance, raises an expectation that the presence of social capital improves health outcomes and may as a result decrease vulnerability to ill health. However, this account leaves unclear in which circumstances social capital may be counterproductive and may increase vulnerability. In their work, Wolf, *et. al.*

(2010) had argued that bonding networks transmit narratives about elderly people's ability to cope with heat stress that may exacerbate rather than reduce vulnerability to the effects of heat. Social capital therefore does not necessarily nor uni-directionally effect improvements in vulnerability. Thus, adaptation to climate change in general cannot rely on efficacy in existing networks to improve health outcomes.

2.1.8.1 Evidence of observed climate change in rural Nigeria

In Nigeria, a key contribution on observed climate change in Nigeria emerged from research and pilot projects executed by the Building Nigeria's Response for Climate Change (BNRCC) network (NASPA-CCN, 2011), spread throughout the ecological zones of the country. Results of these projects have been collated and synthesized, providing documentation of community level experience with climate hazards, impacts, vulnerabilities and adaptation measures. In 2008, the Nigerian Meteorological Agency conducted an assessment of the Nigerian climate over the period 1941 to 2000 and demonstrated the following changes (Anuforum, 2010).

In reporting observed changes in rainfall in Nigeria, their report confirmed that between 1941 and 1970, only some few parts of the country, around Sokoto and Maiduguri and in the south-eastern region experienced late onset of rains. However, as from 1971 to 2000, they reported that late onset of rains had spread to most parts of the country, leaving only a narrow band in the middle of the country with normal conditions of rainfall.

In the same vein, their report showed that only a small part of the country in the southwest recorded early cessation of rains between 1941 and 1970, whilst from 1971 to 2000, results confirmed that early cessation of rains had covered most of the country. Hence, the combination of late onset and early cessation of rainfall shortens the length of the rainy season in most parts of the country. Furthermore, according to them, between 1941 and 2000, annual rainfall had decreased by 2-8 mm across most parts of the country, but increased by 2-4 mm in few other parts, mostly around Port Harcourt where the increase in rainfall rose significantly (NASPA-CCN, 2011).

For temperature change, the report also confirmed that from 1941 to 2000 there was evidence of long-term temperature increase in most parts of the country. The main exception was in the Jos area, where a slight cooling was recorded. On the other hand, the most significant increases were recorded in the extreme northeast, extreme northwest and extreme south-west regions where average temperatures rose by 1.4-1.9°C.

Another observed evidence of climate change or warming of the climate in Nigeria as reported by BNRCC (2011) was the decrease in the occurrence of hail, with its total disappearance in the 1990s in the Jos plateau area where hail used to be a common occurrence.

2.1.8.2 Evidence of expected climate change in rural Nigeria

Future climate change analyses are usually made using climate scenarios – these are analytic tools that provide long-term perspectives on expected changes in climate parameters. These climate scenarios are neither predictions nor forecasts. Instead, they provide useful information on how the future climate will be different from the present, based on a defined set of assumptions.

As part of the BNRCC Project, climate scenarios were developed for Nigeria by the Climate Systems Analysis Group at the University of Cape Town. An empirical approach was employed using the statistical downscaling method (NASPA-CCN, 2011). Trends in the past climate over Nigeria were investigated by analyzing the historical climate records from 40 NIMET stations for the period 1971 to 2000; and future climate change information was generated by downscaling two future climate projections from nine Global Climate Models. The two future climate projections were based on two scenarios known as A2 and B1, with A2 incorporating higher GHG emissions, and B1 incorporating lower GHG emissions (NASPA-CCN, 2011). According to the projection, the higher global GHG emissions scenario (the A2 scenario) was selected as the strongest for Nigeria (BNRCC, 2011).

Overall, the scenarios suggest a warmer climate in the future for Nigeria. For instance, the A2 scenario projects a temperature increase of 0.04°C per year from now till year 2046-2065; then this would rise to 0.08°C per year after 2050. However, regional variations are expected accordingly. The coastal regions are projected to warm less than the interior regions because of the cooling effects of the Atlantic Ocean, and northern Nigeria is expected to be warmer than southern Nigeria. The highest increase (4.5°C by 2081-2100) is projected in the northeast region of Nigeria. This temperature distribution is consistent with the findings of the 2007 Intergovernmental Panel on Climate Change (IPCC) report (NASPA-CCN, 2011).

The projected changes in rainfall vary across the country, with the A2 scenario suggesting a wetter climate in southern Nigeria, but a drier climate in the northeast region of the country. For the 2046-2065 periods, the projected change ranges from an average increase of 0.4 mm per day in the south (15 cm annually) to an average

decrease of 0.2 mm per day (7.5 cm annually) in the north. These changes are consistent with the projected increase in temperature. The higher temperatures along the coast would increase evaporation from the ocean and produce more rainfall over the coastal region, provided there are mechanisms to trigger the precipitation process. On the other hand, a warmer climate in the semi-arid region (i.e. northeast) would decrease the atmospheric humidity (moisture in the air), and thereby reduce the chance of cloud formation and rainfall.

Although projected annual rainfall increases in some parts of the country and decreases in others, all areas show increases in rainfall during at least some part of the year. The scenarios show a peak increase in monthly rainfall in the 2046-2065 period of about 2 mm/day in the mangrove and rainforest zones, and about 1 mm/day in the savanna zones. In the mangrove, rain forest and tall grass (Guinea/Sudan) savanna, the scenarios project earlier rainfall season onset and later rainfall season cessation, resulting in a longer rainfall season by up to two weeks by the 2046-2065 period. In contrast, the scenarios project a shorter rainfall season over short grass (Sahel) savanna, with a potential decrease greater than one week.

For the 2046-2065 period in the mangrove, rain forest and tall grass savanna, the scenarios suggest a small increase in extreme rainfall days (that is, days with more than 50 mm of rain). Over the Sahel, the A2 scenario suggests a small decrease in extreme rainfall days. However, the projected changes in temperature-based extreme events are pronounced over the entire country. For example, the scenarios suggest that by the 2046-2065 period the number of extreme heat days with the temperature reaching 38⁰C or more would increase by 7 days per year in the mangrove, 23 days per year in rain forest, 41 days per year in tall grass savanna, and 88 days per year in the short grass savanna. The scenarios also project significant increases in the number of heat wave days (number of days when the maximum temperature is greater than 35⁰C for three or more consecutive days) over the entire country – for instance, a 95% increase in the case of the northern short grass savanna zone.

Table 2.1: Summary of Key Trends in Climate Parameters for Nigeria, by Ecological Zone

Climate Variable	Mangrove Zone	Rain Forest	Tall Grass (Savanna)	Short Grass (Sahel)
Temperature	↑	↑	↑	↑
Rainfall Amount	↑	↑	↓	↓
Rainfall Variability	↑	↑	↑	↑
Extreme rainfall events - drought	Likely	Likely	↑	↑
Extreme rainfall events - storms and floods	↑	↑	Likely	Likely
Sea level rise	↑	NA	NA	NA

Legend: ↑ likely increase or increase; ↓ likely decrease or decrease; NA not applicable

Source: (NASPA-CCN, 2011)

From the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 to the Kyoto Protocol in 1997 to the Bali Action Plan ten years later, several multilateral environmental agreements have been developed to assist developing countries, especially in sub-Saharan Africa in adapting to climate change; mostly by facilitating innovation and diffusion of technology that can bolster the resilience of vulnerable communities to climate change, variability and extremes. For example, Article 4.5 of the UNFCCC urges developed countries who are party to the Convention (Annex I countries) to promote, finance and facilitate the transfer of environmentally sound technologies and know-how to developing countries. Yet despite their commitments, the difficulty of fulfilling this critical need has highlighted the importance of moving toward concrete actions. Today, the World Trade Organization's (WTO) agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) provides potential opportunities to speed up the transfer of technology for adaptation. While addressing some concerns, significant challenges still need to be overcome in developing countries in order for adaptation technologies to deliver their full promises (IDS, 2007).

The need for this transfer of technology for adaptation lurks on the fact that global processes and crises are changing and deepening the risks already faced by poor and vulnerable people in forest-dependent communities, particularly those involved in agriculture (Tickell, 2008; World Bank, 2008). As approaches to minimising the risks faced by these vulnerable people, social protection and climate change adaptation have much in common as they both seek to protect the most

vulnerable and promote resilience in these communities (IDS, 2007). The climate change regime, with the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (KP) as its main components, is primarily concerned with mitigation of climate change, that is, reductions in greenhouse gas (GHG) emissions (IPCC, 2012). Jerneck and Olsson (2008) have argued that climate change adaptation is as central to the Convention as mitigation and that the regime allows for this, but the UNFCCC needs to be more concerned about adaptation especially in developing countries. This means that the potentials of adaptation must be addressed more specifically and strongly in research and action (FAO, 2008). This is essential especially in the context of the poor in forest-dependent communities who suffer the most, not only from the general weight of poverty but also from climate vulnerability (IPCC, 2007a). The need for adaptation is urgent in these communities where adaptation must be coupled with efforts to improve livelihoods as they are no longer allowed to fully exploit forest resources on their lands (UNHABITAT, 2003).

The goal of the UNFCCC, according to Article 2 of the Kyoto Protocol (KP), is to stabilize GHG in the atmosphere at levels that prevent dangerous anthropogenic interference with the climate system. But the interpretation of the term 'dangerous' is rather relative and contextual instead of being absolute. This implies that what is dangerous in an actual situation is, in the end, often determined by a community's capacity to cope with and to adapt to climate change (World Bank, 2008). In this light, danger can be interpreted externally by objective measurements such as actual loss of physical property, or interpreted internally by perceived danger and subjectively experienced fear (Jerneck and Olsson, 2008). This therefore means that if a community's adaptive capacity is low, even minor climate changes might entail danger. This gives the validation that climate change adaptation is as central to the climate change regime as mitigation.

Unfortunately, as regards binding commitments in the current climate regime, the language on adaptation is unclear and more imprecise than that of mitigation. In the UNFCCC and the KP, the texts on adaptation focus mainly on planning rather than action (Jerneck and Olsson, 2008). For instance, the UNFCCC says 'prepare for', rather than implement, and 'take climate change considerations to the extent feasible', rather than giving them highest priority. The KP says 'strive to', rather than implement policies and measures. Hence, compared to mitigation, for which there are legally binding commitments and compliance mechanisms; it can be argued that the legal

base of adaptation is very weak. Yet, the adaptation agenda is advancing, this can be seen with the Nairobi Work Programme which lasted for five years from COP-12 in 2006 and it aimed to improve understandings of climate change impacts, vulnerability and adaptation.

This vagueness in language and weakness in policy is partly explained by politics in the negotiations of the Convention and partly by the priority given to mitigation over adaptation as a solution to the problem of climate change (Jerneck and Olsson, 2008). When the UNFCCC was negotiated, it was anticipated that climate change effects would have severe social repercussions only in a distant future, thus providing a motive for giving less attention to adaptation as a tool for coping with climate change. Another reason for not giving equal priority to adaptation according to the IPCC (2007a) was the fear that it would distract attention and action from mitigation. Much evidence now indicates that it is time to correct these misunderstandings (UNEP, 2011).

2.1.8.3 *Climate change adaptation: relevance and significance*

In 2007, it was established by the IPCC that due to low adaptive capacity and potentially severe climate change impacts, developing countries are more vulnerable to climate change impacts (IPCC, 2007a). This, in conjunction with certain other factors, makes adaptation to climate change particularly important, especially for the poorest of the poor, most of who depend on agriculture, forest-related activities, mainly at subsistence level. Most agricultural systems are very vulnerable to extreme climate events, such as drought, storms and floods (World Bank, 2011; World Resources Institute, 2005). Since many of the forest-dependent peoples live in places with limited access to food markets (World Bank, 2010), there is further stress on already vulnerable livelihoods in cases of food emergency (Msheliza, 2011). Hence, Jerneck and Olsson (2008) have argued that the following four factors make climate change adaptation increasingly important: the first factor is accelerating climate change – they argued that the rate of build-up of atmospheric CO₂ was unprecedented in the last decade, thereby increasing the risk of rapid and dangerous climate change. Climate scientists agree that, even in the hypothetical case of immediate stabilization of CO₂ levels, the temperature increase is expected to continue for a century, making substantial climate change unavoidable (IPCC, 2007a).

The second factor is increasing vulnerability to climate variability impacts – this portends that irrespective of climate change, vulnerability to climate impacts will

continue to increase due to rising populations in climate-sensitive areas which include most of the forest-dependent communities (IPCC, 2007b). The third factor is increasing vulnerability due to multiple stressors – this explains the reality that in some settings, certain conditions increase the vulnerability to climate impacts, such as (i) low agricultural productivity partly caused by poor or decreasing access to inputs; (ii) malfunctioning markets and distribution systems due to poor or deteriorating infrastructure (World Bank, 2008); and (iii) shortage of labour because of rural-urban migration (Jerneck and Olsson, 2008).

In addition, (iv) deterioration of natural and modified ecosystems caused by land-use change will increase the risk and severity of climate impacts, while (v) imports of subsidized food would surely out-compete local production and exacerbate domestic agricultural conditions (World Bank, 2010). The last factor why climate change adaptation is important is because of deteriorating social conditions and health status – this dwells on the fact that high and increasing burdens of diseases such as HIV/AIDS, malaria and TB contribute to making climate impacts more damaging (World Bank, 2010). Labour shortages may cause shrinking food production and collapsing social services that could increase risks of food crises as a result of even minor climate impacts (World Bank, 2011). All these factors contribute to make adaptation very crucial and important in climate change regime.

Beginning from December 2007, The Forest Dialogue (TFD) had led an intensive, multi-stakeholder dialogue process which had resulted to the eventual emergence of the Reducing Emission from Deforestation and Degradation (REDD), as a climate change adaptation mechanism. In recent times, innovative sustainable development initiatives are underway in government, civil society and the private sector that are making a huge difference and charting a new course for local communities, national governments and even for the entire world. 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 livelihood and economic opportunities with renewed environmental vitality (FAO, 2008). But the challenge is how to scale-up and mainstream these encouraging innovations and how to create the enabling conditions for more sustainable and equitable alternatives to flourish.

A range of innovations had been showcased over the years, these include community and local initiatives, policy and governance reforms, solutions based on

traditional and indigenous knowledge, more sustainable business models and investment opportunities, initiatives inspiring ethical behaviours and innovative methods for integrating gender equity into conservation work, the latest technologies and emerging multi-sector partnerships (Jerneck and Olsson, 2008). A more recent interesting focus is the role of economic tools and markets in supporting the transition to sustainability by stimulating new production practices and consumption patterns. The REDD mechanism falls within this platform, and it is founded under the following principles (www.theforestdialogue.org 2009):

2.1.8.4 Reducing Emissions from Deforestation and Degradation (REDD) Principles

Principle 1: REDD-plus must be firmly base on sustainability principles -

Impliedly, this enunciated that REDD-plus finance mechanisms must be sufficiently robust to deal with both in-country and international leakages, using credible baselines to achieve verifiable additionality. This means that REDD-plus projects must demonstrate the following characteristics: i) ecological integrity – this entails enhancing levels of biodiversity and other forest ecosystem functions such as the provision of water, food, fuel and so on; ii) social integrity – this resides on recognizing, protecting and respecting the rights of indigenous peoples and local communities by ensuring that they can develop their livelihoods and share the benefits of REDD-plus; and iii) atmospheric integrity – this calls for the real reduction of CO₂ in the atmosphere alongside deep emissions cuts in line with IPCC recommendations.

This means that REDD-plus finance mechanism must be effective, efficient and equitable. For it being effective implies that it must contribute to tangible and independent third-party verifiable stabilizations of atmospheric concentrations of greenhouse gases; brining efficient results in ‘value for money’ and allowing both private-sector and public-sector institutions to participate on fair terms. On the whole, equitability entails at a minimum, avoiding the exposure to greater risks of the poor and most marginal rural communities whose livelihoods depend on forests, averting the distortion of forest products markets and allowing broad participation on equitable terms at the national and international levels.

Principle 2: Plan for full range of forest-based climate change mitigation options -

Consistent with current negotiations in the UNFCCC, REDD-plus must create incentives for the full range of forest-based mitigation activities, based on the principles and practices of Sustainable Forest Management (SFM). In addition to reducing emissions from deforestation and forest degradation, REDD-plus finance

mechanisms must also create incentives for additional actions in conservation, in the sustainable management of forests, and in the enhancement of carbon stocks, as envisioned in the Bali Action Plan.

Principle 3: Priority for biodiversity under threat –

Early investment must give priority to the conservation of areas under the greatest threats that have the highest levels of biodiversity.

Principle 4: Phased approach with strong performance-based safeguards -

A phased approach will enable REDD-plus to address the drivers of deforestation at a country level according to country-specific circumstance.

- a) Phase 1: The initial preparation and readiness phase involves the development of a REDD-plus strategy at the national level, including among other things, the identification and prioritization of key policy and institutional capacity-building measures for both state and non-state actors. This will pave the way for investments in phase two through the development of systems for Monitoring, Reporting and Verification (MRV) and the identification of required protocols. Public sector, private sector, multilateral and bilateral grants and investment mechanisms such as the Forest Carbon Partnership Facility (FCPF), UN-REDD and the voluntary carbon market are expected to support this phase.
- b) Phase 2: In an intermediate second phase, enabling policies and measures are to be put in place to allow for the implementation of REDD-plus and, based on performance, encourage scaled-up public-sector and private-sector investments in the following areas:
 - Institutional capacity, forest governance and information
 - Land tenure reforms, forest management, the restoration of degraded forest landscapes, the strengthening of conservation in protected areas, and community-based fire management.
 - Activities outside the forest sector necessary to reduce the pressure on forests, such as the promotion of certified sustainable agriculture, sustainable biomass energy supply and agro-forestry, and the enhancement of small-scale agricultural productivity.

Financial sources according to this principle should include voluntary contributions from governments, market-linked and transaction-linked international levies, and the auctioning of allowances. Multilateral

concessional financing sources such as the Forest Investment Programme (FIB), as well as bilateral funding and early market payments are also options, but must be performance-based.

- c) Phase 3: Market mechanisms such as the carbon market and fund-based mechanism should by phase three, deliver performance-based payments based on third-party verifiable emission reductions and carbon stock enhancements. Market policies must be designed with the objectives of creating equitable distribution mechanisms, stabilizing prices, and developing risk-management and credit-management vehicles.

Principle 5: Triggers guiding the transition from one phase to the next

The eligibility of countries to move from one phase to the next should be based on triggers that are informed by a verification body and help to steer processes rather than block them. Safeguard policies and criteria for entering the compliance market apply to both forest nations and donor nations, and also to companies aspiring to enter into arrangements.

Principle 6: Matrix mapping key outcomes, safeguards, finance mechanisms and triggers

The following matrix highlights the key features of the three phases of the phased approach to REDD-plus:

	PHASE 1 Preparation and readiness	PHASE 2 Policies and measures	PHASE 3 Performance-based payments
Outcome	<ul style="list-style-type: none"> . REDD-plus strategy . Issues identification . Preparation of protocols . Capacity building assessment . Institutional development . Demonstration activities . Co-relate national and regional development policies, including landscape, land-use plans and forest plans 	<ul style="list-style-type: none"> . Capacity building . Development of national REDD-plus portfolios . Benefit sharing and equitable distribution . Pilot project . Inclusion of small-scale projects . Carbon registry 	<ul style="list-style-type: none"> . CO₂ reduction . Verification . Social and environmental impact assessment
Safeguards	<ul style="list-style-type: none"> . Transparency . Participation and representation 	<ul style="list-style-type: none"> . Stakeholder platforms . Social and environmental audits . Governance and legality audits . Free prior and informed consent of Indigenous Peoples . Transparency 	<ul style="list-style-type: none"> . MRV system . Free prior and informed consent of Indigenous Peoples . Social and environmental audit . Financial audit . Financial accounting guidance from the financial Accounting Standards Board and the International Accounting Board
Finance mechanisms	<ul style="list-style-type: none"> . Multilateral and bilateral grants . Proposed windows within the UNFCCC . Public-sector funding 	<ul style="list-style-type: none"> . A portfolio of finance tools . underwriting financial, livelihood and political risks . Rules for performance-based payments . Implementation of equitable distribution mechanisms 	<ul style="list-style-type: none"> . Compliance market . Non-market compliance fund . Underwriting risk . Equitable distribution mechanisms

Triggers/eligibility criteria	<ul style="list-style-type: none"> . Multi-stakeholder endorsement . Plan for overcoming governance and policy gaps 	<ul style="list-style-type: none"> . Adequate legal rights and tenure systems . Endorsement of benefit distributions . National capacity to implement and audit . Carbon registry . Free prior and informed consent of Indigenous Peoples . MRV system . Proxy indicators 	<ul style="list-style-type: none"> . Forest carbon-pool buffer and forest carbon project insurance
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Principle 7: Financial stability through public and private funding and country commitment

Stable, reliable and long-term financial flows require strong coordination between public-sector and private donors and investors and robust commitments from both developed and developing countries. Developed countries must be willing to guarantee support and long-term financing arrangements that depart from business-as-usual models for north-south financial transfers. Developing countries need to commit to policy and institutional changes that focus on the transformation of land-use dynamics, forest governance, and the flow of resources to Indigenous Peoples and local communities.

Principle 8: A portfolio of finance mechanisms

Given the scale of the challenge involved and as part of a well-designed phased approach, there is need to move beyond the ‘markets versus funds’ discussion and to accommodate a portfolio that makes optimal and coordinated use of both markets and funds, as well as other sources of finance. A broad coalition of public-sector and private-sector institutions will need to provide the necessary up-front investments for phases one and two according to the capacity of each individual institution; investments will need to include both bilateral and multi-lateral loans and grants.

Principle 9: Additionality of funds

REDD-plus funding must be additional to regular official development assistance funding.

Principles guiding REDD-plus Monitoring, Reporting, Verification and Financial Assurance

Principle 10: Robust Monitoring, Reporting and Verification (MRV)

In all phases of a phased approach, REDD-plus must assure environmental, social and financial performance through robust MRV at the local, national and global levels.

Principle 11: Performance-based delivery and safeguards

REDD-plus finance must be predicted on performance-based delivery, including proxy-based performance in phase two, with appropriate safeguards in all phases. Phase-three performance must be underpinned by independent third-party verification of CO₂ emission reductions according to local circumstances in individual countries. During phase two, proxies of overall deforestation must be linked to key measures such as the implementation of policies and the strengthening, in practice, of the rights of local communities.

Principle 12: Social, environmental and financial assessment in addition to carbon monitoring

In all phases, performance of REDD-plus activities should incorporate social, environmental and financial indicators in addition to the assessment of changes in carbon stocks. Socially, environmentally and financially sound processes, based on adaptive management and learning and with full and effective community participation, will produce secure and tradable carbon assets that are appropriate to the market-oriented system that characterizes phase three.

Principle 13: Social, environmental and financial audits could be either part of or separate from MRV

Social, environmental and financial audits, whether incorporated into MRV or set up as separate instruments, must:

- A. Be equal in status to other aspects of REDD-plus
- B. Simultaneously maintain independence and the possibility of ceding social and environmental audits to a third party
- C. Be part of improved coordination between relevant government departments
- D. Be subject to only limited government control
- E. Prevent higher transaction costs due to complex intra-agency coordination
- F. Build on existing methodologies

G. Encourage engagement with the private sector

Principle 14: Verification of performance on issues of livelihoods, rights, benefits sharing and consultation

Social auditing must include:

- A. Provisions for men, women and youth in local communities and Indigenous Peoples to engage in REDD-plus design and participate in REDD-plus activities.
- B. Clarity on benefit-sharing arrangements with a view to promoting equity between stakeholders within communities; this does not mean prescribing the benefits but, rather, assuring an adequate distribution mechanism.
- C. The monitoring of negative impacts with respect to forest-dependent livelihoods.
- D. Respect for free prior and informed consent by Indigenous Peoples and local communities.
- E. Independent third-party verification.

Principle 15: Biodiversity and ecosystem services

Environmental auditing must include:

- A. the delivery of ecosystem and biodiversity co-benefits;
- B. priority for high-biodiversity areas, including early action on forest landscape restoration;
- C. independent third-party verification

Principle 16: Free prior and informed consent as a rights issue and as a procedure

The concept of free prior and informed consent is a right for Indigenous Peoples. It is also a consultative process and a requirement that applies to other stakeholders, such as local communities and forest owners.

Principle 17: Building governance through adaptive management, piloting and learning

The strengthening of governance arrangements and institution building need to incorporate learning through piloting, adaptive management and knowledge transfer, and focus on progress in key areas such as carbon rights, tenure rights and distribution mechanisms.

Principle 18: REDD-plus oversight body under the auspices of the Conference of the Parties to the UNFCCC (COP)

To ensure viable REDD-plus financing in the long run, a REDD-plus oversight body with technical, financial and administrative responsibilities should be set up under the COP with representation based on United Nations regions. The Nine Major Groups' structure under the ECOSOC framework – as found within the United Nations Forum on Forests and the United Nations Commission on Sustainable Development – can be a model for inclusive stakeholder participation through legitimate representation.

Principle 19: Mandate of the international oversight body and the COP

The REDD-plus oversight body must be endowed with the authority to evaluate eligibility for countries to move from one phase of REDD-plus to the next. The COP could set the priorities, such as caps on the proportion of CO₂ emissions that Annex-1 countries may offset. A project-by-project approach could be taken in phase one and phase two, with grants and early action generated by the private sector.

Principle 20: Cross-sector approach for national REDD-plus bodies

National REDD-plus coordination bodies must work across public and private sectors and have a multi-stakeholder membership.

Principle 21: Building on experience of existing certification, monitoring and verification schemes

REDD-plus mechanisms have to build on the important experiences gained in the existing voluntary carbon market, particularly with regards to carbon market accounting and credible standards and certifications. At the national level, REDD-plus provisions should make use of existing government regulations and structures and capitalize on existing monitoring and independent third-party verification mechanisms, such as forest certification systems.

Principle 22: Standards for accounting and tax codes based on existing practices

Tax code and financial accounting standards for carbon transactions and investments in the public and private sectors should be established and be compliant with existing practices and institutions. Where existing practices and institutions are inadequate, new mechanisms need to be created. Another required instrument is the International Transaction Log.

Principle 23: Complaint and grievance structures

REDD-plus governance structures at both the national and international levels must include independent complaint and grievance mechanisms.

Principle 24: Increased coordination and utilization of existing instruments

In order to minimize transaction costs, existing forest-based instrument (example, Forest Law Enforcement and Governance (FLEG) processes, Voluntary Partnership Agreements, UN-REDD, FIP and FCPF) should be used in preference to setting up a new global mechanism. Efforts should be made to strengthen coordination and collaboration between such instruments.

Principle 25: Inclusive and accountable forest management through strong partnerships and active participation

REDD-plus must be underpinned by transparent, inclusive and accountable forest management based on local processes. This demands strong partnerships founded on respect for the rights and active participation of Indigenous Peoples and local communities, consistent with international obligations and standards such as the United Nations Declaration on the Rights of Indigenous Peoples and locally defined measures and legal systems. Key areas of concern are the clarification and strengthening of tenure, property and carbon rights.

Principle 26: Effective and efficient interventions through multi-stakeholder platforms

Where possible, the engagement of stakeholders should build on the many national experiences of stakeholder involvement in FLEG processes. Multi-stakeholder platforms in the REDD-plus planning process not only contribute to equitable participation and representation, they are also more effective and generate more efficient interventions. They promote better understanding of the role of each stakeholder group and improved communication between groups and can therefore help to avoid or diminish potential conflicts.

2.1.9 Endogenising global climate change adaptation dynamics within forest-dependent Cross River

Several agitations have expressed that without urgent mitigation action the world cannot avoid dangerous climate change (IPCC, 2008). 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). 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).

In the same light, local strategies are being drawn up to prepare for more extreme and less certain future weather patterns. 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. However, developing countries face far more severe climate change adaptation challenges. 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. Inequalities in capacity to adapt to climate change are becoming increasingly apparent (Sassen, 2010). For one part of the world—the richer part—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, especially in sub-Saharan Africa, adaptation means people themselves learning to ‘float in’ flood water. 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. As Desmond Tutu, the former Archbishop of Cape Town, has argued, we are drifting into a world of adaptation apartheid (HDR, 2008).

Planning for climate change adaptation therefore confronts governments in developing countries with challenges at many levels. These challenges pose systemic threats. In Egypt, delta flooding could transform conditions for agricultural production. Changes to coastal currents in southern Africa could compromise the future of Namibia’s fisheries sector. Hydroelectric power generation will be affected in many countries. Hence, responding to climate change require the integration of adaptation into all aspects of policy development and planning for poverty reduction within and outside the country. However, planning and implementation capacity is limited due to the following factors:

- *Information.* Many of the world’s poorest countries 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. However, the region has the world’s lowest density of meteorological stations. In France, the meteorological budget amounts to about US\$388 million annually, compared with just US\$2 million in Ethiopia. The 2005 G8

summit pledged action to strengthen Africa's meteorological monitoring capacity. Follow-up has fallen far short of the commitments made.

- *Infrastructure.* In climate change adaptation, as in other areas, 'prevention is better than cure'. Every US\$1 invested in pre-disaster risk management in developing countries can prevent losses of US\$7 (HDR, 2008). In Bangladesh for instance, research among impoverished populations living on *char* islands shows that adaptation against flooding can strengthen livelihoods, even in extreme conditions. 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.

- *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 employment, 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. 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).

The case for international action on adaptation is rooted in past commitments, shared values, the global commitment to poverty reduction and the liability of rich nations for climate change problems. Under the terms of the United Nations Framework Convention on Climate Change (UNFCCC), northern governments are obliged to support adaptation capacity development. Support for the MDGs provides another powerful rationale for action: adaptation is a key requirement for achieving the 2015 targets and creating the conditions for sustained progress. Application of the legal principles of protection from harm and compensation for damage would constitute further grounds for action. 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).

For purposes of comparison, this is equivalent to one week's worth of spending under the United Kingdom flood defence programme. Current pledged funding amounts to US\$279 million for disbursement over several years. This is an improvement over past delivery but still a fraction of what is required. It represents less than one-half of what the German state of Baden-Württemberg will allocate to the strengthening of flood defences. It is not just the lives and the livelihoods of the poor that require protection through adaptation. Aid programmes are also under threat. It is estimated that around one-third of current development assistance is concentrated in areas facing varying degrees of climate change risk. Insulating aid budgets from that risk will require additional investment of around US\$4.5 billion. At the same time, climate change is contributing to a diversion of aid into disaster relief. This has been one of the fastest growing areas for aid flows, accounting for 7.5 percent of total commitments in 2005 for instance. Estimating the aid financing requirements for adaptation is inherently difficult. In the absence of detailed national assessments of climate change risks and vulnerabilities, any assessment must remain a 'guesstimate'. The current 'guesstimate' is that by 2015 at least US\$44 billion will be required annually for 'climate proofing' development investments (this is based on 2005 prices). Building human resilience is another priority area.

Investments in social protection and wider human development strategies are needed to strengthen the capacity of vulnerable people in forest-dependent communities to cope with risk. The ballpark estimate is that at least US\$40 billion will be needed by 2015 to strengthen national strategies for poverty reduction in the face of climate change risks. To put this figure in context, it represents around 0.5 percent of projected 2015 GDP for low income and lower middle income countries. Provision for disaster and post-disaster recovery will also have to be strengthened as droughts, floods, storms and landslides pose greater threats. Provision of an additional US\$2 billion a year is implied by these estimates. Adaptation financing requirements should be seen as 'new and additional' commitments. That is, they should supplement rather than divert existing aid commitments. Northern governments have pledged to

double aid by 2010, though the record on delivery is mixed. Any shortfall in delivery compromises progress towards the MDGs and compound problems in climate change adaptation.

The headline figure for new and additional adaptation financing appears large—but has to be placed in context. The total of around US\$86 billion by 2015 may be required to prevent aid diversion. It would represent around 0.2 percent of developed country GDP, or around one-tenth of what they currently allocate to military expenditure. Measured in terms of returns for human security, adaptation financing is a highly cost-effective investment. There are a range of innovative financing mechanisms that could be explored to mobilize resources. These include carbon taxation; levies administered under cap-and-trade programmes and dedicated levies on air transport and vehicles.

This therefore means that international support for adaptation has to go beyond financing. Current international efforts suffer not just from chronic underfinancing, but also a lack of coordination and coherence (HDR, 2008). The patchwork of multilateral mechanisms is delivering small amounts of finance with very high transaction costs, most of it through individual projects. While project-based support has an important role to play, the locus for adaptation planning has to be shifted towards national programmes and budgets (IPCC, 2008). The integration of adaptation planning into wider poverty reduction strategies is a priority. Successful adaptation policies cannot be grafted on to systems that are failing to address underlying causes of poverty, vulnerability and wider disparities based on wealth, gender and location. Dialogue over Poverty Reduction Strategy Papers (PRSPs) provides a possible framework for integrating adaptation in poverty reduction planning. Revision of PRSPs through nationally-owned processes to identify financing requirements and policy options for adaptation could provide a focal point for international cooperation.

In the global sphere, the strong commitment of the United Nations Development Programme on Climate Change Adaptation (UNDP-CCA) to technology-transfer is reflected in its robust portfolio of twenty-nine projects specifically geared toward the absorption and diffusion of technology for climate change adaptation in developing countries. These projects are now being implemented in twenty-nine countries in Africa, Asia, Europe, the Pacific and Latin America. The Global Environment Facility

(GEF) is the largest funder of these initiatives, with nearly \$66 million in grant contributions (Tessa & Kurukulasuriya, 2010).

Adaptation programmes and projects being implemented with UNDP's technical assistance and financing using resources managed by the GEF aim to achieve the following key objectives:

- (i) develop technical capacities at the national and sector levels to undertake prospective exercises in order to identify climate change risks and opportunities and prepare long-term strategies for risk management;
- (ii) internalize climate change risks into planning, budgeting, management and decision making of key economic sectors;
- (iii) revise and formulate national and sectoral policies and establish appropriate institutional support mechanisms;
- (iv) test approaches and technologies for climate change risk management in key sectors at the national and sub-national levels;
- (v) codify and disseminate knowledge and best practices.

In this regards, a project approach is used to promote a combination of so-called hard and soft technologies for effective and efficient impacts. The technologies are chosen by countries based on their cost-effectiveness, environmental sustainability, cultural compatibility and social acceptability. The sustainability of each project stems from the establishment of institutions to monitor and evaluate technologies for potential adjustments, course corrections and feedback. The scope of intervention includes both the human and the natural systems, with the principal goal of increasing their resilience to climate change risks.

Let us describe the use of these technologies as applied in different systems. The transfer of technology used for climate change adaptation in the human system aims to protect human life by increasing resilience to adverse climate change variability and extremes. These technologies are primarily used in the context of adaptation in the following thematic areas: agriculture and food security, water resources management and disaster risk management.

Agriculture and Food Security

Fourteen UNDP-supported country projects promote the adoption and diffusion of technology in the domain of agriculture and food security. Eight projects were in Africa, four in Asia and two in the Pacific. Most of these projects equipped and built the technical capacity of key stakeholders and institutions, specifically

technical staff, local farmers, community-based organizations and NGOs. They also promoted agricultural and pastoral resilient techniques and practices, such as dissemination of stress-resistant crops and rangeland seedlings, promotion of crop diversification and introduction of pest management techniques. A typical example is the Community Based Adaptation to Climate Change through Coastal Afforestation Project in Bangladesh. This project partners with the Bangladesh Rice Research Institute (BARI) to demonstrate adaptive technologies in high-salinity areas. Additionally, it partners with BARI to train staff and farmers in adopting suitable vegetable and orchard cultivation technologies. These technologies have already been tested in coastal areas. Other interventions include crop diversification and the creation of freshwater reservoirs to facilitate dry season agriculture.

Water Resources Management

Thirteen UNDP-supported projects under implementation focus on the adoption and diffusion of technologies in the area of water resources management. As in the previous intervention area, seven of these projects are in Africa, four in Asia, one in Latin America and one in the Pacific. These projects aim to enhance the capacity of communities and relevant institutions to integrate climate change into water resource management. In this respect, they introduced, demonstrated and promoted integrated water resources management practices, such as changing crop patterns, selection of drought-tolerant crops, drip and borehole irrigation, and water conservation techniques such as rainwater harvesting. A key example of this is the Adaptation to Climate Change through Effective Water Governance project being implemented in Ecuador. The project supports the incorporation of water-saving technologies for irrigation, such as drip irrigation and adjusting timing and volumes of water application in irrigated land. It also supports agricultural practices leading to efficient use and conservation of water, such as change in crop patterns, selection of drought-tolerant crops and improved land management techniques.

Infrastructure/Disaster Risk Management (human system)

Nine projects promoted the diffusion and absorption of technologies with regard to risk management. These projects are more evenly distributed geographically with four in Asia, three in Africa and two in the Pacific. The projects build the technical capacity of communities and institutions to design and develop infrastructure systems that help withstand increasing variability and intensity of climate hazards. An illustrative case is the Promoting of Climate-Resilient Water

Management and Agriculture Practices project in rural Cambodia. The project conducts measures to reduce vulnerability of infrastructure to the impacts of climate change by constructing irrigation canals and dykes, as well as security hills to help prevent flooding.

Technologies used for climate change adaptation in the natural system aim to protect the biological and physical environments from the adverse impacts of climate change. In the case of UNDP-CCA projects financed by the GEF-managed funds, these technologies are used in the areas of biodiversity and ecosystem management, sustainable land management and disaster risk management.

Climate-Resilient Ecosystem Management

Four projects supported by UNDP specifically addressed technology absorption and diffusion of biodiversity and ecosystem management. Asia holds two projects; Europe and Latin America, one each. The majority of these projects build the capacity of key stakeholders, while identifying and disseminating suitable technologies for the protection and conservation of biodiversity and diverse ecosystems. The principal ecosystems discussed here are forest, wetland and coastal ecosystems. A typical example is the Adaptation to Climate Change Impacts in Mountain Forest Ecosystems projects in the South-Eastern region of Armenia. This project trains foresters to conduct early identification and localization of pest invasion and to use environmentally sound aerial pest control techniques, with a focus on the use of a biological treatment that acts on leaf-eating insects without damaging biodiversity.

Sustainable Land Management (SLM)

Six projects addressed the diffusion and absorption of technologies for sustainable land management. Four of these projects are in Africa and two in Asia. These projects enhance the technical capacity of key stakeholders, specifically farmers and pastoralists, to identify, disseminate and implement sustainable land management techniques to restore degraded soils, stabilize land and improve agriculture productivity. A key example is the Adapting to Climate Change through the Improvement of Traditional Crops and Livestock Farming project in Namibia. The project identifies and disseminates cost-effective, innovative and appropriate SLM techniques, which integrate environmental and economic benefits. Moreover, the project strengthens the technical capacity of service organizations and improves

livestock rearing through integrated pasture and animal bio-capacity management techniques.

Disaster Risk Management (Natural System)

There are two UNDP-supported projects under this category based in Egypt and in Albania; these specifically dealt with the absorption and diffusion of disaster management techniques as they pertain to the natural system. In Egypt, the Adaptation to Climate Change in the Nile Delta through the Integrated Coastal Zone Management project assisted the government in implementing the national Integrated Coastal Zone Management (ICZM) plan by installing a set of innovative shoreline protections. This project is implemented following the so-called living shorelines approach, which focuses on an innovative set of bank stabilization and habitat restoration techniques to reinforce the coastline, minimize coastal erosion and maintain coastal processes. The project in Albania promotes the use of efficient technologies to assess vulnerability to environmental changes. This involves training key stakeholders in the use and application of models such as DIVA, an interactive tool that enables users to simulate socioeconomic change and adaptation on natural and human coastal systems.

2.1.10 Rural Livelihoods and Vulnerability to Climate Change in Nigeria

The concept of livelihood is generally considered to mean the bundle of different types of assets, abilities and activities that enable a person, household or community to survive (Stamoulis and Zezza, 2003). These assets include physical assets such as infrastructure and household items; financial assets such as stocks of money, savings, and pensions; natural assets such as natural resources; social assets, which are based on the cohesiveness of people and societies; and human assets, which depend on the status of individuals and can involve education and skill (Lomborg, 2004). These assets change over time and are different for different households and communities in both rural and urban areas. The amounts of these assets that a household or community possesses or can easily gain access to are key determinants of sustainability and resilience (FAO, 2008).

Msheliza (2011) had shown that climate change has substantial implications for the sustainability of rural livelihoods in Nigeria. According to her, it poses a serious threat to livelihoods and enhances risks and vulnerabilities of the people and ecosystems through the increased frequency of natural disasters and extreme weather

events. Likewise, rural livelihoods in coastal areas and the desertification-prone Sahel ecological zones of the country are said to also be highly vulnerable to climate change (BNRCC, 2011). The anticipated sea-level rise and extreme and erratic weather conditions all have serious implications for over 17 million people occupying the coastal environment of the country and over 35 million people that heavily depend on the climate-sensitive resources of the desertification-prone areas of Nigeria. The change in seasonality attributed to climate change has led to certain food products becoming scarcer at certain times of the year (NASPA-CCN, 2011). Such seasonal variations in food supply, along with vulnerabilities to flooding and fire, render livelihoods defenceless at certain times of the year and further worsen the poverty level of the very vulnerable in the society.

The impacts of climate change on agriculture, natural resources, biodiversity, health and infrastructures all impinge on livelihood sources. The impacts affect all people, but the most affected are women and children – especially young girls who often adopt similar roles as women – poor people, and the marginalized in each of the zones (Msheliza, 2011). A close look at the hazards and impacts of climate change on the various sectors reveals that, in both the short- and long-term, most Nigerians are affected due to the existing vulnerabilities of geographical location and the natural physical characteristics associated with the locations. The impacts are interlinked to aggravate the vulnerabilities and further undermine livelihoods.

In rural Nigeria, FAO (2008) have supported that agriculture is at the heart of the means of sustainable livelihoods. Accordingly, livelihood groups in the agriculture sector that warrant special attention in the context of climate change should include: low-income groups in drought and flood-prone areas with poor food distribution infrastructure and limited access to assets and emergency response. Low to middle-income groups in flood-prone areas that may lose homes, stored food, personal possessions, and means of obtaining their livelihood, particularly when water rises very quickly and with great force, as in sea surges or flash floods; farmers whose lands become submerged or damaged by sea-level rise or saltwater intrusions. Others include, producers of crops that may not be sustainable under changing temperature and rainfall regimes; producers of crops at risk from high winds; poor livestock keepers in drylands, where changes in rainfall patterns will affect forage availability and quality; managers of forest ecosystems that provide forest products and environmental services; fish producers whose infrastructure for fishing activities

(such as port and landing facilities), storage facilities, fish ponds and processing areas, becomes submerged or damaged by sea-level rise, flooding, or extreme weather events; fishing communities that depend heavily on coral reefs for food and protection from natural disasters; and fishers and aquaculture farmers who suffer diminishing catches from shifts in fish distribution and the productivity of aquatic ecosystems caused by changes in ocean currents or increased discharge of freshwater into oceans.

Agriculture-based livelihood systems that are already vulnerable to climate change face the immediate risk of increased crop failure, loss of livestock and fish stocks, increasing water scarcities and destruction of productive assets. These systems include small-scale, rain-fed farming, pastoralism, inland and coastal fishing and aquaculture communities, and forest-based systems. Rural people inhabiting coasts, flood plains, and drylands in the country are most at risk.

Climate change is believed to also affect people differently depending on such factors as land ownership, asset holdings, marketable skills, gender, age and health status (Majid, 2003). Again, climate change, together with an increasing demand for freshwater, will equally increase water stress in many parts of rural Nigeria, particularly in the north (Msheliza, 2011). This will be critically important to agricultural production, food security, and rural development. Increasing water stress combined with increasing uncertainty and extreme weather events will affect food production and will expand food insecurity across the country. Changes in the characteristics of the rainfall may further reduce productivity as the West African Monsoon may be unstable due to climate change. Increased natural hazards and extreme weather events may also increase risks and vulnerabilities in rural areas, and accelerate rural-urban migration and the number of environmental refugees in urban areas, further compounding the rural-urban livelihood dynamics in the country. Migration is in some sense, an adaptive strategy to the loss of means of livelihoods under a changing climate scenario.

It is noted, however, that while climate change poses serious challenges, it may also create new opportunities for rural livelihoods through the requirement for better management of natural ecosystems and their services (Msheliza, 2011). Carbon trading through the CDM, Reducing Emissions from Deforestation and Forest Degradation (REDD), and Payment for Environmental (or ecosystem) Services (PES) could be important sources of income for rural communities in the near future. For Nigeria to benefit from these climate change financing mechanisms and instruments,

there must be in place appropriate policies; institutional, legal, knowledge, and technological support; and appropriate property rights for the institutionalization of ecosystem services (Msheliza, 2011). Enhanced benefits could also be gained from the promotion of niche products with improved potential in urban markets. Without such support from the government, it is believed that rural people, in particular, will not be able to tap into the opportunities for improving their livelihoods and well-being in the face of an increasingly changing climate.

Some relevant adaptation strategies for sustainable rural livelihoods include combating agricultural soil degradation and soil fertility management (for example, through improved land clearing), water management techniques (example, anti-erosive small dykes, water pocket or zai and half-moon practices), crop diversification, agro-pastoralism, production and sale of animals, mutual aid and cooperation, diversification of economic activities, migration, intensive farming, and conservation of the natural resources utilized by people for rural livelihoods.

Building climate-resilient livelihoods has been identified as the key overarching strategy to increased adaptive capacity of rural communities and families (BNRCC, 2011). Recent research (MONRE/UNDP/DFID, 2009) indicates that this can be achieved. According to these findings, for Nigeria to effectively achieve this aspiration, the nation needs to do the following:

- i) improve environmental governance at national, state, and local/community levels to reduce environmental degradation and resource depletion, in order to strengthen livelihoods in the face of increasing climate variability and change; in particular, adhere to bottom-up planning processes in the development of long-term adaptation strategies to climate change;
- ii) put in place strong local institutions such as rural extension services for improved adaptive livelihood strategies in response to climate change;
- iii) ensure right sequencing of adaptation measures and strategies;
- iv) empower vulnerable groups to diversify income sources, including migration to encourage remittances back to families in climate change-induced ecologically degraded areas of the country (for instance, coastal and desertification-prone areas), to maintain aged and female household members that are usually left behind in these areas;
- v) ensure intra-generational and inter-generational equity in the strengthening of the processes for successful livelihood adaptation to climate change;

- vi) support vocational and skills training needs for migrants in the urban centres;
- vii) mainstream climate change into development planning;
- viii) integrate hazard risks into the planning, development, and provision of basic needs such as housing, water, and hard and soft infrastructure, in order to build ecological resilience; and
- ix) adopt sectoral climate-resilient approaches to agriculture by introducing climate-resilient species.

They also suggested specific programmes which among others include: building climate-resilient agriculture to improve existing local adaptation measures; for example, adjustment of when to plant and harvest, where to plant (cropping patterns), what to plant (switching to climate-resilient crop varieties), and how to plant (diversified farming, inter-cropping, crop rotation); building climate-resilient fishing and aquaculture (example, introduction of aquaculture species adapted to high temperatures and changed salinities).

Building climate-resilient livelihoods (example, ensuring access to more diverse and better targeted credit, insurance and other financial services, particularly for the poor; ‘hazard-proofing’ residential housing; accessible, secure, safe storage and protection from climatic hazards to enable primary producers to avoid selling when prices are least favourable; improved access of the most at-risk to information on climate risks, adaptation measures, and market information by enabling timely access to communication infrastructure); building climate resilience of the livelihood resource-base, including - incorporating social and ecological perspectives into adaptive management strategy formulation; undertaking ecological rehabilitation of degraded areas; reducing coastal erosion; using biological methods, such as planting mangroves or coconuts as ‘bio-shields’ to stabilize shoreline areas; combating deforestation; re-foresting strategic areas; supporting ‘hazard-proof’ construction and adaptation measures facilitating credit for farmers, fishers, and pastoralists to encourage a reduction in environmental impacts; linking farmers to carbon market options (example, promoting community-based conservation and natural resources management to offset climate change effects that promote unsustainable resource use); improving water storage and management to meet the needs of future generations through increased public awareness and participation in sustainable water use and management; mainstreaming emergency response planning and early warning

systems into the comprehensive development plans of the vulnerable areas along the very vulnerable coastal and the north-eastern parts of Nigeria.

Other programmes include: using a participatory approach; planning and managing early responses to sea-level rise, including - the construction of hard flood defence infrastructure (example, sea walls, dykes, and embankments) and soft flood defences (example, wetlands, coastal salt marshes); monitoring of both sea-level rise and salinity intrusion at the local level to inform decision-making on the extent of the problem and what is required; monitoring, over time, wetland and livelihood gains from alternative responses to climate change threats; planning and managing effective responses to drought and desertification in the vulnerable north, including the establishment of soft infrastructure, such as 'green wall' for ecological rehabilitation of degraded areas; mainstreaming aridity and desertification hazard maps into development planning; continuous monitoring of changes in ecological and livelihood conditions of rehabilitated areas; improving resettlement processes for vulnerable households and communities to include consideration of paying compensation, continuing access over the short-term to previously used livelihood resources, support in exploring new livelihood options, improving access of vulnerable households to productive assets, and providing appropriate skills training prior to resettlement; building adaptive strategies for climate change-induced migrants to include better education and job-related vocational training and re-skilling to strengthen the capacity of migrants to remit money; provision of incentives to encourage successful temporary migrants to invest in local enterprises generating employment; ensuring better labour protection for migrant workers (MONRE/UNDP/DFID, 2009).

2.1.11. Empirical Studies

Indigenous knowledge Systems for forest-management aims at facilitating the expression of the need and priority of forest-dependent communities through effective sustainable forest-management processes (Babaleye, 2011). Anyaegbunam, et.al., (2004) had showed in their work that one of the main reasons while human societies, especially natural-resources-dependent-societies, have experienced slowed development is because of the lack of the people's involvement in the design and implementation of policies and programmes that affect their lives. This enunciates the fact that unless forest-dependent people become the protagonists of their own development, no amount of investment in climate change adaptation programme will improve their livelihoods in a sustainable manner. The point that had been stressed

here is that forest-dependent communities need to become active actors in their development; though they may be largely illiterate, nonetheless, they have ideas, knowledge systems and practices shaped by deep-rooted cultural values, traditions, experiences and norms different from outsiders who bring development to them.

Harvey (2011) had critically examined forms of knowledge and the participation emerging therein from a collaborative network using information technologies for knowledge sharing on climate change and international development. He explored how multiple interpretations of these concepts as related to climate change coalesce around a particular initiative, shaping ways of working and understanding across different epistemic cultures in the network (Knorr-Cetina, 2007)¹. He argued that the resultant shared meanings and practices are a product of existent epistemic and participatory cultures, internal and external dynamics and economies of power, and emergent ways of working that are further shaped by engagement with particular information technologies and protocols. His work established that the process through which these shared meanings are constructed is rarely transparent; but rather, it emerges through the normalization of particular practices that 'organize' our social relations. This however limits our understanding on how a given 'architecture of participation' has been constructed, or how it has situated those working in it. Harvey's study considered the influence that these processes of meaning-making have had on the present shape of the network and reflect on what this means for such forms of collaboration more generally.

In their seminal work, Harvey, Diagne, Nnam and Tadege (2009) looked at the need to ensure that rural communities in Africa have access to information on appropriate adaptive practices for climate change. They showed that knowledge sharing is relatively limited among climate change actors in Africa; and that the creation and dissemination of 'valid' knowledge had always been the monopoly of certain persons or institutions. Consequently, this has resulted in the marginalization of segments of society based on gender, race, language and other discriminating factors.

¹ Knorr-Cetina on his own part has defined an epistemic culture as the 'interiorised processes of knowledge creation. . . that is, those sets of practices, arrangements and mechanisms bound together by necessity, affinity and historical coincidence which, in a given area of professional expertise, make up how we know what we know' (2007:363).

On their part, the Building Nigeria's Response to Climate Change (BNRCC) pilot projects results and research showed clearly that farmers in rural Nigeria are affected by the decline in yields due to climate change, and this has also reduced their income from the sale of crops - thus reducing their ability to purchase other needed foods and goods (Onyeneke and Madukwe, 2010). Other major contributions of environmental sociologists and social scientists include: surveys of attitudes and opinions towards the environment and environmental issues (McCright and Dunlap, 2011, among others). Lifestyle and consumer behaviour studies (Bostrom and Klintman, 2008, among others). Environmental movements (Brulle and Jenkins, 2006; Rootes and Brulle, 2004, among others). Studies of regulation and governance (Lidskog and Sundqvist, 2011; Martinelli and Midttun, 2010). Energy politics and policymaking (Cox, Ostrom and Walker, 2010, 2004, among others). Studies of innovation and entrepreneurship relating to alternative energy technologies, energy policies and sustainability issues (Basurto and Ostrom, 2009, among others). Special sector studies: climate change (BNRCC, 2011; Reenerg and Nielsen, 2010); biofuels (Yemiru, Roos, Campbell and Bohlin, 2010; Khanal, Surampali, Zhang, and Lamsal, 2010; Songstad, Lakshmanan, Chen and Gibbons, 2011); fisheries (McGray and Spearman, 2011); forests (FAO, 2014); tourism (Prah, 2011); transport (Wang, 1988); air transport (Midttun and Steve, 1998.); water, sewage (Zhenlong, 2005); environmental education (Wright and Hill, 2011).

Global environmental change studies (Hester and Roy, 2002). Ecofeminism (Leach and Cathy, 1997). Social theory, the environment and nature-society relationships (Coleman and Coleman, 1994; Iwarsson and Agnetha, 2003). All in all, a substantial number of sociologists - although definitely a minority and to some extent marginal to mainstream sociology - have conducted considerable research on a wide spectrum of environmental questions and issues. A significant part of all these research works is concerned with humanly caused environmental degradation (fisheries, forests, air pollution). Also, societal damage and loss in the face of environmental degradation have been important, especially its impacts on, among other issues, health, habitat, marginal communities and groups (for instance, women's subsistence livelihood (Arora-Jonnsson, 2011).

In sum, most of these works that started in the 1960s and 1970s, investigated and theorized about environmental issues and the relationship between social and natural systems with extension, the development of particular concepts and models;

criticizing mainstream sociology - and sociological theory in particular - for ignoring the biophysical environment and arguing generally that the 'material world' was not sufficiently taken into account in mainstream sociology (Buttel, 2002). So far, no study had looked at the relationship between indigenous knowledge systems (IKS) for forest management and climate change adaptation among forest-dependent communities and peoples. It is this gap that this study had attempted to fill.

2.1.12. Appraisal of Literature Review

On the whole, it has been revealed in the literature that the language as used by the UNFCCC and Kyoto Protocol as regards climate change adaptation (CCA) is unclear and more imprecise, and the description for adaptation focused mainly on planning rather than action (Jerneck and Olsson, 2008). Comparatively, the literature established that certain factors make adaptation to climate change particularly important, especially for the poorest of the poor, most of who depend on agriculture and forest-related activities at subsistence level (World Bank, 2011). Evidence stressed that since many of the forest-dependent peoples live in places with limited access to food markets (World Bank, 2010), there is further stress on already vulnerable livelihoods in cases of food emergency (Mwabu and Thorbecke, 2004).

However, what is missing in the literature is information on the indigenous knowledge systems (beliefs and practices) that are found in climate change adaptation plans. This study has bidden to bridge the existing gap, and this has no doubt improved how climate change adaptation plans and programmes are conceived in rural Cross River State and rural Nigeria in general.

2.2. Theoretical Framework

In the social sciences and sociology in particular, it is expedient that theoretical and rational foundations form the bedrock on which conceptualization and explanation of issues or phenomena are based (Labinjoh, 2002). The depth of theories provides insights into the fundamentals of human behaviour which has yielded knowledge and understanding that transcend time and cultures. Theories in this sense helped in describing, understanding, predicting and explaining reality (Elaturoti and Osiki 2005). Quintessentially, theories in this study helped to capture social reality in objective terms. Urbanization, modernization and globalization had been blamed for eroding traditional values and knowledge (Ihejiamaizu 2002). Consequently, there tend to be disconnections between prevailing knowledge of issues among locals and

'fit-all' knowledge from the outside which had entered local domains through the forces of urbanization, modernization and globalization, a situation that have severally grounded the blossoming of policies and had rather exacerbated uncertainties and poverty among locals (Olutayo and Bankole, 2002).

The conceptual model for this study is rooted on values and principles of standpoint epistemologies and appreciative inquiry which encompass knowledge, expertise, interpersonal skills, participation and empowerment (Karakas 2009). The basic assumption here skulks on the fact that environmental problems are a common concern, the solution of which requires the active and responsible involvement of the entire community (Grebe and Fon, 2006; Olutayo and Fayankinnu 2007; Toyo, 2001). This means that since rural Cross River consists of diverse groups of people with different viewpoints on problems that confront them; some people know these problems fully, while others may not know them at all, or know them only partially. Similarly, some may be highly vulnerable to these problems, while others may be only partially vulnerable, or not at all. In order to tackle these common problems, the concerns and needs of these groups need to be fully addressed. And this therefore means that different groups should be brought together to be made aware of the situation; thus, developing common understanding about these issues, knowing that collective action is only possible when all stakeholders of a community develop a clear common understanding about the issues that confront them (Olutayo, 2009).

The theoretical perspectives in this study have their anchor in (evolutionary theories of) social change theory. This is so because these theoretical perspectives examine social change in forest-dependent Cross River from both the global-national-level-analysis and from a specific-community dimension. Explanations and discussions here demonstrated the magnitude and implications of social-structural changes over-time within these forest-dependent communities, and how these changes have impacted indigenous knowledge systems for forest-management and the adaptive capacity of the people to cope with natural disasters and the stresses that emerge thereby.

2.2.1. Ecological Modernisation Theory

The *ecological modernisation theory* is the theory of social change that is employed in this study. This is a type of transition theory rooted in social theory and technology systems studies. Transitions are examined here as transformation processes in which societies, or subsystems, change profoundly in terms of structures, institutions and relations between actors. After a transition, the society, or a subsystem, operates according to new assumptions and rules, thus indicating a range of new beliefs and practices (Vail, 2008).

Proponents of mainstream modernisation theory have severally argued that internal factors, such as illiteracy, traditional systems and structures, lack of communication and infrastructures, and basically the traditional attitudes of the population in a given society or community are responsible for underdevelopment in such a society or community - meaning that differences in social structure and historical origin of societies or communities, and international dependencies are of little or no importance to explaining social change in such societies or communities (Vail, 2008; Seipel, 2000). Thus, a change of these endogenous factors is the strategy for development for these societies or communities.

However, sociologists have explored the question of social change largely by the close analysis of particular change processes, and by refining definitions (Scott and Marshall, 2004). In this repute, modernisation theory therefore encapsulates social change as a broad range of phenomena, which normally include short-term and long-term, large-scale and small-scale changes, ranging from the global society to the family (Scott and Marshall, 2004).

Typically, modernisation theorists usually describe social change using models of economies and societies of the 'industrialized world' as suitable models that other 'worlds' must 'catch-up' with, if they are to be considered as developed (Appelbaum and William, 1997). This therefore represents a continuum between the least and the most developed country and each country has its position on this line (Appelbaum and William, 1997). The difference between the industrialized or developed countries and the 'underdeveloped' or developing countries is consequently based on the degree of backwardness of these 'underdeveloped' or developing countries which they (underdeveloped or developing countries) must make-up for as soon as possible. Suitable measures used by theorists under modernisation perspectives include measures like the modernisation of the production

apparatus, capital aid, transfer of know-how - so that the developing countries can reach the stage of industrialized countries as soon as possible (World Bank, 2008). Development in this sense, according to modernisation theorists, is seen as an increase of production and efficiency and measured primarily by comparing the per capita income of countries (Brohman, 1996).

More particularly, modernisation perspectives as employed in this study have helped to provide explanations as regards social change in modern society - as modern society is moving toward more environmentally friendly economic and social relations (Vail, 2008). Hence the concern now is how environmental issues are evolving as a proof of a social progress in protecting the natural environment. Some of the concerns include issues like the improvement of the quality of air and water for example. In contemporary society, Mol and Spaargaren (2002) had argued that although economic interests still play a dominant role in production and consumption, and would probably always play this role; however, environmental or ecological interests and criteria are catching up with economic interests and criteria.

While many scholars have expounded on modernisation theory and applied modernisation thinking to a variety of studies; however, the modernisation perspective of focus in this study is the ecological modernisation theory (EMT) of Mol and Spaargaren (2002). This is because, of all the literature in this tradition, their work has demonstrated a distinct character in environmental and ecological issues (Vail, 2008). The origin of ecological modernisation as a system of thought and social inquiry can be traced to the work of the German sociologist, Joseph Huber, in the late 1970s (Mol and Sonnenfeld, 2000a). Seippel (2000) showed that this variant of the modernisation theory arose as a response to the radicalization of environmental thought due to the recession of the early 1980s, and also due to changes in the environmental movement, the emergence of new environmental problems, and the expanding availability of alternative discourses. On his part, Buttel (2000) showed that ecological modernisation thinking emerged in reaction to the ideologies and actions of 1980s radical environmental groups as a response to the tradition in North American environmental sociology that emphasized the intrinsic nature of environmental degradation in modern society, and as a description of sustainable development efforts in developed nations.

Burns (2013) had shown that the ecological modernisation theory differs substantially from other development theories such as the 'World Systems Theory'

and 'Neo-Marxist' frameworks including that of Schnaiberg and his collaborators. In fact, the ecological modernisation theory was developed in the early 1980s; in a certain sense, it continued the earlier modernisation ideas but with several significant variations. The theory had challenged the conventional position of environmental movements that posit that a fundamental reorganisation of the core institutions of modern society - in particular, the industrial production system, that is, the capitalist organisation of the economy and the centralized state - were essential to achieving long-term sustainable development. According to the ecological modernisation theory, even though adjustments and reforms are needed in society; nonetheless, there is no need to do away with or transform major institutions of modern society. A key principle of the theory is that as socio-economic development advances and society becomes maturely developed, especially in 'late industrial society', cultural patterns, institutional arrangements and organisations become increasingly 'environmentally rational' and decision-makers take into account environmental criteria and try to support and formulate policies and programmes that bring minimal human environmental damage (Burn, 2013; Mol and Sonnenfeld, 2000; Spaargaren and Mol, 2006). This implies that 'externalities' would now become internalized, and social production and consumption become cleaner, and the production of goods and services becomes environmentally compatible, according to their perspective on advanced modernised society. Thus, according to Burns (2013), sustainable development implies that late capitalism is environmentally competitive, and that both at home and abroad there is convergence and compatibility between the aims of capital and the environmental goals of society - as a new societal environmental logic.

In the ecological modernisation perspective, this type of development trend is the result of broad and effective coalitions (group alignments) emerging in particularly advanced industrial society to concern themselves with, and to try to protect, the environment. This assumedly leads not only to reduced environmental impact but to continuation of further economic growth: that is, the quantity of resources used per unit of output is minimized, and the wastes emitted per unit are also reduced. The underlying principle of environmental rationality becomes therefore incorporated into corporate, government and organisational policies and strategies. Ultimately, it is these ideas and policies that would now drive technological innovation, market dynamics and government regulation.

The ecological modernisation theory as used here offers a general explanation of the current transformations of environmental institutions, practices and discourses in both advanced and developing phases of modernisation. Major changes can be currently observed in the organization of production and consumption in ways that bring about environmental improvements. The theory focuses on those institutions, in particular economy and technology, which are most important to bringing about a transition to more sustainable production and consumption. It stresses that environmental questions do not enjoy undisputed authority but share this with other societal objectives and considerations.

According to ecological modernisation theory, as countries reach advanced or late capitalist development, they will increasingly adhere to ecological rationality which complements economic rationality. Sustainable development will therefore be the next phase of modernisation, following the phase of advanced industrialization. In their own view, Spaargaren and Mol (1992) had argued that environmental problems can best be solved through further advancement of technology and industrialisation. This means that productive use of natural resources such as air, energy, water, soil, ecosystems - that is, 'environmental productivity' - can be a source of future growth and development in the same way as labour productivity and capital productivity had been for industrial development.

In the ecological modernisation perspective, capitalism is neither an essential precondition nor an obstruction to stringent or radical environmental reform. It becomes redirected so that it causes less and less environmental harm and increasingly contributes in a fundamental way to sustainability (and society's sustenance). While there continue to be 'environmental issues', fundamental conflicts about environmental reform programmes in industrialized countries have in the ecological modernisation view been decreasing since the late 1980s - although this certainly does not apply to the United States of America (USA) and several of the newer members of the European Union, nor to Brazil, China, India and other developing countries opposed to modern industrialized countries.

In sum, ecological modernisation assumes a more or less linear development - that is a further phase of modernisation largely with minimal conflict and struggle; assumptions that it shares with the original modernization theory. However, it is much more sophisticated and conceptually rich - for instance, it gives greater attention to

concrete innovation processes and developments - than the earlier modernisation theory.

Ecological modernisation theory had been criticized for its overemphasis on and optimism about technological innovation - and for ignoring the fact that many of the technological efforts to save the environment and humanity are likely to lead to negative unintended consequences. One cannot have blind faith in technological breakthroughs and progress in that they may not come on stream quick enough and inevitably will generate unintended risky consequences. Likewise, ecological modernisation theory, while representing a type of systems theory, suffers from some of the same short-comings of the earlier modernisation theory. These include: insufficient attention to human agency, conflict and power, and to the many unintended consequences of system change; its linearity; its optimism about the course of societal development (in particular, a high level of technological optimism), boosted by using relative, intensity based environmental indicators (for example, per unit) rather than using measures of increases in absolute levels, for instance the increase in absolute levels of carbon in the atmosphere.

Nonetheless, it is important to mention that there are differences in perspective within the ecological modernisation research programme, namely between those who are techno-corporatist in orientation claiming that the market and technological development will solve sustainability problems more or less spontaneously, on the one hand, as opposed to those who have a more institutional and democratic political orientation which considers state governance in steering through, for instance, environmental policies, taxation, subsidies, caps on pollution, and so on.

In reacting to the various criticisms, Mol and Sonnenfeld (2000b) have argued that ecological modernisation thought had moved through several 'stages' of development from the 1980s through the mid-1990s and with contemporary new directions. They illustrated that the 'first generation' of this thinking was primarily based on the overarching hypotheses that capitalist liberal democracy has the institutional capacity to reform its impact on the natural environment and at the same time advance the development of capitalist modes of production to a kind of '*green capitalism*' which will automatically lead to ecological improvements in society. According to them, this stage emphasized capitalism's ability to adapt to new conditions and was premised largely on the idea of 'technical fixes' for environmental problems (Vail, 2008). The second generation, according to them, focused on the

specific socio-political processes by which the continued social and economic development of liberal democracies would further promote industrialisation and modernisation, thereby resulting in ecological improvements. In the same vein, Mol and Sonnenfeld (2000a) further showed that in the late 1990s, a ‘third phase’ of ecological modernisation thinking emerged that focused on issues of private consumption; that is, the spread of ecological modernisation to non-European countries, and the influence of globalization on development and modernisation processes in individual nation-states. They described this phase as a response to criticism that ecological modernisation theorists were preoccupied almost exclusively with production processes, and that they were Eurocentric in their orientation, and did not account for trans-national social and ecological issues as they affect specific societies and communities (Buttel, 2000).

In this light, Mol and Spaargaren (2000a) reformed ecological modernisation thought as they offered a version of ecological modernisation theory (EMT), as a theory of social change and also as a political programme aimed at achieving a more sustainable society. They asserted that in contrast to other theories of social-environmental change, EMT offers a realistic, achievable vision of a re-ordering of social, economic and political relations to promote environmental improvements (Vail, 2008). Accordingly, ecological modernisation theory as used in this study is employed to explain changes in the relationships of social institutions ranging from the local, state, national and global levels in respect to the environment. Consequently, the following hypotheses represent the salient features of the modernisation perspectives that applied to this study:

- I. That while science and technology has caused most of the environmental problems that the world faces today. Yet, science and technology also constitutes the source of technical solutions. Thus, preventative technologies should replace command-and-control approaches in order to remediate environmental problems. For instance, environmental problems such as air and water pollution can be resolved through the application of science and technology to achieve cleaner operating processes that reduce emissions from vehicles and factories. Science and technology has also brought about a process of time-space *distanciation* – involving the separation of time from space. What this means is that in modern society, what time is does not depend on where one is; in pre-industrial societies, time was not standardized across

the globe, and what time is was depended on where one is. Whilst in modern society, the development of science and technology has made it possible to coordinate social relations across geographic space over a given period of time.

- II. That market forces and economic actors play the important role of being social master minders of ecological restructuring, innovation and reform. In other words, the market encourages producers to cut costs by adopting and using more efficient practices and technologies and by responding to consumer demand for eco-friendly products. This would eventually lead to what Giddens (1990) described as *disembedding* – that is the ‘lifting out’ of social relations from local contexts of interaction. Disembedding allows people to relate to and interact with others who do not live in the same local area with them. Market and economic forces would assume this role of reducing the importance of local contacts, and thus, breaking down geographical constraints.
- III. The government's role in environmental protection is transformed - meaning that the government now adopts decentralized, flexible and collaborative problem-solving methods; while non-governmental organizations (NGOs), such as environmental groups, begin to play more influential roles in policy-making as regard environmental issues. And this is made possible through the development of *symbolic tokens* - these are important environmental symbols that allow interaction among people who have been distanced from one another. Thus, international institutions, such as the World Trade Organization and the European Union, would begin to undermine the authority and ability of the conventional nation-state to determine and enforce policies by altering the meaning of sovereignty.
- IV. The roles and ideologies of environmental social movements would change as environmental groups increasingly seek to work cooperatively with government and market actors to achieve environmental improvements. For instance, instead of seeking to protect the environment by reducing production and consumption, environmentalists would try to work with government and business to make reforms. Although they will eventually abandon their ‘de-modernization’ ideology, these groups will continue to have a ‘dualistic strategy of cooperation and conflict, and internal debates on the tensions that

are a by-product of this duality' (Vail, 2008). This eventually would lead to dependence on *expert systems* – these are systems that allow people living in modern society to carry out their day-to-day activities and to accomplish things without any knowledge of the technicalities of what they are doing. These systems allow many aspects of social life to proceed without the need for personal relationships between those involved.

- V. There would be society-wide shifts in discourses leading to the emergence of new ideologies characterized by concern for environmental issues, with a heightened awareness of intergenerational solidarity to guide reform especially at the local level. This would also lead to a changing pattern of trust, where expert systems are trusted rather than trusting local institutions as found in traditional societies. This would also give rise to the emergence of the culture of reflexivity – where people now think of the consequences of their actions in the future; unlike in traditional societies where people only acted according to the traditional way of doing things.

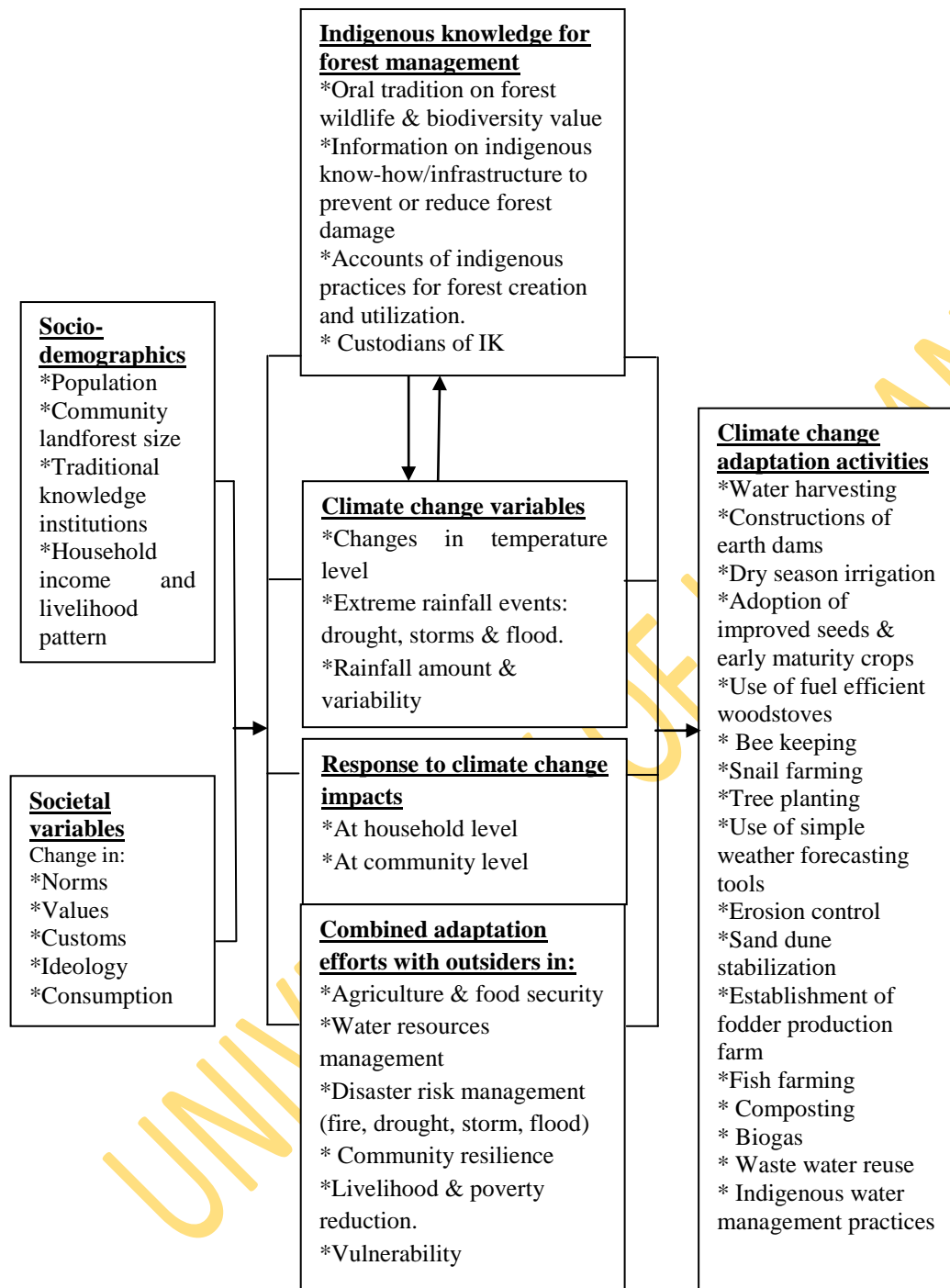
Basically, the relevance of the ecological modernisation theory to this study had been in the identification that change in society comes from two sources - one source is random or unique factors such as impacts of climate change. Another source is systematic factors – which are usually institutional in character - involving changes in the knowledge system for example. So, development and social change as discussed in the context of this study is a combination of systematic factors along with some random or unique factors. The key variables that the ecological modernisation perspective had addressed in this study include: 1) social-structural change within communities, 2) vested interests of community groups, 3) agents of social change, 3) disruptions in forest use among locales, 4) source of change in global climate system, 5) dynamics of adaptation activities, 6) nature of mergers for adaptation, and 7) influence of global knowledge on indigenous systems.

2.2.2. Conceptual Framework

In this study, the conceptual model provided explicit explanations on how socio-demographic variables at the community level were being influenced by global changes. This brought to the fore, the dynamics on how materialistic worldviews and mechanistic paradigms of modern science have dominated local spheres and have challenged their ways of knowing. The conceptual framework had helped to illustrate the nexus between knowledge creation and social learning within contexts of global inequalities; with attention focused on the role of ‘ordinary-people’ in using their own ‘know-how’ in determining their ‘own’ development. This had also helped in reiterating the point that the knowledge for sustainable development in the 21st century does not belong to one single scientific paradigm; but should be based on different epistemologies. In sum, this conceptual framework suggested interpretations that establish that the world is no longer limited to mechanistic and materialistic paradigms, meaning that information for climate change adaptation does not only emerge from processed data of a scientific process, but also emerges as an outcome of a social learning process. This understanding indeed assures sustainable forest governance and ascertains compliance to climate change adaptation activities and programmes by locales. This is so because compliance to climate change adaptation activities is contingent on the circumstances in which the knowledge that generated these activities and programmes emerged.

A conceptual framework as it applied to this study refers to an abstract and stylized ordering of research ideas to guide research design, guided by the principle of clear research premising and assumptions, clarity and precision, navigational change of the main concepts or variables and their prescribed relationship with each other (Moronkola, 2006). The whole essence of the conceptual framework or model of this study was to enable the forecasting of ideas and efforts in order to achieve a research goal.

Figure 2.1: Indigenous Knowledge Framework for Climate Change Adaptation



Source: Adapted from Olutayo and Odok, 2012

Illustratively, the conceptual framework of this study focused on the question of when forest dependent peoples of Cross River invest time and energy to avert a tragedy of the commons. Ostrom (2009) had earlier argued that forest or natural resource users are often not trapped in accelerated overuse of these resources; instead,

these users have invested time and energy in designing and implementing costly governance systems to increase the likelihood of sustaining these natural resources. A theoretical clarification that this conceptual framework has provided is that when expected benefits of managing a resource exceed the perceived costs of investing in better rules and norms for most users and their leaders, the probability of users' self-organizing is high (Ostrom, 2009; Olutayo, 2012). Hence, Ostrom further showed that although joint benefits may be created, self-organizing to sustain a resource usually costs time, and effort, and it can also result in a loss of short-term economic gains.

On the whole, a major challenge that this study had addressed is the loss of forests and natural resources therein. Largely within forest-dependent communities of Cross River State, Nigeria, understanding of the processes that lead to improvements in or deterioration of natural resources is limited, because experts who deliver programmes tend to use different concepts and language to describe and explain complex social-ecological systems (SEs) within these communities. The conceptual framework as adapted in this study was intended to organize findings, as isolated knowledge does not cumulate into meaningful understanding. Until recently, almost all other accepted theories have assumed that resource users will never self-organize themselves to maintain their resources and that it is governments that must impose solutions to manage resources (Ostrom, 2009). Research has confirmed that some government policies actually accelerate resource destruction, whereas in most cases resource users have invested their time and energy to achieve sustainability (Ostrom, 2009). The conceptual framework of this study identified key concepts and variables that affect the likelihood of self-organization in efforts to achieve a sustainable forest management within forest communities of Cross River State, Nigeria. The central feature of the conceptual framework in this study hinged on assumptions that explicate how rational individuals helplessly faced with the dilemma of being trapped in institutional forms galvanize and organize themselves to solve social dilemmas such as the over-exploiting of forest resources.

CHAPTER THREE

METHODOLOGY

3.1 Research Design

By methodology we mean a coherent and logical approach or process for undertaking particular types of tasks or solving particular problems. The methodological approach or design adopted for this study was Participatory Rural Appraisal (PRA)². It is a methodology for participatory action research which utilizes a range of participatory techniques and methods. This is a research approach that has traditionally been used to understand culture and to bring about new activities through new understandings of situations (Himeur, 2010; Schwalbe, 2005; Ake, 2009). The attempt here is to link this research back to climate change adaptation projects and programmes in forest-dependent Cross River. Participatory exercises in the study included: transects which identified paths, confirmed similarities-differences from identified paths; seasonal calendars which assessed sequences of events in nature and their relationship with the people; institutional analysis which assessed communities' interests, layout, infrastructures, demography, health and wealth-patterns. Also, key informant interviews were conducted to examine government response to indigenous forest-management practices. Furthermore, PRA methods are based on extensive use of qualitative research methods for collecting reliable data, hinged on the following principles: (a) use of multiple data sources and continued triangulation of data (this consists of verification of information by cross-checking with other sources); for instance, interviews conducted in the study were verified by other sources of information; and (b) data saturation - this implied a situation where further data collection provided little or no new information.

Thus, values and principles of PRA culminate to hold that communities know their situations best and so any analysis should be built on their knowledge of local conditions (Chiwaka and Yates, 2005). This design holds the potentials that forest-dependent communities in Cross River can be empowered to take charge of their own efforts to address their vulnerability to the effects of climate change. The essence of PRA is not only for communities to develop effective and robust climate change adaptation plans, but to motivate communities

² Holland and Blackburn have indicated that PRA is a qualitative research tool devised for use mainly within developing countries, is an ideal tool for carrying out research in community development and has the potential of reducing the gap between groups, be it education or status (Rutherford, Blackburn and Laura, 2000).

through the process and to enable them to constantly seek opportunities to enhance their resilience to difficult conditions. This research design recognized events at the national and international levels and how these impact on forest-dependent communities' vulnerability.

Consequently, this research design enabled the use of the output of local level analysis to inform national and international level action and policies as regards forest governance and climate change adaptation (Pain and Francis 2003). The design also provided insights into key aspects of vulnerability as there are diverse viewpoints about issues of climate change and its adaptation strategies among forest-dependent peoples and that they also possess positive cores which unleash positive energy and improvement to make sure that climate change adaptation programmes and activities succeed in their communities (Karakas, 2009; Jegede, 2002). Methods and techniques of investigation under this methodology studied *things* in their natural settings, attempted to make sense and to interpret them in terms of the meaning that the people themselves bring to such issues. PRA is used here as both an analysis and planning tool. The processes of this methodology has helped to provide insights on how forest-dependent communities express their knowledge and perceptions of the hazards affecting them, and how they have acted to reduce the impact that these hazards have on their lives, livelihoods and environment. This indeed is key to designing and implementing effective climate change adaptation (CCA) programmes within forest-dependent communities. This is based on the principle that poor forest-dependent peoples are not completely without abilities and means. Hence, development and humanitarian practitioners need to take into account the people's capacities and vulnerabilities if climate change adaptation interventions are to be relevant, sustainable and empowering (Himeur, 2010).

3.2 Population-Area of the Study

The population of this study comprised: 1) all forest-dependent communities (farmers/users) and indigenous peoples groups in Cross River State; 2) forest managers; 3) civil society organizations and NGOs concerned with environmental issues; 4) knowledge institutions; 5) policy makers and relevant government agencies. Specifically, forest communities in Akamkpa, Yakurr and Boki Local Government Areas constituted the area of study in this work.

Akamkpa is one of the original nine local government areas that made up Cross River State in 1987. It covers an area of about 4,300 square kilometres with a population of about 114,924 persons (Erim, 1990). The area is bounded in the north by Biase and Yakurr local

government areas, while Ikom, Etung and Obubra bound it to the North-East and North-West respectively. To the East it shares a common boundary with the Republic of Cameroon, and to the South and South-West, it is bounded by Odukpani and Akpabuyo local government areas respectively. Iko-Esai was the forest community in Akamkpa of interest in this study. It is located about eighty-four kilometres from Calabar. The people of Iko-Esai are predominantly farmers and hunters, and the area is blessed with abundant natural and forest resources. Prominent minerals found in the area include gold, granite, kaoline and copper. The area also houses the National Park and the Centre for Education, Research and Conservation of Primates and Nature (CECORPAN, 2012).

Boki is another local government area that constituted the study area. The area had a population of about 137,618 persons, with a land mass of 3,845 square kilometres (Petters, 1990). The local government area was created on August 12, 1991. Boki is bounded in the North by Obanliku and Obudu, while Ogoja local government area is to the West. The southern parts of the area share boundaries with Ikom and Etung local government areas, while the Republic of Cameroon borders the area on the south-eastern flank. Butatong community was the forest community in Boki of interest in this study. It is about 283 kilometres from Calabar. Economic potentials of the area include rich agricultural and mineral resources such as timber; solid mineral resources like limestone, granite and diamond.

Another local government area that constituted an area of interest in the study was Yakurr. Yakurr is one of the most thickly populated local government areas in Cross River State. It was created on May 8, 1989, first, as Ugep local government area. It is bounded in the west by Abi, in the east and south by Biase local government area, while to the north is Obubra local government. Agoi-Ibami was the forest community of interest in this study. The Agoi-Ibami people of Yakurr local government area are predominantly farmers. Other natural resources in the area include uranium and limestone.

3.3 Sample and Sampling Procedure

During the pilot study, forest-dependent communities in Cross River State were estimated and clustered into three zones based on forest-type. That is: Mangrove forest block, Ekuri forest block and Mbe/Afi forest block. In selecting the actual communities that were studied, communities within these three zones which met the inclusion criteria were purposively selected

as sample for the study. The following communities met the inclusion criteria: Iko-Esai (mangrove forest block); Agoi-Ibami (Ekuri forest block); and Butatong (Mbe/Afi forest block).

3.3.1 Inclusion criteria:

The inclusion criteria for forest-dependent communities in the study were:

1. Community must have at least 95 per cent of its population deriving income and livelihood from the forest.
2. Communities whose forest and woody vegetation resources include - high forests, woodland and bushlands.
3. Community must have an on-going forest conservation programme under the Cross River State Forestry Commission, the National Park or a Nature Conservation Organization.
4. Community must have a forest management framework based on local processes.

3.3.2 Exclusion criteria:

1. Communities with plantations and tree farm forests.
2. Communities lacking inclusion criteria 1), 2), 3) and 4) above.

3.4 Instrumentation

The instruments for data collection in the study included: data reviews from archives in Calabar, Enugu, Ogoja and Ibadan, historical books, reports, news articles, and maps; observations – direct and participant observation and do-it-yourself (DIY) activities. In-depth interviews, key informant interviews and questionnaire survey were also employed. Other data collection techniques that were used in the study were: stories and portraits, that is, colourful description of situations, proverbs, taboos, spirituality, ethno-local histories and trend analyses; diagrams – which included social or wellbeing mapping, photos, transects, seasonal calendars, institutional profiles and vulnerability ranking.

3.4.1 In-depth Interviews (IDIs)

Key community officials (three clan heads, six senior chiefs, three women leaders, three men leaders and three youth leaders); forest managers (three officials from the Cross River Forestry Commission; one official from the National Park); three officials from an international non-governmental organization responsible for nature conservation in Cross River State (CERCOPAN); five experts in forestry (Faculty of Agriculture, University of Calabar); and three policy makers (Cross River State House of Assembly members representing Iko-Esai (Akamkpa II), Agoi-Ibam (Yakurr), and Butatong (Boki II) were purposively selected for in-depth

interviews. The number of indepth interviews in this study depended on the questions explored and the information that was obtained. Altogether, there were thirty-three (33) indepth interviews in the study. Interviews continued until no important new information was provided again (data saturation).

3.4.2 *Key Informant Interviews (KIIs)*

Through the snowball sampling technique, seven key community leaders, five forest managers (who were experts in community forest management), and two climatologists were contacted for interview. Information elicited from these persons included issues on creation and utilization of forests before the advent of colonialism/modernity; documented indigenous knowledge for forest management; observed climate change based on climate parameters; vulnerability to weather extreme events; the people's perception to climate change and its adaptation strategies; and government response to community-based forest management practices. In all, there were fourteen (14) key informant interviews (KIIs) in the study.

3.4.3 *Questionnaire Survey*

The questionnaire for the study consisted of sections A and B. Section A was drawn to obtain the social and demographic characteristics of households in the study area. Section B was designed to gather data to determine the influence of indigenous belief systems and practices on climate change adaptation behaviour in forest-dependent communities of Cross River State, Nigeria.

The questionnaire was presented to experts in indigenous knowledge, rural sociology, forestry and those in community development for their suggestions and comments. Thereafter, this was presented to the researcher's supervisor for final scrutiny. Through this process, the criterion-related, content and construct validity of the instrument was enhanced. To achieve the reliability of this instrument, a pretest was conducted on selected sample elements in a different community (Bebi village, Obaniku local government area, Cross River) not involved in the actual study. The result for the test was $r = 0.88$, using Cronbach's Alpha at 0.05 significant level.

A multi-stage, non-probabilistic sampling procedure was used to select respondents for the questionnaire. In the first stage, the quota sampling technique was adopted in allocating 300 respondents to Iko-Esai (150) and Butatong (150) communities; and 200 respondents to Agoi-Ibami community. The second stage involved the selection of the actual households that

responded to the questionnaire. These households were selected through the purposive or criterion based sampling technique. This technique involved a situation where some households in Iko-Esai, Butatong and Agoi-Ibami were deliberately selected to reflect particular features. That is, households whose main source of monthly income is from forest resources. This selection was not intended to be statistically representative; instead, certain characteristics formed the basis for selection as these allowed detailed exploration and understanding of the central themes and puzzles of this study. These features relate to socio-demographic characteristics, specific experiences as regard forest utilization and cultivation, and roles of households in climate change adaptation projects or programmes. On the whole, the sampling procedure also allowed for the selection of households whose main source of monthly income is not from forest resources, though all households were fairly homogeneous. The selection of these households gave allowance for comparisons. Altogether, 459 respondents from households representing the three forest blocks in Cross River, mangrove forest block (Iko-Esai, 153 respondents), Ekuri forest block (Agoi-Ibami, 191 respondents), and Mbe/Afi forest block (Butatong, 115 respondents), eventually responded to the questionnaire survey.

3.4.4 Transects

Transect walks were carried out by the researcher to record and confirm accounts of climate change in the study area. The researcher followed identified paths and then counted occurrences along the paths and at the same time confirmed similarities and differences from identified paths. This instrument helped the researcher to further understand particular patterns along which climate conditions in forest-dependent Cross River followed and to view evidence of climate change over-the-years in these forest-dependent communities. This research instrument provided a good way of being able to clearly visualize climate change(s) that have taken place in Agoi-Ibami, Iko-Esai and Butatong in the past twenty-five (25) years.

3.4.5 Trend Analysis

Transect walks were complemented with trend analysis. This involved the collection of oral tradition to estimate uncertain climate events in the past that the people cannot clearly remember. Investigations here dwelt on how climate conditions were at the period when the forebears of Agoi-Ibami, Iko-Esai and Butatong firstly settled where they are settled now.

3.4.6 *Seasonal Calendar*

One of the ways in which indigenous knowledge for forests-management was organized in the study is in a circular map or 'seasonal calendar' that showed the sequences of events in nature and their relationships with the people of Agoi-Ibami, Iko-Esai and Butatong. In these communities, there were basically four major seasons; namely: early wet; late wet; early dry and late dry seasons. These seasons are related to the winds that blow at different times of the year. Each season has its own patterns of winds and weather, plant growth and cycles of animal life and death. Through the seasonal calendar technique, the researcher was able to understand climate patterns, and this understanding of seasonal cycles was found to be central to the lives of forest-dependent peoples of Cross River State.

3.4.7 *Institutional Analysis*

Institutions in this study were defined as organizations, sets of conventions, policies and legislations which regularized social behaviour (Chiwaka and Yates, 2005). It was recognized that institutions operated at all levels from the household level to the global or international level - and these levels influence climate change adaptation in forest-dependent communities. This, therefore, implied that the institutional environment is dynamic and changing. Processes such as political change, privatization, market liberalization and globalization were identified to have dramatic impact on the organizations and conventions of climate change adaptation and forest governance in general. In the study, institutional analysis was employed as a data collection technique to examine the institutional context of climate change adaptation in Agoi-Ibami, Iko-Esai and Butatong; that is, the 'transforming structures and processes' of climate change adaptation in these communities.

Participatory exercises in form of a baseline survey were carried out to ascertain key interests in forest governance in Agoi-Ibami, Iko-Esai and Butatong. As part of these exercises, the researcher used Venn diagrams to map out key institutions involved in forest management at the local level in these communities. Participating members in these exercises were asked to name the institutions which had been involved in forest management in their community. The names of identified institutions were written on circular pieces of paper. Institutions which were regarded as being mostly present in the community were placed near the centre of the card, while more distant institutions were placed further out. At this stage, lines were drawn on the diagram

to indicate linkages between various institutions. This allowed for a clear visual image of the institutional context of forest governance in Agoi-Ibami, Iko-Esai and Butatong communities.

This led to discussions with community members where the following issues were raised and discussed: do local institutions work together to create a dynamic and sustainable climate change adaptation plan or programme? How can this plan or programme complement or enhance other forest-management programmes that are already in existence? What are the possibilities for community members to work together with ‘outsiders’ in a participatory way to encourage shared goals and joint planning as regards climate change adaptation? Also, since institutional development involves a political context, how are community members coping with changing rules and conventions in forest governance? These personal discussions further probed if there were traditional institutions which are being threatened by climate change adaptation activities. And if so, is there a way this can be reduced by involving these institutions in climate change adaptation programme planning and implementation? Who are the key institutional partners, whether they were involved from the start of programmes planning and implementation?

3.4.8 Vulnerability Ranking

Threats to the sustainability of forestlands arise from multiple potential stressors. The most obvious threat was the conversion of forestland into other forms - with consequent loss of most forest resource values. For purposes of strategic forestlands assessment in Agoi-Ibami, Iko-Esai and Butatong, vulnerability ranking was used to assess the threat of conversion of forestlands to other development purposes. The tool was employed to gather information about specific factors that contribute to the vulnerability of the people to climate change effects as well as factors that make vulnerability less likely.

3.4.9 Social or Well-being Mapping

This tool was used to present information on communities’ development plan, land use plan, infrastructure, demography, ethno-linguistic groups, health and wealth patterns. The purpose of this method was to identify households on the basis of predefined indicators related to socio-economic conditions. This method concentrated on a relative ranking of the people’s socio-economic conditions (that is, in terms of those who are relatively well-off and those relatively worse-off), rather than making an absolute assessment. This helped to assess which households were benefiting from climate change adaptation programmes in terms of income, status, and power.

3.5 Validity of Instrument

The interview guides were presented to experts in rural and community development for their suggestions and comments. Thereafter, these were presented to the researcher's supervisor for final scrutiny.

3.6 Administration of Instrument

To ensure actual participation and for the proper coordination of the research activities, the researcher used some community members who were knowledgeable about local issues as research assistants. They were given some orientation on what to do and how to do it. The researcher took time to cross check the work of these research assistants to ensure that it was always in line with research ethics and procedures. Where there were doubts and uncertainties, clarifications were made. During dialogues and interviews, conscious efforts were made by the researcher to promote and develop dialogue naturally, flexibly and openly using the common language of the people, and using interpreters were necessary.

3.7 Method of Data Analysis

Since participatory rural appraisal (PRA) consisted of both qualitative and quantitative methods, the data analysis in this study was kept simple. Analysis was based on the research questions and scope of the study. Efforts were made to present findings of complex data that emerged in non-technical language. Data and information was arranged according to category, issue and question. For qualitative data that emerged from participatory activities, interviews and archives, data was analyzed using the circular hermeneutic process as reflected in ideas of flat ontology (Marston and Woodward, 2005; Kearney, 1984). A flat ontology rejects hierarchical models of scale and provides a framework for a strategic localism that challenges the idea that in order to be effective, climate change responses must be big or wide-reaching. Instead, the ideas hold that global impacts can be achieved by local adaptation efforts while remaining engaged with the contingencies and specificities of local contexts, concerns and capabilities.

The analysis proceeded from a naive understanding to an explicit understanding. This process allowed for an interpretation to emanate from a series of analytic steps – recognizing interrelationships between the interpreter and the interpretation. The analytical process in this study followed the following sequence: at the first stage which involved *naive reading* – archival records and interviews were transcribed and the whole text was read – thereby formulating a general perception of the text. The second stage involved *structural analysis* – where meaningful

patterns and connections were framed by reviewing transcripts line-by-line to identify themes that have emerged from the data that could not be readily explained. The third stage involved *interpretation-of-the-whole* – at this stage, attention was given to ensuring a comprehensive understanding of the findings. To fully capture the data's richness, a separate interpretation was performed to identify prevalent themes and sub-themes. This separate analysis was done to preserve the meaning that resided within cultural and historical contexts.

Exact quotes, especially from archival records and interviews were noted as these have been powerful elements of the report. Simple statistical techniques such as frequency counts and percentages analyses were employed in analyzing quantitative data. In all, since social science knowledge differs broadly from other knowledge forms (Olutayo, Liadi and Odok, 2013), the data analysis was primarily concerned with the construction of images of society and social processes within forest-dependent Cross River.

3.8 Ethical Considerations

Informed voluntary consent was obtained from all participants prior to interviews. Ethical approval was also obtained from relevant local authorities within forest-dependent communities in Cross River State. Contacts with existing government agencies and traditional institutions were made in advance to plan for possible referrals. Specifically, community heads of Agoi-Ibami, Iko-Esai and Butatong were contacted for permission before the study was conducted. Generally, the following ethical issues were taken into consideration during the study: 1) Respect for participants; 2) Justice - distributing benefits and burdens fairly; 3) Beneficence – obligation to ‘do good’ to participants/communities; and 4) Non-maleficence – obligation to avoid harm and risks to participants/communities.

3.9 Data Management (Secondary and Primary)

3.9.1 Secondary data

Secondary data collection began prior to primary field data collection. Secondary data included internet searches, relevant local documentation such as agency reports, socio-economic and demographic data about the population, health data (from health facilities), weather data (temperature, rainfall, and wind data), and relevant assessments, reports or evaluations including those from the forestry department, education, food security, health and weather-forecasting sectors. Secondary data included information on:

- a. extreme climate change events and other associated problems in both the place of origin and the place of current residence;
- b. the political and economic situation, and population movement;
- c. modernizing and cultural features (religion, ethnicity, languages, socio-economic status, literacy, demographics);
- d. relevant regulatory, legislative, judicial and forest-policing framework; and
- e. existing resources (food, water, shelter, health, psycho-social and community services, functioning community and cultural institutions, and educational, recreational and employment opportunities).

3.9.2 *Primary data*

After initial consultations, primary data was collected and managed using the procedures given below.

3.9.2.1 *Direct observation*

Key events and behaviours relevant to indigenous knowledge for forest-management and climate change adaptation and other related issues were observed during the data collection period. Observation involved looking, listening and recording. The researcher observed events and behaviours relevant to indigenous beliefs and practices for forest-management within the study area, as well as community service facilities. Observations were made at different times of the day and night and on different days of the week. Key informants assisted in the selection of important sites, and passers-by were consulted opportunistically when needed.

The following elements were recorded during observations:

- i) Date, day of week, time of day;
- ii) Observer;
- iii) Interpreter;
- iv) Key informant; and
- v) Finish time.

Notes also were taken on what is seen and heard, including:

- i) Activities witnessed;
- ii) People present (similarities and differences between them; actions; conversations; relationships to each other; beliefs or behaviours taking place); and
- iii) Location, layout, objects present, including any equipment for forest-management.

Photographs were taken where possible to indicate key themes and sites. Illicit forest activities were only photographed where information could not be obtained by other methods. With full consent of participants, ensured confidentiality was maintained. Care was taken not to put observers or participants at risk. Notes, records and other research materials were always stored in a secure and locked place.

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CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter contains the analysis and discussions of the study's findings based on data collected from forest-dependent communities in Cross River State. Results presented are based on data gathered from three forest-dependent communities in Cross River (Agoi-Ibami, 191; Butatong, 115; and Iko-Esai, 153), consisting of 459 respondents to a survey on the basis of household; 33 indepth interviews (IDIs); 12 key informant interviews (KIIs); archival records in National Archives - Ibadan and Enugu; Cross River State Library Archive - Calabar; National Museum Archive – Calabar. Other sources of primary data involved participatory do-it-yourself (DIY) activities such as social or wellbeing mapping, photos, transects, seasonal calendars, and institutional profiles. The outline of the presentation of results is based on the research objectives of the study. However, the first part is the socio-demographic characteristics of households.

4.2 Socio-demographic characteristics

Households' demographic and socio-economic characteristics are presented first to facilitate the interpretation of key variables relating to the incorporation of indigenous knowledge for forests-management into climate change adaptation programmes and activities in forest dependent communities of Cross River State, Nigeria. Table 4.1 below presents demographic characteristics of households in the study.

Table 4.1: Per cent distribution of households by demographic characteristics

Characteristics	Number	Per cent
<u>Sex of household head:</u>		
Male	283	66.3
Female	144	33.7
<u>Total number</u>	427**	100.0
<u>Age of respondents:</u>		
0 – 17 years	12	2.9
18 – 25 years	24	5.7
26 – 35 years	32	7.6
36 – 45 years	86	20.3
46 – 59 years	187	44.2
60 years – above	82	19.4
<u>Total number</u>	423**	100.0
<u>Years lived in community:</u>		
Since birth	217	50.5
Less than 1 year	11	2.6
1-5 years	36	8.4
6-10 years	63	14.6
11-15 years	18	4.1
16-20 years	24	5.6
21-25 years	11	2.6
≥ 26	50	11.6
<u>Total number</u>	430**	100.0
<u>Household monthly income:</u>		
≤ 999 NGN	18	6.2
1,000 – 4,999 NGN	27	9.2
5,000 – 9,999 NGN	35	12.0
10,000 – 19,999 NGN	96	33.0
20,000 – 29,999 NGN	43	14.8
30,000 – 49,999 NGN	18	6.2
50,000 – 99,999 NGN	32	11.0
≥ 100,000	22	7.6
<u>Total number</u>	291**	100.0
<u>Level of Education:</u>		
Postgraduate qualification	16	3.7
Degree/HND	48	11.1
NCE/OND or equivalent	64	14.8
SSCE or equivalent	48	11.1
Primary school or colonial standard	193	44.7
Only informal education	63	14.6
<u>Total number</u>	432**	100.0

<u>Religion:</u>		
Christianity	402	95.5
Traditional	19	4.5
<u>Total number</u>	421**	100.0
<u>Household size:</u>		
≤ 3 persons	104	25.6
4 – 6 persons	105	25.0
7 – 10 persons	140	33.7
11 – 14 persons	24	5.7
≥ 15 persons	42	10.0
<u>Total number</u>	415**	100.0
<u>Occupation of household head:</u>		
Farmer	87	46.5
Carpenter	22	11.8
Wood carver	2	1.1
Timber dealer	7	3.7
Forest guard/security	34	18.2
Clergy	8	4.3
Civil servant	13	6.9
Business	6	3.2
Student	8	4.3
<u>Total number</u>	187**	100.0

Source: field survey, 2012.

Note: **Computation was based on the actual responses without 'No' responses which were excluded from the computation. Total respondents in the survey were 459.

Table 4.1 summarized the demographic and other basic information of respondents. Among respondents, 66% were male and 34% were female. The average age was 40.5±4.5 years. Families were composed of three to ten persons. About 3% of households have one working member in government employment. Majority of the surveyed households (81.3%) depended mainly on agriculture and forest-related businesses because of little alternative employment. Only 1.3% of farm households obtain some income from off-farm activities such as business. About 77.3% of respondents affirmed that they have resolved to live *satisfactorily* with the prevailing conditions that confront their lives, while 12.6% believed that their current conditions are mediocre, and the remaining 8.1% are dissatisfied with their current living conditions. About 44.7% of respondents had at least primary school or the colonial *standard* school education; while about 14.6% had only informal education. Since the introduction of western education by 'oyebo' Christian missionaries in the early part of the twentieth century in these communities, western education was believed by respondents to have had profound influence on indigenous

knowledge systems, which also affect their ability to adapt quickly to ‘modern’ ways of solving natural-disaster related problems.

4.3. Physical and forest resource characteristics of Agoi-Ibami, Butatong and Iko-Esai communities

The maps in this section show what Agoi-Ibami, Butatong and Iko-Esai community members considered to be their community space. Community members have well-elaborated justifications for their forestland claims which are grounded in reference to social and political institutions that existed before the advent of colonialism, modernization and the 1978 Land Use Act. Community members have specific ideas of forestlands and resources that they occupy and which also belong to them. Map 4.1 below is of the Iko-Esai community with outlines of what constitute the communities’ physical and forest resources boundaries. In broad terms, forest dependent communities in Cross River were found to have deep historical antecedents – in prior grants of community titles, in shared occupation and use, and in long-standing patterns of interaction, cooperation, and collective identity formation before the advent of colonialism.

Community-level discussions during the study proceeded with the participants’ full understanding that the mapping of their land claims was a unique opportunity that required not a passive rendition of existing boundaries. Thus, participants audaciously and creatively appropriated this process; this allowed them finally to identify community forestland and resources that had been threatened by climate change. For instance a participant with nostalgia reminisced how his community started under ‘*Esai*’ tree, and then proceeded to take possession of the forestland under its control at present:

This community, Iko-Esai, all started under a tree called *Esai* in our language. This tree was located at the centre of the community where you now have the town square (including daily market shade, the Christian Cross and town hall). The tree provided shelter to hunters who later discovered that the land around the land was very fertile, and that is how our fore-fathers left their other settlements and then settled under the tree into order to cultivate the fertile land around the tree.

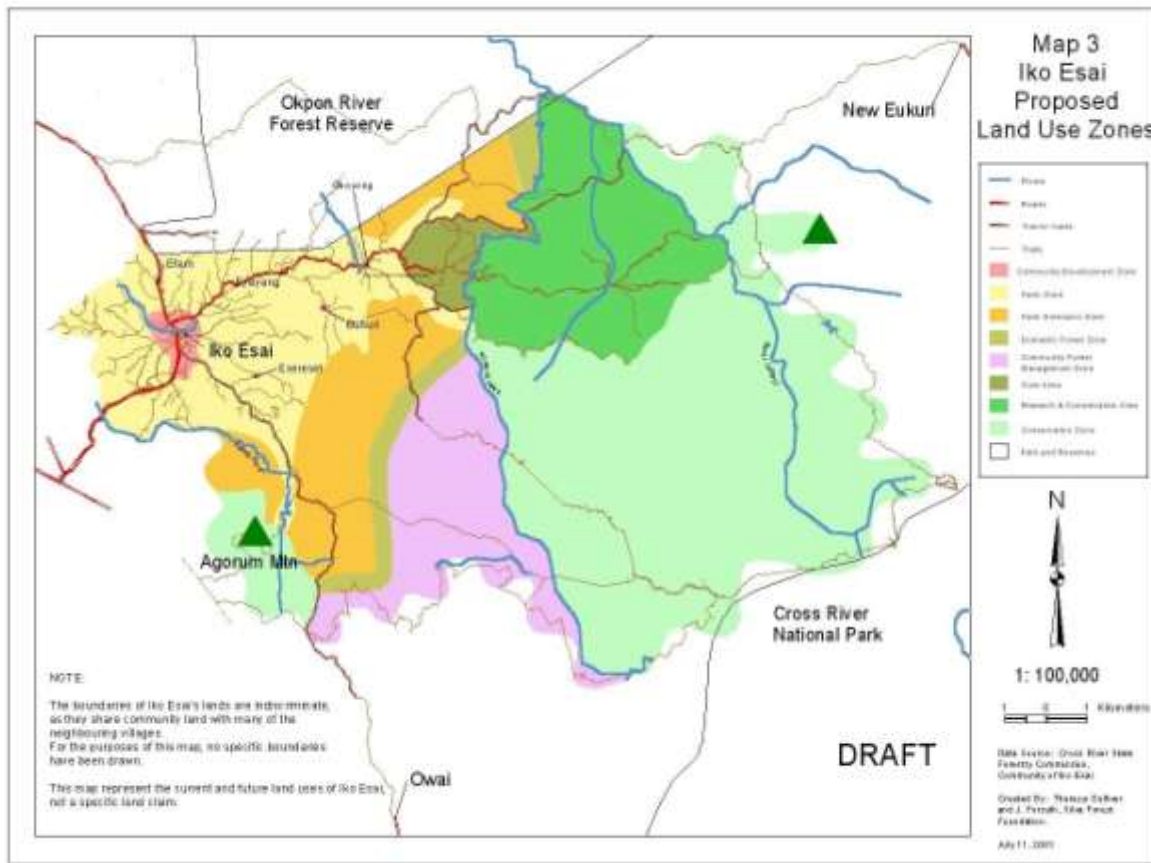
Male IDI/Iko-Esai/Chief/80 years /August 31, 2014

Photo 4.1: Images of space in Iko-Esai where the Esai tree was originally located



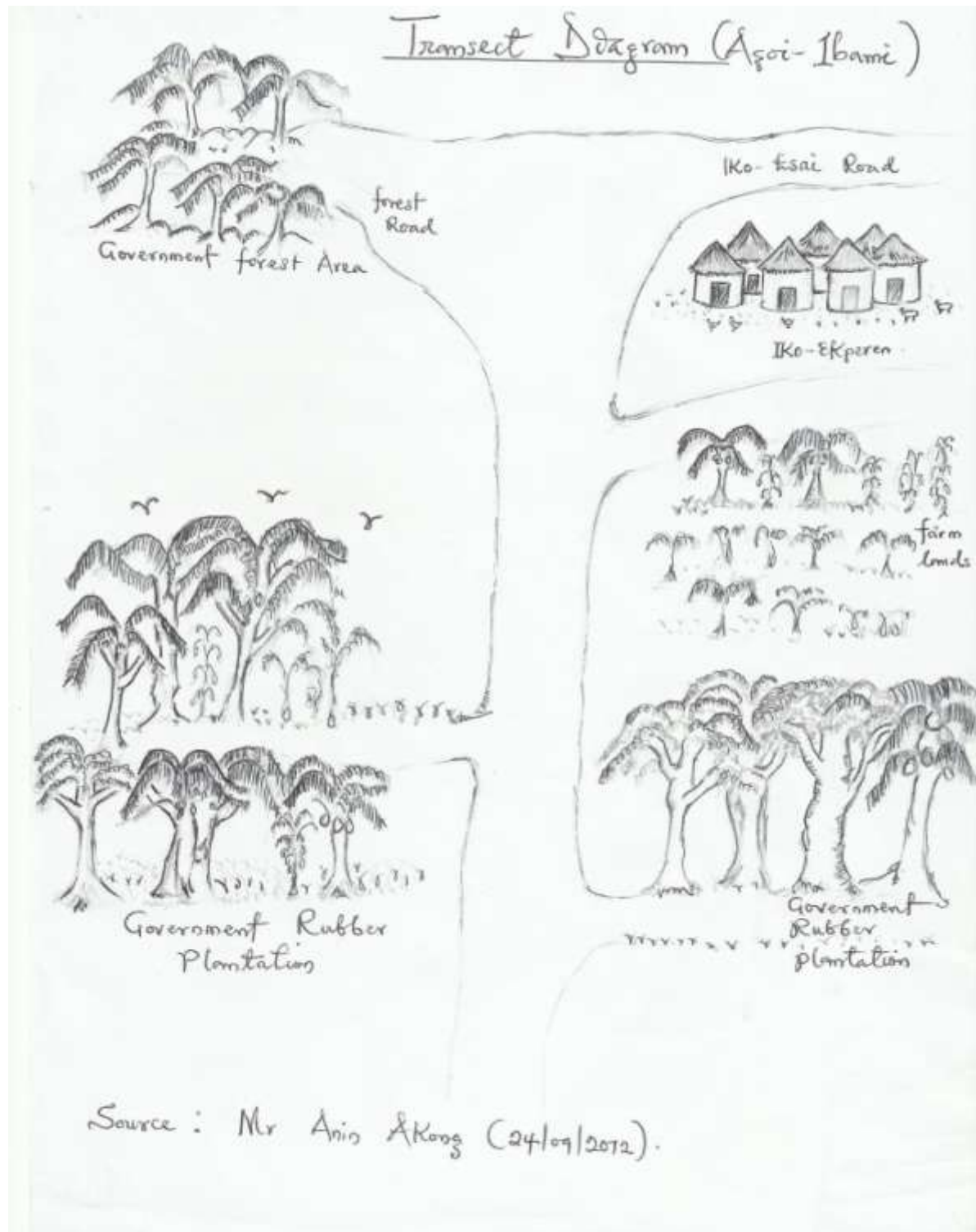
Source: Author, 2014

Map 4.1: Map showing Iko-Esai Land Use Zones



Source: Provided by CERCOPAN, 2012

Map 4.2: Map showing Agoi-Ibami Community Space



Source: Fieldwork, 2012

The main identified forest management regimes in Cross River State (CRS) include: national parks (covering roughly 4,000 Km²), these are under the control of the Federal Government; forest reserves (covering about 2700 Km²) controlled by the State Government; and community forest estate (estimated to cover about 1600 Km²) under the control of communities. Altogether, fourteen forest reserves exist in Cross River state. These are gazetted lands held by the State Government for the conservation and sustainable management and production of forest resources. The forest reserves are shown in the table below:

Table 4.2 Forest Reserves (FR) in Cross River State, Nigeria

S/n	Name	Location	Area km ²	%Area
1.	Afi FR	Boki	402.9	14.5
2.	Agoi FR	Akamkpa/Biase/Yakurr	44.4	1.6
3.	Cross River North FR	Etung	146.1	5.3
4.	Cross River South FR	Etung/Ikom	526.3	19
5.	Ekinta FR	Akamkpa/Akpabuyo	117.1	4
6.	Gabu FR	Yala	4.8	0.2
7.	Ikom Fuel Wood FR	Ikom	1.8	0.1
8.	Ikrigon FR	Ikom	5.8	0.2
9.	Lower Eyong FR	Odukpani	20.9	0.8
10.	Oban Block FR	Akamkpa/Odukpani	736.6	26.6
11.	Ukpon FR	Obubra/Yakurr	315.7	11.4
12.	Umon Ndealichi FR	Biase/Odukpani	112.0	4
13.	Uwet Odot FR	Akamkpa/Biase/Odukpa	302.8	11
14.	Yache FR	Yala	36.8	13
Total			2,773.6	100

Source: Adapted from data of Cross River State Forestry Commission, 2012

The sections below provide answers to the research question. The study's results are further presented following the sequence in which the research objectives were stated:

4.4 Indigenous beliefs and practices for forest-management in forest dependent Cross River

A key theme that reoccurred in the study was the fact that indigenous knowledge (IK) for forests-management in forest-dependent Cross River is '*at risk of becoming extinct*'. According to one interviewee:

We have lost almost everything. Our traditional ways of doing things are at risk of becoming extinct. We no longer know our traditional wise-sayings and proverbs. Our people have lost traditional ways of farming; it is what outsiders now bring to us that we follow; there is now a *shabby* order in the way our forest is managed. Our forefathers lived in total connection and harmony with the forest and the whole natural environment...they understand and know the rules of forestlands. Today, that closeness with forestlands is washing away in Iko-Esai. This is because we now have different irreconcilable ways of life and people in our community.

Male IDI/Iko-Esai/paramount chief/58 years /September 23, 2012

The description here no doubt resembles Kent Redford's image of an idealized 'ecologically noble savage', where he showed that the indigenous people's world is collective, communal, human, respectful of nature and wise; whilst the western 'modern' world is greedy, destructive, individualistic, and enemy of nature (Haselgrove, 1995). Findings established and reaffirmed the assertion that indigenous knowledge for forest-management is at '*risk of extinction*' because oral paths are being blocked and community people no longer live in homogenous community blocks. A respondent in Butatong used the following proverb to explain how this blockage emerged: '*n-te-nten owanaton*' (giving someone a space to sit comfortably in one's compound can lead to the takeover of the owner's compound by the visitor who had been given a space). Another respondent reacted thus:

A lot of things have been destroyed in our community since the Europeans came into our community. For instance, we use to have a *god* carved from a tree commonly known as *kefe ofa* – known also as the tree of luke. This tree as we know it was very powerful and when someone rubs it on his or her body, it makes one fertile, it cures diseases and could have even cured *ebola* if that knowledge was still with us. But when the Europeans came into our community, the knowledge on how to use the tree for healing and other helpful purposes had been lost. Some Europeans even had to buy some important images of this god and take them to their country. Our people now do not have any interest again in tracing roots and trees.

Male KII/Butatong/farmer/70 years/August 22, 2014

This response further entrenched the rarity of documenting indigenous knowledge systems in Africa³. From the study, it was showed that IK for forest-management is transmitted, disseminated and preserved when elders teach it to their children. An interviewee recounted the powerful influence of beliefs and myths on the everyday social life of the people. According to him, there was this story about *'keshi-oluo'*⁴:

...where in the olden days here in Butatong, this stream (keshi-oluo) was revered and feared among our people. The stream was associated with a lot of superstitious stories and happenings, and no one dared to question the truthfulness of these stories because all that was said about the stories and histories that surround this stream were considered true. There was this story of a hunter who was returning from hunting very early in the morning; and on reaching this stream, the man was very pressed and he branched aside the road near the stream to excrete, and while excreting, he heard some people beside him making serious noise and he then hid himself to see who the people were. When he saw the people as they approached him, he realized that some of the people were having just one leg, some had no head, some no legs, while others had two heads, some had head of wild animals, there were all manner of creatures, wearing human form in the crowd. The hunter was frightened but he was able to hide himself properly until these creatures eventually got into this *'keshi-oluo'* where they all took their bath and immediately they took their bath in that stream, that is how each of those deformed creature was transformed to a perfect human being and when all of them had taken their bath in the stream, they now moved to the village market, because that day was the village market day. It was right from that moment that our people discovered that that stream has great supernatural powers and herbalists started using the water from the stream to heal people of all kinds of diseases.

Male IDI/Butatong/farmer/78 years/August 25, 2014

³ It is commonly believed that, in Africa, indigenous knowledge provides valuable insights on how communities have interacted with their local environment. Unfortunately, their indigenous knowledge systems have not been systematically recorded and are therefore not readily accessible to policy makers, researchers and development agents even though several writers have provided detailed overviews of indigenous knowledge systems in agricultural development, pastoral management, and agro-forestry (Rajasekaran and Warren, 1991). This 'uncertain status' of indigenous knowledge in the African continent is of great concern. According to Warren (1992), "very little of this knowledge has been recorded, yet it represents an immensely valuable data base that provides humankind with insights on how numerous communities have interacted with their changing environment including its floral and faunal resources".

⁴ *'Keshi-oluo'* is laterally interpreted to mean 'the stream of the devil' in Butatong (eastern *Bokyi* language).

Photo 4.2: One of the streams in Butatong in which *Keshi-oluo* flow into



Source: Author, 2014

Indigenous knowledge for forest-management among forest peoples of Cross River State was embedded in a complex religious and moral system. The following were indigenous practices that ensured the sustainable utilization and exploitation of forest resources within forest-dependent communities of Cross River State: preservation of special species of trees like ‘iroko’ and ‘cotton’ trees as homes of spirits; preservation of portion of land with big rocks as homes of spirits; folklore of not eating new yam before the appeasement of the gods through a ‘new yam festival’; the practice of shifting cultivation and crop rotation; folklore of not hunting certain animals or felling of certain trees as agents of the gods; non-felling of immature trees especially for construction; not wearing of footwear to the bank of a community drinking stream; weeding of farmlands instead of spraying chemicals; making of heaps instead of ridges; use of certain leaves for medicine; preservation of forestland around drinking water sources; clearing of road path to community streams and toilets; land inheritance from parents to children; prohibitions of outright land sale to especially external and non-communal interests.

To the people, sustainable forest management is vital because they recognized that if the forest is used wisely, it would continue to be useful to their children in the future. A respondent affirmed in an interview session:

‘Kejune kekpo’. What I mean here is that forest do not disappoint any one. Whatever you plant in the forest brings good yields. Forest is therefore the greatest legacy we can leave for our children.

Male IDI/Butatong/Community leader/63 years /August 23, 2014

Another participant reiterated the importance of maintaining balance with the environment in the following way:

'Eya bashua ne keshn oyin ketem ke lobee'. What I'm trying to say means that 'if a river overflows its bank, and the river is still noisy, it is then difficult to know where the water is deep in the river'. We are indeed in difficult and dangerous times in this our world today because we have problems that are overflowing their banks, and yet there is so much noise that does not allow for sober reflection on how to solve these problems. Our grand-fathers developed distinctive methods and practices that enabled them solve the problems that confronted them in strategic manners.

Male IDI/Butatong/paramount chief/84 years/August 26, 2014

Forest-dependent communities in Cross River used a variety of innovative, effective, and in some cases, unique indigenous knowledge approaches to environmental conservation in general. Some of the approaches, such as shifting cultivation (*erometima* in Iko-Esai), mixed cropping; intercropping and precision farming (*atro-osen* in Iko-Esai) were commonplace in all the communities studied. A participant testified as follows:

Atro-osen is where we locate a special portion of land that we believed is more fertile than others. This is where we plant crops like plantain, yam, banana, cassava, maize. I can testify that this kind of soil and planting is very good, it usually brings good yields. I have planted in such a special portion of land and I had very big punches of plantain.

Male IDI/Iko-Esai/farmer/65 years /August 31, 2014

However, many of the approaches were peculiar to these local environments and cultures and could not easily be replicated elsewhere. For instance, the cultivation technique known as *kefat-owo* could only have evolved in an environment like the Mbe Highlands in eastern Boki where unusually heavy rain pounded on the landscape destroying crops planted on hillsides. The Butatong people, believed to have lived in the steep slopes of Mbe Highlands since time immemorial, built the system to protect their farmlands against erosion and to trap the rapid runoff to improve the moisture of the soil, as well as to conserve soil fertility by composting. The following Butatong proverb explains the importance of this practice: *'mmo buko emenke beke ewaii'* ('stop wasting oil on fowl's legs' – this entrenched the need to effectively and productively use only fertile portions of forestlands rather than cultivating portions that are not fertile). The *kefat-owo* system illustrated the multi-purpose function of many of the indigenous knowledge approaches to forest-management. Among forest-dependent peoples of Cross River, it is difficult to isolate only one function, or role, or to say where one function ends and another

begins. For example, many of the traditional forest-management measures were also measures for dealing with natural disasters or extreme climate change events such as drought and floods. For instance, the prohibition not to urinate and excrete in streams and rivers was a measure to ensure that water sources are kept pure and clean for community people during times of drought especially. The rationale for this prohibition was expressed thus:

It was believed among our people that anybody who urinates or excretes in the river or stream is directly causing harm to him or herself. This is because if he or she does not take the water, the person's wife or husband, or brother or sister, or extended family member, will certainly drink from the waters of that stream or river in which the person had polluted.

Male IDI/Iko-Esai/village elder/80 years /August 31, 2014

However, the people also recognized the significance of the forest as both an economic and political commodity. Forests according to them, especially in this era of 'ecological rationality'⁵ are treated as any other political commodities such as the power to tax, and the discretion over the locating of infrastructure, in this way modern forest-management practices are used to discriminate between allies and enemies.

A forest-management measure such as mixed cropping or intercropping maize with pumpkins, maize with cocoyam, and so on, is not only a conservation measure in that it conserves soil fertility through the benefits of crop symbiotic relationships such as nitrogen fixation and weed control, it also minimized the risk of total crop failure through hazards as it spreads the risk by having more than one crop variety in the farm.

The effects of indigenous knowledge for forest-management within forest-dependent Cross River also tend to pervade the entire environment. For instance, in all the studied communities, certain forests were protected as shrines to be used for worship and other rituals. Such protected areas in fact ended up having multiple roles and functions, as they also influenced other elements of the environment - like biodiversity, land use and management, and so on. The table below shows the estimated size of some community forests in Cross River State.

⁵ This position as expressed by respondents reinvigorated the main thrust of the ecological modernization theory (Mol and Spaargaren, 2002) which holds that as socio-economic development advances and society becomes developed, especially during the era of 'late industrial society', cultural patterns, institutional arrangements, and organizational society would become 'environmentally rational'. This implies that decision-makers would take into account environmental criteria in order to support and formulate policies and programmes that minimise environmental damage.

Table 4.3 Profile and structure of land use types in some community forest estates, CRS

S/n	Community/settlement	Vegetation/land use type	Size sq km
1.	Agoi-Ekpo (Tekowa)	High forest Secondary forest Swamp land Total Land Area	18.9 18.7 1.7 39.3
2.	Iko-Ekperem/Owai	High forest Secondary forest Total Land Area	89.3 52.7 141.9
3.	Abo I	High forest Secondary forest Swamp land Total Land Area	34.5 13.3 1 48.8
4.	Abo Inland	High forest Secondary forest Total Land Area	44.8 17.2 62.0
5.	Bashu	High forest Secondary forest Total Land Area	12.0 5.2 17.1

Source: Adapted from CRSFC, 2010 and Bisong, 2007

Because of this interconnectedness and ‘cross-cutting’ nature of indigenous knowledge for forest-management within forest-dependent Cross River, it is convenient to describe the different indigenous knowledge measures for environmental conservation in general regardless of their intended or perceived purpose and examine how they relate to all areas of forests management including land management and use, wetlands and biodiversity conservation.

Under indigenous knowledge practices within forest-dependent Cross River, it was found that what may appear to be a purely forest management issue may have implications for land management, wetlands and biodiversity conservation. Hence, compartmentalization was difficult if not impossible in this area of indigenous knowledge within forest-dependent Cross River. Let us look at the different elements of forests management within forest-dependent Cross River separately, but we must also bear in mind their ‘cross-cutting’ nature.

4.4.1 Land management

Land management under indigenous knowledge in forest-dependent Cross River involved a number of farming practices and technologies that had repercussions across the whole spectrum of sustainable forest management. These include practices such as slash-and-burn, shifting cultivation, use of grass strips, intercropping, selective cultivation, and a number of other technologies and practices that seek to optimize food production under varying climatic and environmental conditions. In addition, in almost all the communities studied, cultivation was

combined with small-scale livestock rearing. Use of grass strips was another form of land management within forest-dependent Cross River. In Butatong and Iko-Esai, these were common traditional land management systems. Pieces of land, about one to twenty-fifty metres wide, with traditional vegetation are usually left between farms to control soil erosion and conserve biodiversity. The strips also serve as sources of medicinal plants.

Photo 4.3: Vegetation left between farms to conserve biodiversity and control erosion and small-scale livestock rearing in Iko-Esai



Source: Author, 2014

4.4.2 Simple tools

In identifying and examining indigenous knowledge for forest-management in forest-dependent Cross River, respondents stressed the need to begin at the beginning - with land clearing and cultivation. This was done using simple tools, mostly crude iron blades made by the village blacksmith. A village blacksmith remarked:

'Akikiwomute aawkroogange avararerim aaedui-parazi obomuachi, chuchunudu. Ehu eroeho nerehie chiraquent uwummuwachi nimpi nkwo' (As a man, you need to have a gun, a knife and hoe for your family to survive and to be able to eat tomorrow).

Male IDI/Iko-Esai/village blacksmith/63 years /August 31, 2014

Participants reminisced that their communities did not have modern power saws, tractors and ploughs. Their simple implements were believed not to be capable of cutting big trees or clearing large tracts of land easily, or killing animals not needed for immediate consumption. A respondent observed as follows:

Our people actually had this belief in the olden days that the animals and plants in the forest will certainly reproduce themselves, there was no fear in them that these animals and plants will finish one day. The fear for the possible extinction of certain animals and plants in our forest actually begun when more sophisticated tools for hunting and forest exploitation emerged.

Female IDI/Iko-Esai/village blacksmith/52 years /August 31, 2014

This non-availability of sophisticated tools for hunting and forest exploitation was a mixed blessing because the use of these rudimentary tools was labour intensive, and it also meant that big trees and forests were left largely untouched. It also helped control soil erosion as there was minimum tillage and only the top soil was disturbed. This, too, helped in nature conservation because forests in general were left intact.

Photo 4.4 Rudimentary hunting and forest exploitation tools fabricated by village blacksmiths



Source: Author, 2014

4.4.3 *Slash-and-burn*

Given the simple tools in use, the most popular method of land clearance was the ‘slash-and-burn’ method. This entails that the bushes are cleared and then collected in heaps and burned. Alternatively, a small bush area would simply be set on fire, which was carefully controlled. This was the only method that the traditional farmers in forest-dependent Cross River could use with ease to cultivate sizable pieces of land. The method also assisted in controlling disease vectors. Even though the fires might also destroy some nutrients and living organisms; nonetheless, the land was left to lie fallow under shifting cultivation and was able to regenerate.

4.4.3 *Shifting cultivation*

Shifting cultivation was a major form of land use and management among forest-communities of Cross River State. This practice known also as ‘*erometima*’ in Iko-Esai described a condition where a portion of cultivated land is not cultivated again during the subsequent farming seasons until after about ‘three to four years’⁶. This indigenous practice for forest management involved cultivating one spot of land, then leaving it lie fallow after a few years of cropping. Because land was freely available this practice was possible and convenient. Farmers could easily move from one piece of land to another to allow for natural rejuvenation of the land. In mountainous areas, such as the Mbe Mountains of Butatong, shifting cultivation also

⁶ This was according to an elderly respondent in Iko-Esai village.

helped to control gully erosion by allowing natural vegetation to reclaim the land. However, in recent history, as population increased and land became not so freely available, the length of the fallow period had diminished. And, in many cases, shifting cultivation has given way to sedentary farming.

Even as land became less freely available to support shifting cultivation, forest dependent peoples of Cross River have developed a number of indigenous knowledge practices in land management that promoted sustainable forest management. These practices included mixed cropping and intercropping, minimal tillage and agro-forestry, zoning, fisheries conservation, and a number of land use and cultivation technologies that were primarily aimed at optimizing on the available land and conserving the moisture and fertility of the soil. Let us briefly describe some of the indigenous forest management practices that supported shifting cultivation and likewise underlined the value of sustainable forest management in forest dependent communities of Cross River State, Nigeria.

4.4.3.1 Land ownership

It is necessary to note that before the advent of colonialism, land in general within forest communities of Cross River State was communally owned and equitably available to all members of the community⁷. A respondent explained this claim in the following way:

We believed that everything in this world is created and owned by ‘Wase’ (God). This belief has helped us curb the practice that make people take over forestlands that they do not have the power to cultivate. This allowed people not to over-use a particular piece of land over and over again even when such land is no more fertile. This practice supported shifting cultivation, because it ensures that one does not need to use a particular piece of land continuously for too long.

Male IDI/Iko-Esai/80 years /August 31, 2014

The term ‘community’ as used in this sense refers not only to the whole of these forest dependent communities, but also to any part of them with a politically and socially integral life of its own. Communal here also refers to that part of the land of each of these communities which still remains undivided among its members.

⁷ At the time, forest-dependent peoples of Cross River had only user-rights but not outright ownership of land rights. In all the communities studied, they could not be any deal or transaction in land without the consent of the elders. However, the present-day individual land ownership rights, backed by legislation and land registration, as well as population increase have led to wanton forest destruction and land degradation. Also, the elders have lost their traditional control over forests and lands in all the communities surveyed.

Generally, the land within the geographical limit of forest dependent communities of Cross River was found to be divided into unused land (this was the collective property of the community or group as a whole); sacred forests or groves; unused land belonging to extended-families; market places (collective property of local communities); used or unused land belonging to individual families, and land belonging to individuals.

In this way, no adult member of these communities who has need of land goes without it. A young man, on reaching the age of marriage, is usually allotted land by his father out of the plot of land he controls as the head of his family. This land would therefore belong to the young man and his descendants in perpetuity as long as it is in beneficial occupation⁸. The idea of transfer of land by sale was foreign to forest dependent communities of Cross River. Aligning to the history of land sale in Nigeria, it was unequivocally asserted that the practice of transfer of land by sale was traceable to European merchants who obtained grants of land for valuable considerations from the local king, even before the cession of the island of Lagos in 1861 to the British crown⁹.

4.4.3.2 *Mixed cropping*

Besides relying on forest or bush vegetation in shifting cultivation to regenerate the soil, mixed cropping and intercropping farming technologies were adopted among forest-dependent peoples of Cross River to optimize the use of naturally available soil nutrients and to promote high yields. Mixing or intercropping maize with crops like cassava, okro, cocoyam and yam was a common practice. To forest communities of Cross River, this promoted efficient labour utilization and lessened the risk of total crop failure since the chances were that if one of the crops succumbed to stress others would survive. Mixed cropping or intercropping stabilized yields, preserved the soil and made it possible to harvest different crops at the same time. The primary advantage of this practice according to the people lied on the fact that there was a reduction in susceptibility of the crops to pests and diseases and a better use of forestlands and the environment in general as the combination of species grown had different light requirements and explored different depths of soil. Likewise, they also tended to provide a complete

⁸ See Fadipe (1970), *The Sociology of the Yoruba*. Ibadan: Ibadan University Press. This practice is also found among the Yorubas, where Fadipe showed that the right to resume possession on behalf of the group or to occupy personal land that has been abandoned or allowed to go out of cultivation is exercised very rarely owing to the possibility of generating serious problems should the previous holder subsequently return to claim it.

⁹ See Fadipe, 1970

vegetation canopy, although at different heights, and thus broke up heavy rainfall, protecting the soil as well as controlling weed growth.

Photo 4.5 Mixing or intercropping of cassava, okro, maize, cocoyam, banana and yam in Butatong and Iko-Esai



Source: Author, 2014

4.4.3.3 *Minimal tillage*

Minimum tillage and agro-forestry were also indigenous practices for forest-management in forest-dependent Cross River¹⁰. To most respondents and participants, these methods of forestland use and management were adopted to promote higher yields. In Butatong and Iko-Esai - where the methods were common - bushes or forests were cleared and the vegetation burned and the resulting ash used as the initial fertilizer. Only the area where the collected vegetation was placed and burned was tilled and planted. Also, branches of the leguminous acacia tree were usually burned in heaps and pumpkins were planted on the ashy spots. This often gave very high yields because of the nutrients released into the soil by the ash of the burned branches. The acacia trees were not felled; only their branches were cut, leaving the tree to regenerate new branches for future use. This was a kind of agro-forestry practice. The people also practiced what can be described as *precision farming*. This is a practice where portions of the forest or bush that are identified as more fertile than others are cultivated. For instance, spots that used to have anthills or household wastes were selected for planting.

4.4.3.4 *Zoning*

All of the forest-dependent communities in the study 'zoned' their land according to ecological factors. In Iko-Esai and Butatong for example, community land is zoned - using the higher grounds for homestead settlements and the lower grounds closer to rivers and water bodies for cultivation.

¹⁰ Agro-forestry system involves various combinations of woody and herbaceous vegetation with agricultural crops. It could result in multiple agronomic, environmental, and socio-economic benefits, and conserve biodiversity.

4.4.3.5 *Indigenous forests management*

Intimately tied to indigenous knowledge land management practices was the management or conservation of forests. Using indigenous knowledge know-how as well as rules, prohibitions and taboos - all the communities practiced forest conservation. In the communities studied, most of the farming was done on the edges of forests, leaving the thick forests untouched. This helped protect indigenous plants in the thick forests, which take a long time to mature. It also prevented land degradation. Likewise, there were tree and plant species that were considered sacred, or as totems, or were associated with special importance. These include trees like *Aformosia elata* (locally known as Aformosia); *Funtumia spp.*; and *Irving spp.* For these reasons, such plant species were protected. For instance, there are trees that were not supposed to be cut down or their wood used for fuel ('*dienam-natake*' (Iko-Esai) tree was believed to have a powerful scent that once a man rubs the leaves or bark of the tree on his clothes or his room, and a woman perceives the scent, such a woman will automatically 'fall-in-love' with the man and follow the man to do whatsoever the man wants the woman to do).

There were also trees that were protected from being used as sources of building materials; these include '*okebomi*' (Iko-Esai), a tree believed to increase the sexual drive or libido of a man or woman when the bark is cooked and the solution taken. It is also believed that the tree can cure malaria when the bark is cooked and mixed with 'lipton tea'. In almost all the communities studied, there were also plants and trees that were associated with shrines and water sources that were therefore protected. A participant described some of these trees in the following way:

The '*okpet-owane*' tree was a greatly revered tree among our people, because this tree is a symbol of peace among our people. There is a special day in our community that comes up around the 29th Day of September every year known as the peace oath day. This day also coincides with our new yam festival. This is a day where all our traditional chiefs usually wear a special uniform to demonstrate unity and oneness, then all of them will walk and sit on stones around the village squad known as '*eyoun*'- interpretatively, the name of the squad means 'a place where our old fathers lived and were buried'. Before getting to the village squad, the traditional chiefs would gather in a special location where all of them would be required to put the root of '*okpet-owane*' in their mouth and then hold hands in a straight line and then walk to '*eyoun*', the village squad. Nobody says a word to anybody all through this walk, it is at '*eyoun*' that they would now remove the root of '*okpet-owane*' tree from their mouths and they begin to drink palm-wine from the same cow-horn. It is during this drinking time that they would now discuss issues that threaten the clan's peace and unity. Issues for discussion here usually range from land trespass issues to other sensitive issues. Also trees like '*ehurere*' (iroko), '*ngende*' (opepe) were used as shrines. For example, if a person is sick of diseases like epilepsy or stroke, such a person would be taken to any of these trees to be bathed. The person is expected to go with a white chicken, soap, rapper, and a washing basin, and the sick person will be bathed under the tree, and once the bath has been carried out, the person is expected to leave all these items under the tree.

Male IDI/Iko-Esai/farmer/51 years /August 31, 2014

The communities valued trees for their beauty and products which included fruits and berries, medicine, fuel wood and construction materials. The various communities in forest dependent Cross River managed and conserved these trees by harvesting them in a manner that allowed them to regenerate. There were restraints on the customary right of access to forests, thus checking the indiscriminate use of forest resources. Certain trees were also protected in order to meet the future energy needs of households. A participant reflected as follows:

Firewood is the main source of energy for us here. There are special trees that one is only allowed to use to cook, not all fire-woods are suitable for cooking eatable foods in our culture. This is because not all fire-woods produce likeable smoke; some trees produce more dangerous smoke than others¹¹.

Male IDI/Iko-Esai/46 years /September 1, 2014

There were also taboos and restrictions on gathering of plants, which limited to some degree the harvesting of plant resources. Some taboos prevented women and young people from

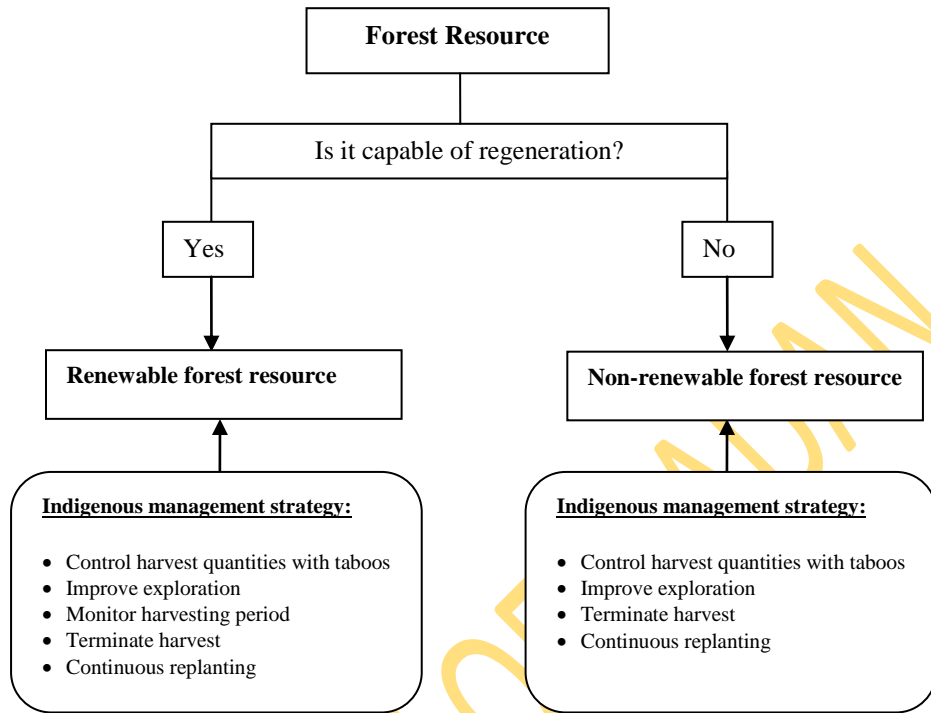
¹¹ This claim that not all trees produce likeable and healthy smoke (gases), was collaborated in an interview with a petroleum engineer in Calabar, who noted that fire-woods from certain trees do produce dangerous 'polynuclear aromatic hydro-carbons' (PAHs), including cyclic benlyn, a dangerous substance to human health.

cutting down certain trees. Menstruating girls and women for instance, were prohibited from collecting medicinal plants. It is believed that if they did so it would reduce the healing power of the plants. These taboos ensured the conservation of many species. Also, big trees were not cut for domestic purposes. Only small shrubs, which regenerate quickly, were used for the building of houses for example. Among communities with aquatic plants - such as papyrus reeds and water reeds, these were harvested sustainably and commonly used in making baskets, sleeping mats, fish cages and for thatching roofs.

Generally, the people's classification of forest resources was similar with that of the biological sciences where resources are classified as biotic and abiotic¹². In the classification of forest resources, forest dependent peoples of Cross River extended the classification to include what the resources are *capable* or *not capable* of – that is, what is the economic interest of these resources to the people. Their concern was that as they continue to exploit these resources, whether these resources would be able to regenerate, or not. Thus, the broad classification of forest-resources within forest dependent Cross River was in terms of *renewable* and *non-renewable* forest resources. Figure 4.1 below illustrates how the people distinguished renewable and non-renewable resources, as well as some strategic indigenous ways employed for the management of these resources.

¹² This classification is common to all biological texts. It simply illustrates whether a resource is composed of living or non-living materials and whether the resource itself is living or not.

Figure 4.1: Indigenous strategies for managing renewable and non-renewable forest resources in forest-dependent Cross River, Nigeria



Source: Fieldwork, 2013

Within forest dependent Cross River, attention is focused mostly on non-renewable forest resources as a matter of principle, while at the same time sustainably managing renewable forest resources because these hold more promise for sustainability. Forest dependent peoples of Cross River were found to believe that although renewable resources have the potential to regenerate, human exploitation rates far exceed their regeneration rates; thus, they always ensure that exploitation techniques are compatible with resources regenerative capacities. However, respondents reminisced that the creation of forest reserves in Nigeria, including forest-dependent Cross River, by the colonial administration was guided by ‘the single objective of producing timber for consumption in metropolitan cities and countries’.

In Iko- Esai (Bukuri, Esereset, Eyeyeng, Efem, and Okoyong), not just anyone could go into certain forest areas. Most of the centuries-old forests areas or zones were the hunting

grounds for kings and for some special rituals. Within these forests are trees that are ‘steamed and washed for good luck and health’¹³. Trees, according to a respondent:

‘...are your friends and knowing them changes your fortunes’
(Male IDI/Iko-Esai/65 years /September 16, 2012).

He pointed to a tree, which he says ‘grinds itself from the inside’; the flour-like substance comes out of the hollows of the tree which when harvested and used cures heartaches. He also said that the substance stops witchcraft and whoever bewitches the person that uses the substance gets bewitched in return. He said there is another tree that has many uses; that in moonlight, it shines. When crushed and mixed with other herbs, it relieves stroke. There is another tree with a Tanzanian name, the *umkhondweni*: “...this tree brings back your wife if she deserted you”, it is believed. He described that “you grind it, make a hole out of a short stick, place it there and then blow it and whisper her name. And it is done”¹⁴.

4.4.3.6 *Indigenous wetlands management practices*

Within almost all the communities studied - marshes and swamps - were generally found at the edges of rivers, streams, ponds, lakes, and along floodplains. These were important habitats for biodiversity as many species of flora and fauna thrive in them. Even though much attention was not devoted to wetlands in this study, what came out clear among forest dependent peoples of Cross River was the fact that wetlands are important ecosystems which according to them lessen soil erosion and also improve the quality of water as they serve as sites where surface water can seep into the ground and replenish the groundwater systems. It was also clear that in recent times, wetlands have been lost or encroached upon in the three communities studied.

¹³ This was an account of a traditional healer in Iko-Esai who harvests medicinal plants in the community forest management zone.

¹⁴ This respondent cursorily argued that the “white man’s Viagra is unfair to women...” This according to him is because it selfishly boosts only the man’s libido; that their traditional *aphrodisiac* must be used by both the man and the woman, unless the woman gets sick later. He further said that the wild bug mixture is used to heal stroke, and when the wild bug is mixed with other plants and taken by a man’s wife, this prevents her from being promiscuous; “...other men won’t come near her”.

However, it was acknowledged that wetlands were protected and conserved under indigenous knowledge systems in the course of protecting watercourses including rivers¹⁵. Under indigenous knowledge systems, the conservation of watercourses - rivers, streams, wells, water pans - and associated forests were integrated. It was explained that communities had rules that ensured the conservation of all sources of water and the associated forest cover. The springs, in particular, were *jealously* protected. Shrines and the forests covering springs were not interfered with at all. This was so to ensure that water loss through evaporation was reduced. All the communities also valued rivers as important sources of water and fish and a lot of emphasis was put on their management. Communities had strong rules to protect forests associated with rivers, which they considered as shrines. River Rhoko for instance in Iko-Esai, was protected by traditional rules and prohibitions. The river is still intact today. In Agoi-Ibam, elders protected sand dunes, which were one of the vital sources of fresh water for the village. Nobody was allowed to dig any water well without the permission of the elders. The communities thus observed certain practices in the management of water, which protected watercourses as well as wetlands and ensured sustainable utilization of water sources including rivers and lakes. Many of the practices were based on taboos and prohibitions. For instance, in Butatong individuals were warned not to urinate in rivers. If they did their wife or livestock would give birth in a river and the newborns would drown and they would therefore end up being without children or livestock which are also a symbol of wealth and good fortune. This belief protected watercourses from contamination.

4.4.3.7 *Indigenous biodiversity management practices*

In all the communities studied, it was resounded that indigenous knowledge systems conserved the biodiversity of the local environment in many ways. Indigenous practices such as the traditional protection of forests, shrines, watercourses, certain species of flora and fauna, as well as farming technologies that focused on indigenous food crops, according to community members contributed immensely to sustainable biodiversity management. However, they identified the protection of forests and shrines as the most notable indigenous biodiversity management practice. Most of these forests and shrines were established by ancestors for worship and other cultural rites. Thus, they were protected by the inhabitants in accordance with

¹⁵ In forest dependent communities of Cross River, Nigeria; when permanent wetlands show signs of drying up, this indicated looming drought. Also, cocoyams (*Colocassia* spp.) are usually grown in wetland gardens as a fallback crop in case of a famine.

customary laws. Apart from being used as places of worship, sacred forests were also believed to bring rain. In all, the value of traditionally protected forests according to forest dependent peoples is based on the unique plant and animal species that these forests harbour. Wildlife was known to take refuge in these forests to escape forest fires and hunters. These protected forests therefore play an important role as habitats for a high diversity of flora and fauna within forest dependent Cross River.

Plant species vary greatly in these forests, showing that each traditional protected forest is also invaluable as a conservation haven. In Iko-Esai, before the 'coming of the whiteman', traditional leaders designated certain areas as exclusion zones in order to protect and conserve forests. Indiscriminate felling of trees and other vegetation in these areas was forbidden. Violators were fined some quantities of food or live animals by the village authority. Some forests were also protected by taboos that forbade people to enter them and some trees were declared sacred and felling them constituted a breach of taboo. Folklore and stories such as those claiming that witches were patronizing some forests to practice their trade and store their tools of trade helped instill fear of violating the rules.

The effectiveness of traditional sanctions was displayed through the fact that indigenous forest reserves within forest dependent Cross River had been virtually untouched for generations. They stood out as ecological museums of local vegetation. Most of them were located on slopes, hills and around natural springs. These places were important havens for biodiversity as they provided a sanctuary for plants, animals, birds and insects.

Before colonialism and modernization, participants recalled that among forest-dependent communities of Cross River, the idea and practice that forestland can be owned - that it can belong to an individual even when left unused, uncared for or uninhabited was alien to the people. A respondent resonates:

Our forefathers never had a system to deliberately own or create forestland. We had abundant forestland that accommodated anyone who wanted to cultivate. All the forestland defined as falling under the territorial domain of the community was considered as owned by the entire community and not really an individual. In a way, this practice is still being applied when it comes to the picking of 'ovem' (bush-mango). You can see that anyone in this community can freely enter into anybody's forest, cocoa, banana, plantain, yam, or cassava farm to pick 'ovem' without any harassment. Before we started planting cocoa in a large scale, both entire households and elderly men depended on the picking of 'ovem' for income; hence, allowing everyone to have access to this product serves as a welfare measure so that children, orphans, widows, the needy and indigent people can always have a source of income to support themselves.

Male IDI/Butatong/farmer/76 years /August 23, 2014

To these people, forestlands were held collectively for the community. Under this system, all members of the community have usufruct to forestland (in Butatong, forestlands were collectively owned by *keko-beni* – the extended family). Supporting this claim, an archival source confirmed this indigenous practice of non-sale of forestland in the following way:

No man may sell, lease, pledge or mortgage land to anyone, whether a member of the tribe or not. The unit is not the individual but the family. The community decides which land shall be farmed in any given year. The various families proceed to make their farms. In practice, therefore, the individual farms the same land each year as he did the last time that particular area was farmed. If a stranger settled in a village, he would be allowed to farm with the community, being regarded as "one of the family" but he would be required to give a small portion of his crops to the elders, as an acknowledgement of the communal rights¹⁶.

Intelligence Report of Ogoja Divison, Sheet No. 2/1925.

In sum, conceptions of forestlands ownership in *modern* forest-dependent Cross River were found to resemble Professor Akinsola Akiwowo's ideas of what he called an indigenous sociology of knowledge in reference to the Yoruba Cosmos (David & Ugochukwu, 2011). He used concepts like: *idagbe*, *ibagbe*, *alabagbe*, *adawa*, *asuwa ori*, *ajogbe*, *ajumogbepo*, *asuwada enia* and so on, to explain the gradual "loss of community" in rural Nigeria. These concepts largely explain *Gemeinschaft* and *Gesselschaft* in the indigenous sense. According to Akiwowo, *idagbe* connotes individualism, while *ibagbe* is concerned with living with others (David & Ugochukwu, 2011). The concept of *alabagbe* represents a situation where two or more individuals live with other individuals in whatever conditions. Accordingly, *asuwa* connotes an

¹⁶ This archival information emerged from the Intelligence Report of Ogoja Divison, Sheet No. 2/1925. This was a chronicle of the colonialists about the forest tribes in present day Cross River State.

assemblage of existence for the purpose of becoming a living entity. On the whole, *asuwada enia* refers to the human society, while *ajumogbepo* refers to communities. All these concepts as postulated by Akiwowo helped to explain social change in forest-dependent Cross River as communities here are moving from 'indigenous' to 'modern' community living.

In every case, forestlands in indigenous forest communities of Cross River were seen to be held in trust by the eldest males in the community who in theory have a responsibility of allotting parcels of these forestlands to other male members of the community who needed them for cultivation or occupation. In principle, forestland so allotted remains the property of the community. A forestland is considered as a property of the living and the dead. Thus, it was considered as the home of ancestors' spirit, and the idea of disposing of it was sacrilege. According to the customary laws of these communities, an individual can never be more powerful than a trustee to forestland because of the collective responsibility to preserve the forest. An interviewee explained this kind of forestland ownership this way:

The pattern of forest ownership in our community before the coming of the whiteman (*oyebo*) is that no single person actually own any virgin forestland, the virgin forest was owned by the entire community. Individuals were allowed to cultivate secondary forestlands to feed their families. A person who first indicates interest in a virgin forestland by cutting marks on the trees on the virgin forestland was given the right to cultivate that portion of forestland that year. Marked areas must be within the cultivation space of at most three years, no one was permitted to mark a forestland portion that would not be cultivated within three years, this mechanism helped to check greed.

Male KII/Butatong/56 years /July 1, 2012

The significance of forestland in the social structure of forest-dependent Cross River was found to also follow the pattern outlined by Ihejiamaizu (2002) who showed that for most African societies, land had basically the same meaning among the people. Elderly interviewees in Agoi-Ibami, Butatong and Iko-Esai communities confirmed that forestland especially is viewed as a sacred entity '*freely given by God to the earth*'. The sacredness of land is further demonstrated in respect of all anti-social behaviour and criminal acts such as murder, adultery, incest, suicide, and so on as offences committed against the land or forest gods. Committers of these evils and crimes were usually accepted back into the community after offerings and sacrifices had been made to appease the offended gods of the 'land'. Such offerings and sacrifices are often made to prevent any direct or indirect punishment from befalling the

offender, his or her present and future generations. Beliefs about this common ownership of the land were said to undoubtedly help to ensure moral and mechanical solidarity within forest communities of Cross River. On the whole, geographic, socio-political and exploitative factors were found to have influenced traditional categorization of forestlands in forest-dependent Cross River. Hence, forestlands in Agoi-Ibami, Butatong and Iko-Esai were traditionally categorized into compound forests, farm forests, sacred forests (*buchi-egbe* in Boky language) and common forests.

- (i) *Compound forest*: This type of forest was found in residential area within the community, known in Butatong as ‘*esimbere*’ – meaning ‘backyard forest’. This is part of the compound where the head of the household and other members of the compound grow oil palms, palm wine trees, shade crops and other trees such as pear, oranges, cocoa, coconut and so on. These trees also serve as wind breakers to protect living houses during strong winds and storms. Within this forestland, women usually cultivate crops like vegetables, pepper and other varieties of crops that satisfy household food-needs during periods of emergency.
- (ii) *Farm forest*: This is also called ‘plantation’ in Agoi-Ibami. It is the outer forestland where community members farm, but do not have permanent residence. In Butatong and Iko-Esai, this traditional forest-type is completely outside the compound forestland and is exclusively for farming in a reserved forest area shared annually by adult males of the community. In Agoi-Ibami community, farmers usually live in farm-forests in bamboo-huts during periods of intensive farming: cultivation, weeding and harvesting.
- (iii) *Sacred forest*: This traditional forest-type was found within the community living space, and is dedicated to community or family deities. What constitutes a village deity varied from community to community in forest-dependent Cross River. This kind of sacred forest was found in Agba village (a community near Butatong in Boki) where the ‘*buchi-egbe*’¹⁷ is located.

¹⁷ *Buchi-egbe* represents a traditional criminal justice system located within a sacred forest where serious criminal matters in the Boky tribe were judged and adjudicated. During a personal interview with an elderly man in Nkim-Osokom village, it was related that this was the highest court of the traditional Boki people that had the attorney to execute criminals and offenders of heinous crimes. Within the forest, there are dedicated trees where such criminals were made to hang themselves after being found guilty.

- (iv) *Common forest*: This was found to be a designated portion of the forest reserved for the burial of sorcerers and people who have died of abnormal diseases such as swollen stomach (*demu`t* in Bokyi language; *roboessima* in Iko-Esai), leprosy (*agbe* in Bokyi; *egbe* in Iko-Esai), tuberculosis, as well as people lynched on criminal account. This type of forestland is also known as ‘evil forest’, where unwanted charms were thrown. Community people usually keep away from this forest for fear of physical and psychological harm from bad or evil spirits believed to inhabit this forest. In Agoi-Ibami, Butatong and Iko-Esai, most of these forestlands were seen to be given to churches. These portions of forestlands were given to missionaries just like in Chinua Achebe’s *Things Fall Apart* (1958) to serve as a battlefield where the churches would show their ‘victory over death’ as they often boast.

Within forest-dependent Cross River, forestlands were not considered merely as economic resources. Ancestral lands are literally the source of life, and the distinct way of life of a particular community was found to be developed and defined in relation to the forest around them. Community members were also found to be conscious of their forests and understood that to harm the forest was to ‘destroy themselves’, since they are part of the same organism. An interviewee opined as follows:

The future was always in the minds of our forefathers as they cultivated the forest. There is a proverb that says that ‘*odot etamromo occugha aree hene, ero okemegha aroke etamromo aree hene* (a forest cannot be cultivated in one day but it can be destroyed in one day’ this means that when one need to destroy forest resources, the person must remember that just as a forest cannot be cultivated in one day, but can be destroyed in one day, if the person decides to destroy the forest in one day, the person must also know that he cannot eat in one day to survive in another day. Our forebears don’t usually destroy all the trees in a forest, forests were effectively managed by them.

Male IDI/Iko-Esai/65 years /September 16, 2012

Another interviewee expressed indigenous conception about the utilization of forest resources in the following manner:

Ami uma oren obonghe okim odot uma uwah cha recomuroh (whosoever eats and remains is sure of the next meal...), our fathers know that forests must be used in sustainable manner...

Male KII/Iko-Esai/64 years /September 23, 2012

It was seen that patches of forestlands were set aside around community drinking water sources (*dejun-Boki*, *eyun-Iko-Esai*); shrines (*eyuna-Iko-Esai*); burying ground (*ekpoma eyinibishi-Iko-Esai*) in Agoi-Ibami, Butatong and Iko-Esai, and these forestlands were strictly protected by customary laws. Taboos associated with these sites include prohibition of cultivation and cutting down of trees and any form of deforestation around these sites (*kefen-Boki*)¹⁸.

Although the protection of these forestlands may be said to be based on religious and cultural beliefs; nonetheless, these indigenous practices are in all forms similar to modern-day *in-situ*¹⁹ forest management practice where the conservation initiative is implemented directly at the site where forest protection is intended.

Photo 4.6: A protected indigenous sites threaten by deforestation



Source: Author, 2012

So far, the underlying causes of deforestation and forest degradation in forest dependent communities of Cross River State can be grouped under the following: macro-economic factors, governance factors, demographic, technological and cultural factors. For macro-economic factors, evidence prevailed to indicate that higher profitability of agriculture was the main economic factor that underlined the conversion of forests to other uses. Other macro-economic factors of deforestation and forest degradation in Cross River State identified by a source in the federal ministry of environment include:

¹⁸ A perusal of the archives (File No.106/1931, NAE) revealed similar traditional forest management practices like the Awka ozo ritual among the Igbos where the candidate for the Eze or Ozo title would be taken away at night to the *nkpu ozo* (white-ant-hill) in a designated forest. The person would be stripped naked and placed on his back on the ground, that is, the candidate becomes a corpse. He is later raised and washed with white clay (*nzu*) and then left to reside with his first wife for three weeks in a palm leaves booth where location is chosen by the dibia.

¹⁹ *In-situ* is a modern forest protection strategy that consists of the identification, designation and management of natural areas to give them various levels of protection, as defined by forest protection objectives. It has been widely acknowledged that the effective management of any *in-situ* protected area depends on a management plan (Inyang, 2011). Likewise, a good management plan depends on both expertise and indigenous knowledge of the area concerned.

...external debt; foreign exchange rate policy and trade policies governing the sector. We can say for instance that the ban on log and sawn timber export has contributed significantly to the inefficiency by keeping prices in the sector lower than their true competitive levels. This has continued to protect the inefficiency of the wood industry. In 2003 alone, there was a World Bank study that showed that the forest industry in just four states in Nigeria was subsidized to the tune of about US \$6.5 million. Also, the same World Bank study provided that between 2001 and 2003, these same four states lost about US\$18.7 million through a failure to adjust their fees to their real levels and a failure to capture revenues lost through illegal logging.

Male IDI/FME-Abuja/62 years /April 13, 2012

Governance factors that had caused deforestation and degradation in Cross River were identified to have resulted from the combined impact of poor forest tenure arrangements and weak forestry institutions. Respondents related that the legislative structure for forest management in Nigeria generally has remained largely unchanged since colonial times. According to a respondent, forest resources fall under three main categories, which include forest reserves, state and private tree plantations, and 'free areas'. The colonial legislation set a number of precedents that are still evident today, including a policy thrust based upon the expansion of reserved areas and plantations, in which communities have very limited rights. In this way, the current National Forest Policy (1988) continued this trend by focusing on achieving national self-sufficiency in wood production and a doubling of the reserved forest area. However, the status quo appears to have continued largely unchanged by this policy environment. The role of rural communities in forest management and the importance of forest resources to the rural poor was said not to have been recognized in legislation within forest dependent Cross River State, Nigeria. One of such legislations that were identified to have neglected the role of rural communities in forest management was the Land Use Decree of 1978. An official commended as follows:

Land tenure laws in Nigeria have generally failed to formally recognise community tenure of land removing an incentive for the very community people to manage their land resources more effectively. I will say that the rights of communities over the forest sector had worsened since after the Land Use Decree of 1978.

Male IDI/FME-Abuja/62 years /April 13, 2012

By this Land Use Decree of 1978, respondents were mindful of the fact that the management of forest resources and the right to generate revenue from the forest estate are both vested in the State Governments at present. This is because the 1978 Land Use Decree vested all

land in the hands of the State Governors, strengthened this mandate. An official clarification of the role of both the federal and state governments in forest management was provided as follows:

The Federal Government is somehow limited when it comes to the control of forests, even though the Federal Department of Forestry (FDF) has the responsibility to advance national forest policy. I can tell you that the FDF is in a weak position to effectively do anything about sustainable forest management in Nigeria because it suffers from a lack of capacity. On the other hand, the National Forest Development Committee (NFDC) is the forum that brings together all the State Forestry Directors and is usually chaired by the Director of the FDF. This forum has the responsibility to provide an important institutional link between the Federal Government and the States. It is also saddled with the responsibility to guide forest policy and legislation development... Let me also add to say that another important cause of deforestation especially within the forest reserves is the absence of forest management planning, particularly at the state level. State forestry departments have actually abandoned forest management for natural forest since the 1970s. In this way, reserve forests are being treated as an infinite resource with no effective policies in place to regulate their harvesting. For instance, there is this common practice of allocating short-term concession of one to three years for re-entries and this most often results to total degradation of the forests.

Male IDI/FME-Abuja/62 years /April 13, 2012

Generally, photographs taken during the study were used systematically as a starting point to ask questions during interviews and transect walks. Discussions based on these photographs enabled the researcher to compile a corpus of very specific data on representations of landscapes and traditional-indigenous practices related to forests. The discourse that the views of the photographs evoked had proven to enrich the understanding about the relationship of the space, motivations of actors and their choices for deforestation at a time like this. An interesting finding from the photograph above (figure 4.1) is the assertion from an interviewee that ‘knowledge for keeping spiritual forests comes from errors that have been committed and the desire that community members need no longer commit such errors again’. Seen from this perspective, it can be said that forest-communities of Cross River are beginning to acknowledge that the progress of their indigenous knowledge system lies in the “improvement of the existing knowledge modified in the hope of further approaching truth”. This perspective is not too different from Karl Popper’s view (Gueye, 2011), where he shown that:

A problem or a question (P_n) arises for a scholar and it must be solved by formulating a hypothesis (H_n). This hypothesis is then compared to experience in order to eliminate errors (EE). The modification of the hypothesis which results from this comparison engenders new problems (P_{n+1}) which we try to respond to with the help of a new hypothesis (H_{n+1}) and so on.

Accordingly, the common notion held by participants why sacred forests are being deforested lied in the reality that '*times are changing*' and thus, traditional knowledge needs to be conceived at every moment as the set of hypotheses temporarily held to be true at that moment and not at all times true²⁰.

The photographs presented in this report actually reproduced part of the research results. They largely illustrate descriptions, comparisons and interpretations. These photographs had been inserted here because they largely captured specific data which are often difficult to render in writing. Nonetheless, the image can in no way replace discursive production, the researcher chose to used photographs based on the following reasons:

- (i) Photographs contributed to the construction of the research subject.
- (ii) During the research process, photography became a full-fledged research tool. It supplemented description and comparison. Later, when presented to participants in the study, these photographs contributed to the collection of discourses on questions which were difficult to organize by themes during interviews.
- (iii) In the reproduction of results, photographs became illustrations of the research. This meant that the use of photographs allowed for the presentation of visual data which, if they had been transcribed linearly, would have lost a part of their meaning.

²⁰ This notion largely demonstrated that even though modernization theories had been pilloried by African academics, forest communities in Cross River are implicitly conscious of the fact that their society, like all societies are evolving and developing to become Western-type society.

Photo 4.7: The locales' knowledge creation exercise of their landscape



Locales participating to sketch a map of their forest landscape (Iko Esai village, September 2012). Source: Author, 2012

In several ways, events of colonialism and modernization were shown to have stunning influence over indigenous patterns of forest-management among peoples of forest-dependent Cross River. For elderly participants in the study, they recalled that it was at colonialism that the political history and geography of their community was altered. The implication here was that the various settlements underwent far reaching transformations under the impact of alien rule, which did not only affect socio-political structures, land-use, but also consumption patterns which had impact on the climate system. Throughout the pre-colonial period, participants reminisced that forest communities were politically fragmented into village republics, each of which was conquered in turn by colonial rule and modernization²¹. This thought was reflected by an interviewee in the following light:

Before colonialism, there was no all-encompassing political authority to which the numerous village-republics paid either tribute or allegiance. Rather, each village-republic in the upper Cross River region was independent and guarded its autonomy even in forests governance jealously.

Male KII/Calabar/51years /October 3, 2012.

In terms of indigenous forests management as stated earlier, the main organ of forest-governance was a council of elders who were fathers of the component family units. These elders' council is believed to represent the ancestors and their various symbols of offices also

²¹ See Olutayo's (1991) work on "The development of underdevelopment: rural economy of colonial south-western Nigeria" where he also showed that societies in pre-colonial south-western Nigeria were organized politically, socially, and economically before the advent of colonialism or modernisation.

symbolized the authority of the ancestors, and were, therefore, venerated as the embodiment of the supernatural world and all the spirits. This elders' council was said to also be playing legislative functions in the community, including the making of laws for forests exploitation. Although these laws were not in the modern sense of the word; instead, these were rules that were handed down from one generation to another. The entire community, the age-grades and secret societies formed part of the judicial and executive systems of these communities even in matters of forest governance.

Even at this stage and level, the description of the social structure of forest communities in Cross River State during pre-colonial period resembles postulates of Karl Marx & Friedrich Engels in their work, "The Communist Manifesto" where they showed that in the earlier epochs of history, one can find almost everywhere a complicated arrangement of society into various social ranks. And that modern bourgeois society has not done away with class antagonism; instead, this has but established new classes, new conditions of oppression, new forms of struggle in place of the old ones.

4.5 Changes in climate conditions over-the-years in forest-dependent Cross River

Findings revealed trends and challenges of climate change in the past 25 years within forest-dependent communities of Cross River; it was established that climate change have had significant impact on rural water resources in these communities. This impact is in three dimensions: too much water (flood); too little water (drought); reduced water quality (contamination of freshwater). Table 4.2 below demonstrates the status of climate change impact in forest-dependent Cross River.

Table 4.4: The status of climate change impact in forest-dependent Cross River

Community	Drought	Flood	Strong wind	Heat	Cold
Butatong	X	XXX	XXX	X	XX
Agoi-Ibami		XXX	XX	XX	XXX
Iko-Esai	X	XXX	XXX	X	XX

Key: Degree of climate change impact: X = slight, XX = moderate, XXX = severe

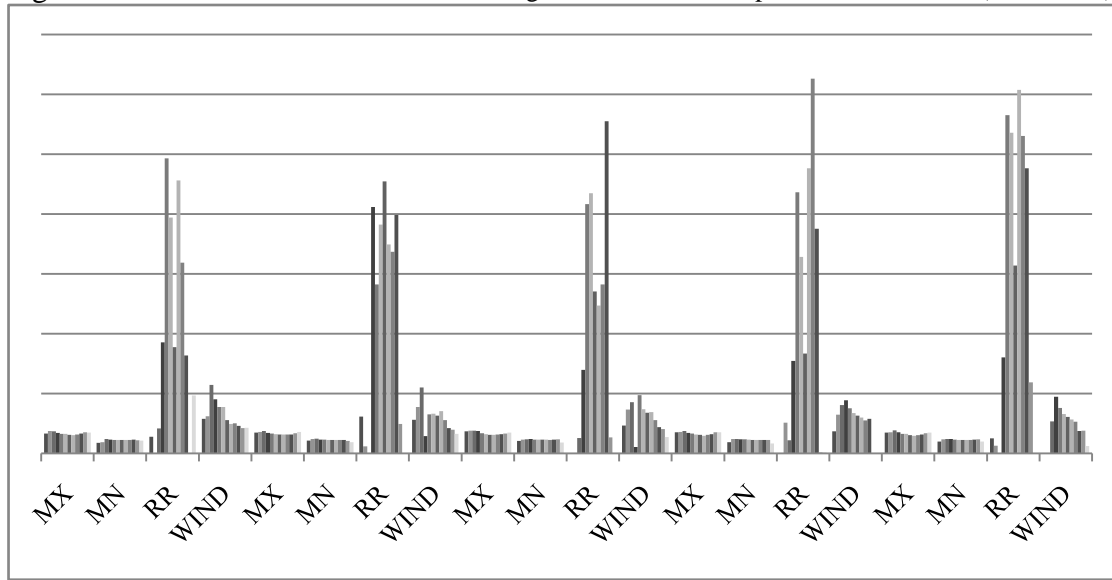
Source: Fieldwork, 2012

Each community studied had an array of early warning indicators and well-developed structures through which the wisdom of the community was applied to deal quickly and efficiently with climate change stresses and other related natural disasters. The structures

included a council of elders which had at its disposal the speed and strength of numerous powerful community warriors who are used to investigate particular phenomena. On the whole, the indigenous knowledge used to predict extreme climate change events and related natural disasters is usually based on keen observation of the behaviour of trees, clouds, animals, birds, insects, vegetation, water temperature, winds, air, and earth movements. These sets of indicators are locally grown. The presence of snakes and other reptiles, as well as wild animals, around homesteads in search of water and food indicated persisting drought. In Butatong for instance, the delayed immigration swallow in large numbers circling the sky indicated the possibility of poor seasonal rainfall. Also, the noisy weaver birds known locally as *ofifi* were used as indicators of rainfall failure or the coming of drought on account of their behaviour. The birds usually make more nests when a wet season was expected and less nests when a poor rainy season was expected during which they migrate from their usual nesting places.

The behaviour of amphibians, especially frogs (*Africana* spp.) and toads (*Bufo* spp.), was a powerful indicator of season change. For example, the absence of frogs and toads indicated the coming of the dry season. Also, when frogs stopped croaking during the rainy season, even though it may still be raining, it indicated that the rains would soon stop. Likewise, when the wind changes direction to blow from the east, this signaled an imminent heavy rain without thunder. On the other hand, fast-blowing wind from the west is a sign of imminent dry weather, which may lead to poor harvest and famine if it is prolonged. Fast-blowing wind accompanied by towering darkened clouds on the west, are signs of an imminent fierce hailstorm with thunder and lightning.

Figure 4.2: Status of extreme climate change events in forest-dependent Cross River (2008-2012)



Source: NIMET Office (Ogoja), 2013

Key: MX = Data maximum (Temperature)
 MN = Data minimum (Temperature)
 RR = Rainfall
 WIND = Speed of Wind per Km/hr²²

Transect walks in Agoi-Ibami, Butatong and Iko-Esai confirmed increased deforestation due particularly to population pressure on forest resources. An interviewee narrated impact of population pressure on forest resources in the following way:

²² Data was reported from the respective NIMET instruments at 10am (9.00GMT) every day.

Things have really changed in this our world. For me, it is not actually the climate that is changing or that had changed, it is we human beings that are changing and this have made the climate to also change. I can confidently tell you that during the time that our traditional or indigenous systems were working very well, there was real discipline among our people, especially the children than what is obtained now. Just check out now, a girl or boy of 14 years can chose to sleep anywhere without the parent's knowledge, no child can dare to try this in the past. We had very powerful traditional laws that regulated human conduct in the past. As I was growing up, I heard about these laws from the elders of my community before I heard about them in the church I attempt, Assemblies of God Church. Before the coming of Christianity into our community, there was the observance too of special days of the week that nobody was allowed to do any serious work or to go to the farm. These are days specially set aside for special rituals and sacrifices. For instance, 'asi-wula' (Wula market day) was a day nobody was expected to go to anywhere. I remember a story of a woman who violated this rule or law and she fell terribly sick immediately. In the past, the process of getting married was very difficult, because it was the father of a man that determine when the man is to get married and the father will then marry for his son. But now, it is not so again, boys and girls can now live together as boy and girl friend for years and they would have children without the boy giving anything to the parents of the girl. This explains why we have so many people today and the population is increasing every day. In those days, a man can never have sex with a woman; talk less of having children with a woman except 'ishean-debe' (breaking of kolanut) rite is performed by the two parents or their representatives. Before this rite, it is expected that the man must have spent some year serving and helping the girl's parents in the farm and to do some tedious house chores for them too. It is only when this 'ishean-debe' rite had been performed that the mother to the woman would now give out a mat to her daughter and the daughter and the suitor would now have sexual intercourse in the girl's father house for the first time. It is indeed a pride to the girl's parent if they confirm that their daughter was a virgin as at the time the suitor had intercourse with her in their house. It was also believed that when a woman is promiscuous, she will definitely have complications during childbirth and if these complications arise during childbirth and she does not confess her evil and promiscuous deeds, she will die in childbirth. With modernity now, one cannot wait to hear the confessions of a promiscuous wife again because when such complications arise, she would just be taken to the theatre and operated upon.

Male IDI/Butatong/farmer/76 years /August 23, 2014

Findings further showed that traditional agricultural practices exist in these communities and these had been for many years without much stress on vegetation and natural resources in general. Over-the-years, the study confirmed that as population increases, more new forestlands

were exploited with increasing deforestation in the area. Within these communities, there were vast arable land, varied soils and vegetation types as well as the large expanse of surface and underground water and abundant rainfall. Agriculture was the single most important economic activity of the local population. It was the main food provider and it generated over 95% of the total household income for the people. The matrix scoring below (table 4.3) shows the impact of climate change on household seasonal food security levels in Agoi-Ibami, Butatong and Iko-Esai. Findings revealed two/three months (June, July to half of August, just before new yams) food shortages. Yam was found to be an important food item to the local population, without which they consider themselves starving. During the period of food shortage, only supplementary foods such as roasted corn/maize (*icunun-Boki*), vegetables and few plantains are available. Change in rainfall was seen to have serious impact on food supply throughout the year, shortage of crops like: yam, maize, plantain, local beans and cocoyam, was more obvious as shown in table 4.3 below. Cassava (*ewaa-Boki*) was identified as the only crop that is abundant throughout the year in all the communities studied (Butatong, Agoi-Ibami & Iko-Esai).

Table 4.5: Household food security levels in forest-dependent Cross River

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Yam	** ***	** ***	** **	** *	* *	* *	* *	* *	** *	* **	** **	** **
Cassava	** ***	** **	** **	** **	** **	** **	** **	** **	** **	** **	** **	** **
Cocoyam	* *	** *	* **	** **	** **	* *	* *					** *
Maize				* *	* *	** **	** **	** **	** *			
Plantain	* **	** **	* *	* *					* *	** *	** **	** **
Local Beans	* *	** **	** **	** *	* *	* *					* *	* *

Source: fieldwork, 2012

Key: Maximum Score: 5*
Minimum Score: 1*
Empty box: No score

In reiterating the reality of climate change, an interviewee emphasized thus:

There are so much evidence to show that climate or weather conditions have changed over the years, we now have long period of rainfall; short period of dry season, acid rain as it occurred in Abi local government recently and landslide in Boki. All these changes are worrisome, because this is leading to severe hunger. I can say that the next thing that will destroy the world is hunger. Climate change is so obvious and all of us are now feeling the impact of climate change.

Male KII/Calabar/41 years /October 2, 2012

Due to changes in climate conditions, majority (72.1%) of households in the survey agreed that they have been severely affected by much rainfall in recent years (5 years) and this has led to contamination of drinking water sources and resulted to infections and diseases. Table 4.4 shows infections and diseases prevalence in forest-dependent Cross River in the past 5 years:

Table 4.6: Matrix Scoring on Prevalent Diseases and Infections in forest-dependent Cross River

Ages	Malaria	Typhoid	Cholera	Guineaworm	'Witlow'	Asthma	Hypertension
0 – 6	* * * * *	* * * *	* * * *	* *	*		
7 - 14	* * * * *	* * * * *	* * * *	* * * *	* *	*	
15 - 24	* * * * *	* * * * *		*	* * * *	* *	*
25 – 34	* * * * *	* * * * *		*	* * *	* * *	* * *
35 – 44	* * * * *	* * * * *			* * * *	* * * *	* * * *
45 – 54	* * * * *	* * * * *			* * * * *	* * * *	* * * *
55 - 64	* * * * *	* * * * *				* * * *	* * * *
≥ 65	* * * * *	* * * * *				* * *	

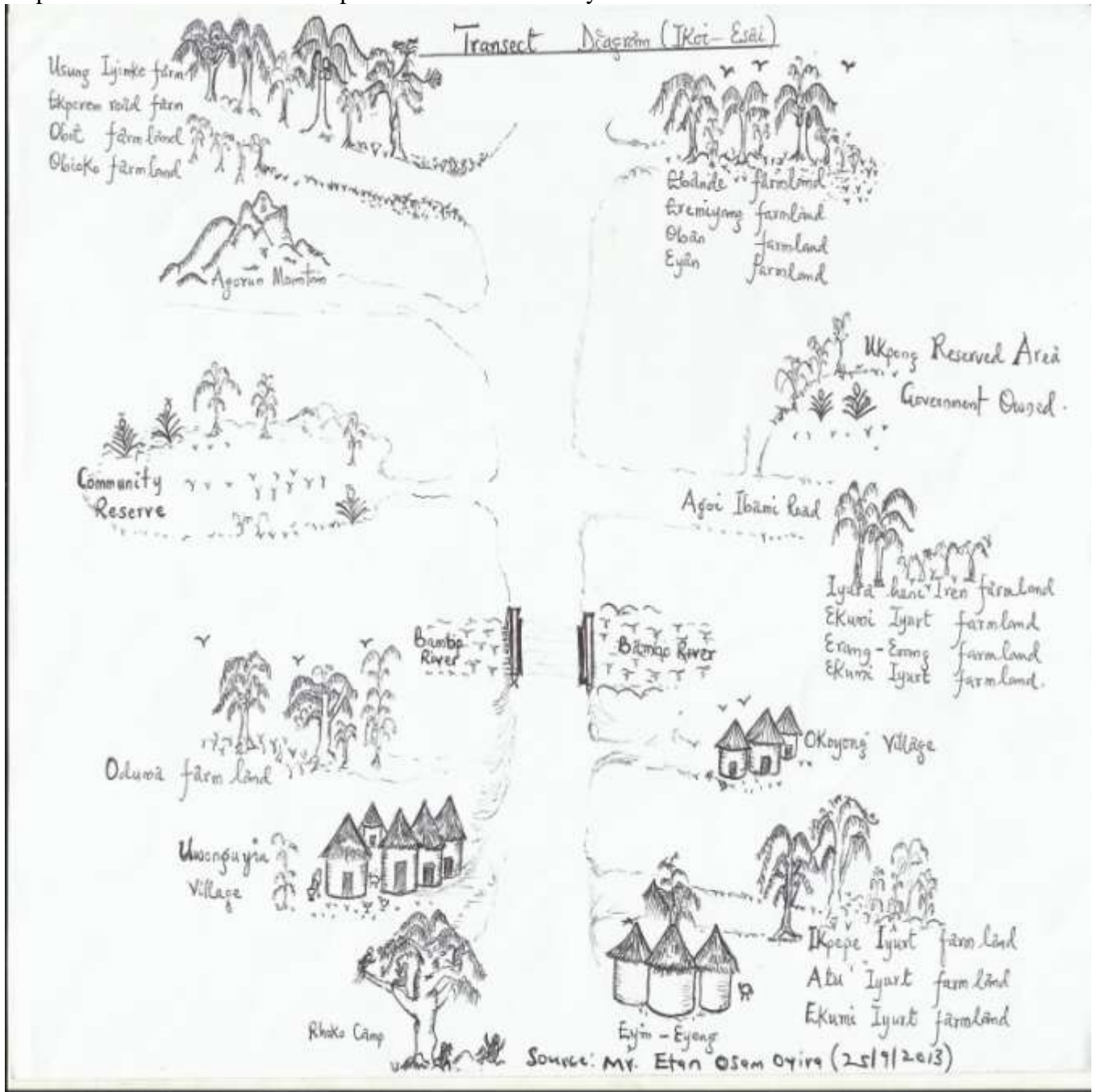
Male KII/Agoi-Ibami/54 years /28/09/2012

Key: Maximum Score: 5*
Minimum Score: 1*
Empty box: No score

Recognizing the fact that the social sciences possess the capability to construct image-tools which enable understanding, analyzing and explanation of reality in visible aspects; that is, specifying the approaches used to account for ordinary or extraordinary subject-images produced daily in the social universe. Also knowing fully well that most of the criticisms of modernization theories revolve around the concept of *tradition* – as well as for the need of a more historical approach to the study of modernization; the researcher in this study described the nature of the ‘traditional’ setting of agriculture in forest-dependent Cross River in order to understand the dimension and processes of change in agricultural practices due to climate change. Maps 4.3 and 4.4 are sketches of the traditional setting drawn by members in Iko-Esai and Agoi-Ibami communities respectively.

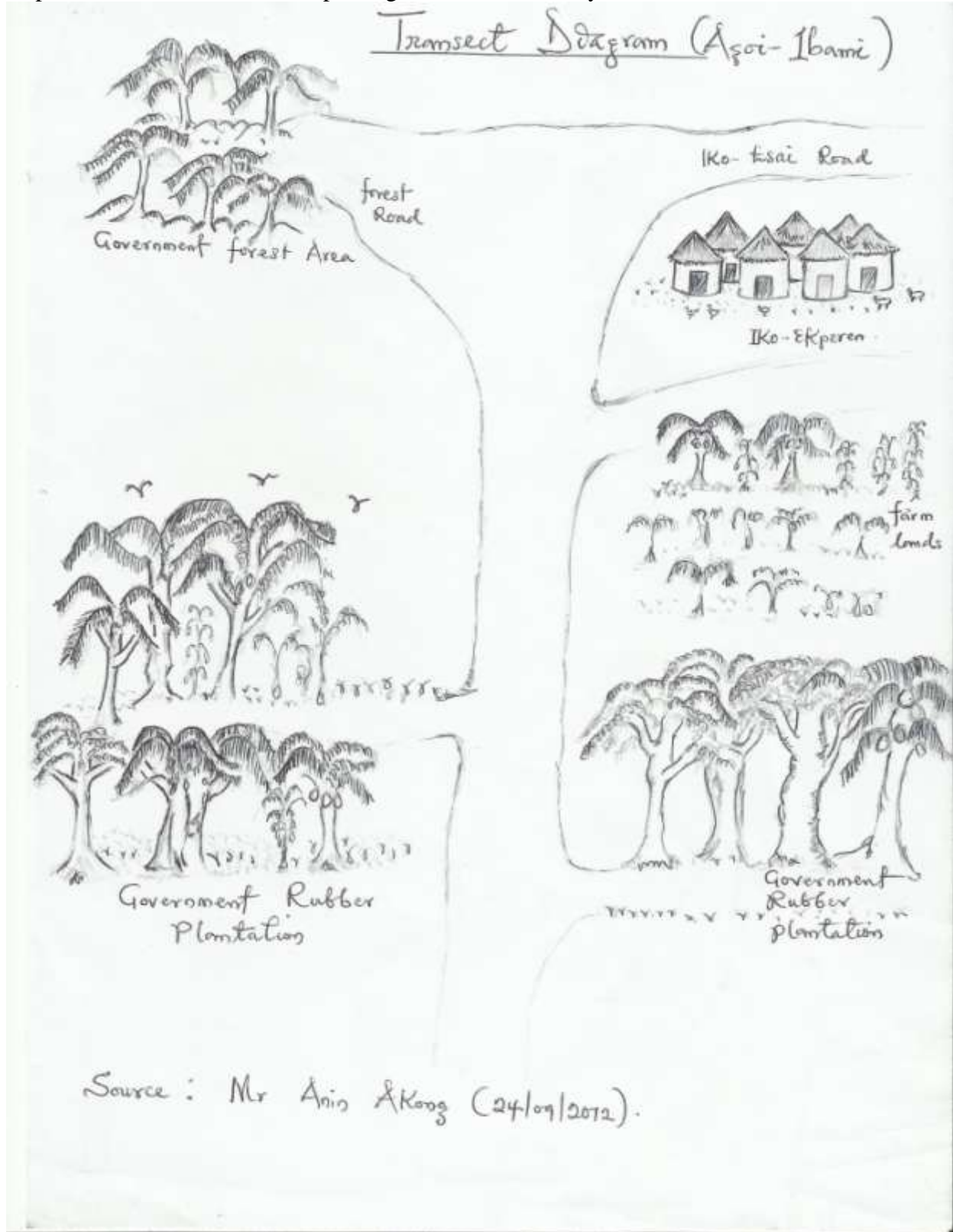
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Map 4.3: Transect walk map of Iko-Esai community



Source: Mr. Etan Osam Oyira/50years/Iko-Esai/September 25, 2012

Map 4.4: Transect walk map of Agoi-Ibami community



Source: Mr. Anin Akong/45years/Agoi-Ibami/September 24, 2012

Using the seasonal calendar, community members demonstrated that traditional agricultural practices in the respective communities had been affected by climate change. They recognized that their society indeed has a centre (*kefen-Boki*). That is, there is a central zone in the structure of their society - and this central zone according to them impinged in various ways on members of the community and all those who live within the ecological domain of their community. Real membership in the community to them is more than being located within an ecological space and adapting to an environment. Instead, membership is constituted by relationship to the central zone. The central zone is not, as such, a spatially located phenomenon, but it is a phenomenon of the realm of values and beliefs, especially in means and relations of production. It is this centre of order of symbols, of values and beliefs, which govern the society.

To most participants, the central zone connotes the sacred. Accordingly, agriculture to them is the phenomenon of the realm of action. It is a structure of activities, roles and persons, within the network of institutions. That it is in agricultural roles that values and beliefs are propounded and embodied. Agricultural practices in forest-dependent Cross River appear similar across forest peoples of the State. Table 4.7 below attempts to analyze historical periods of the year with an aim of tracing changes in agricultural practices among forest-dependent peoples of Cross River; this inter-linking analysis accounts for continuities, discontinuities and new modes of agriculture.

Table 4.7: Seasonal Calendar of Agricultural Activities in Forest-Dependent Cross River

Activity	Dry Season				Rainy Season				Dry Season			
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Clearing	← →			→				← →			← →	
Burning	← →			→							← →	
Heap/Mound Making	← →					→						
Crop Planting	← →					→						
Staking				← →			→					
1 st Weeding				← →				→				
2 nd Weeding								← →				
Harvest	← →				← →							→
Storage		← →			→							
Marketing	← →									← →		

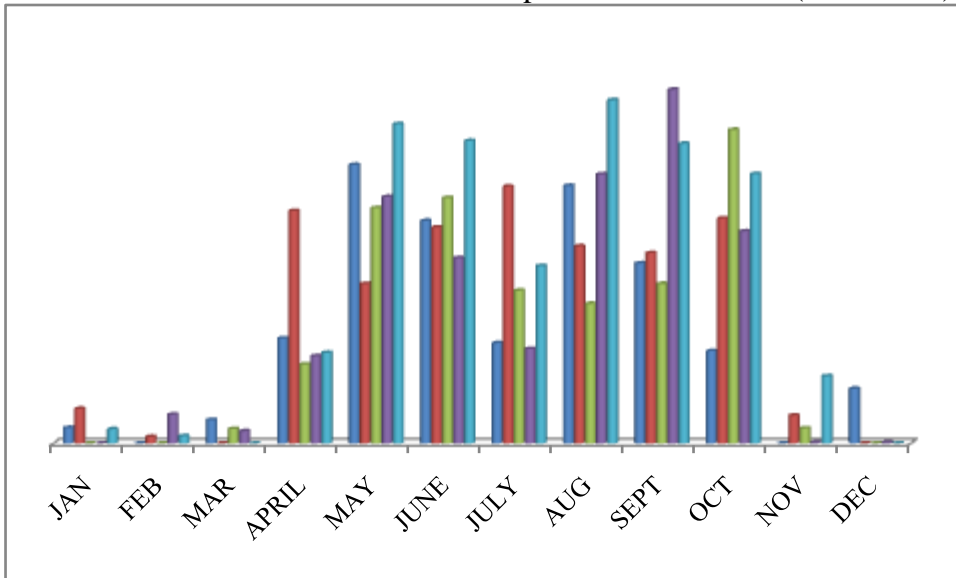
Source: fieldwork, 2012

On the whole, the appearance of certain birds/insects, mating of certain animals and flowering of certain plants are all important signals of changes in time and seasons that are well understood by forest-dependent peoples of Cross River. An elderly respondent captured observed climate change in her community in the following manner:

There is the evidence of climate change in my community since the Millennium (that is since year 2000). In the past, there used to be August break. At this time, you will see the physical appearance of earthworm. This is because the earthworm would have enough time to come out of their holes and for them to build their houses without the rains destroying these houses. But now, one cannot readily predict when there would be this break of rains in the month of August.

Female IDI/Ishibori/54 years /June 19, 2013

Figure 4.3: Status of rainfall within forest-dependent Cross River (2008-2012)



Source: NIMET Office (Ogoja), 2013

Respondents recognized and acknowledged that in recent times, there have been role displacement – the traditional central sphere losing authority to an external arm of a central government of which they have been suspicious “since the first whites arrived here to take our forests for conservation”²³.

To respondents, this external interference laid the foundation upon which subsequent interactions flowed. This sets the basic prerequisites to rational social action where community members now make rational calculations about the ways in which to attain their goals in the real world. In this way, strategies are always evolved to ensure that others are controlled to remain outside the ‘central zone’ of production. What came clear in all renditions was the understanding that local entities like forests, lands, and biodiversity which climate change adaptation policies seek to protect are not physically present at negotiations. Hence, representations – words, symbols, utterances - are created to stand for what cannot be brought into the negotiation table. Respondents bemoaned that since their contact with the ‘outside world’, the task of creating representations for forests and natural resources protection has largely been left to ‘outsiders’. In order to adequately capture this plight in vivid terms, respondents underlined discourses from which social processes emerge within the milieu of climate change in rural Nigeria.

²³ This assertion was made during an interview; it reflects the notion of epistemic captivity which indicates a dependence on western knowledge for standardization and certification (See Omobowale, Natewinde, Sawadogo and Ugbem, 2013).

First, the position that was advanced resembles Michel Foucault's suggestion that discourses are statements that "define, describe, and delimit what is possible to say and not possible to say (and by extension – what to do or not to do)" (Hajer, 1995; Kress, 1985). This means that in the context of climate change adaptation policies design, only statements that conform to establish discourses are considered "truthful" (Rajao, 2013). Implying that representations rely on the dominant discourses to become valid; and representations that do not fit into the dominant discourses are silenced (Foucault, 2002).

Within forest-dependent Cross River, local social networks were found to be dominant channels of coping with climate-related disasters. In the rural community of Iko-Esai for instance, a small group of villagers use to work together with a local facilitator to identify challenges facing their community and then consider solutions together. In a discussion, an individual noted that the friendships they usually develop from such networks were very important; "...we talk to each other and tell each other information...". As a result of their experiences, the people use to have a local disaster assistance network where they divide responsibilities to check on each other and their neighbours during disasters. In this way, these disaster networks were established based on the people's experience in the relatively unique context of rural life. This example no doubt contrasts present-day climate change adaptation processes within the area by being dynamic, and locally driven.

In the case of present-day climate change adaptation in forest-dependent communities of Cross River, evidence prevail to insist that understanding local social processes is essential as sustainable adaptation measures must rely on a global network of localised actions. This reiterated the fact that adaptation needs to be context specific and locally based. This therefore suggests that rather than look to a codified set of tools or approaches, a diverse and perhaps unexpected set of practices may be appropriate in the process of adaptation to climate change. A key lesson that emerged from these findings is around the important role of collective action and social networks in ensuring social cohesion in the face of daunting climate change challenges; thus, making it evident that the cultivation of social networks can enhance community capacity to deal with climate-related disasters. This is because the creation of new social networks can provide new relations of support in times of climatic stress and facilitate the dissemination of new knowledge and practices for an uncertain context.

Contrary to Pieterse's (2010) view, in which indigenous or local knowledge is undermined, evidence from forest-dependent communities of Cross River coalesced to show that indigenous knowledge for forest management for instance accumulates towards a diverse set of climate change adaptations that authorize important alternatives to the emerging norms of adaptation. Community members recognized the legitimacy and value of this local knowledge and practices, and they do not necessarily require that they be replicated elsewhere or be 'scaled up' to larger scale regional or global programmes. Respondents likewise acknowledged that the context of climate change adaptation efforts in rural Cross River is undeniably shaped by ideas of hierarchical scale, with relations between development actors, funding agencies and policy makers fitting with Howitt's model of relational scale formations. However, the relevance of indigenous knowledge was visibly displayed in manners that, though the knowledge may be considered disparate and disconnected; yet, it is significant in responding to a global challenge like climate change. The emphasis of interest worth highlighting was the point that development in its true sense is always of necessity embedded in the local. This implied that global discourses of development are always simultaneously local discourses and practices, and that the subject is placed as the starting point for change. This further stressed that it is in a process of re-subjectivisation that real change becomes possible (Gibson-Graham, 1996; 2005; 2006; 2011).

4.6 How forest-dependent peoples of Cross River have responded to Climate Change

The pattern of response to climate change challenges among forest-dependent peoples of Cross River State was observed to occur within two broad solutions. These include technological solutions introduced by 'outsiders'; and solution that basically involved changes in social organization and modification of behaviour among community members. A common definition of climate change adaptation emerged that described climate change adaptation as involving those strategies that enabled the individual or the community to cope with or to adjust to the impacts of an uncertain climate. To participants in this study, climate information was recognized as a key resource in farming. They also acknowledged that men's, women's and youths' differential access to this resource plays a role in their ability to adapt to an uncertain climate. On the whole, a respondent described response to climate change in the following manner:

With the changes we now have in climate or weather conditions in recent times, the whole thing is now complicating our work and these unpredictable changes are making us to work harder and to stress ourselves the more. Because the work that one could have been doing in a relax mode let's say for like one month, one is now forced to do it in 2 weeks or even days because you have to just do it when the climate or weather conditions are favourable, if not, you may not be able to still do the work. We over-labour now to just dry our cocoa. Because of so much rain, most people now over-ferment their cocoa, and over-fermenting cocoa makes the cocoa to be light and this reduces the quality of the cocoa. What we now do is to ferment the cocoa for four (4) days, after which we will try to dry it with the little sun that may appear, and after sun-drying for like three (3) days, we will now put it in bags to be kept in the bags for about three (3) days again before finally drying it under the sun. Although we do not have modern ovens, we usually made local ovens from 'kpabe-kpabe' (outer part of raffia palm). Under normal weather conditions, the standard period for fermenting cocoa is seven (7) days, but with the unpredictability of climate and weather conditions, we struggle now with different ways to make sure that we do not lose the fine quality of our cocoa. I can say that the way we now stress to work in order to make things not to damage is making us to grow old faster.

Male IDI/Butatong/74 years/August 25, 2014

On the whole, the stock of indigenous knowledge within forest-dependent Cross River was found to include technologies, know-how, experiences, observations, beliefs and rituals. These range from the simple to the complex, such as relying on the 'home-bird', known locally in Iko-Esai as 'okunot' or 'black and white terroco' to tell the time of the day; letting the water beetle identify potable water in streams and ponds, and reading the movement of earth worms to discern the abundance of harvest and famine²⁴. A participant reiterated the importance of traditional beliefs and knowledge in the following way:

²⁴ The people of Butatong for instance in Boki have traditionally relied on *entuishe*, a water beetle, for the identification of clean and safe drinking water in streams, ponds or springs. In Agoi-Ibam, beanstalks were burnt and the ashes used as a preservative for grain and cereals. The Boki elders frequently used the behaviour of animals and their health to foretell climate or weather change. Goat guts for instance would be examined by a specialized Boki elder, and if they were found to be having watery cysts on them between March and April, this would be taken to foretell that the imminent season would have a lot of rains but if the small intestine was found to be empty, drought, famine, hostility and war were to be expected in the community.

We have so many traditional beliefs among our people. For instance, we believe in the existence of water spirits and in the power of some people to transform themselves into animals or influence others. There is a story of my grandmother who died after cooking and eating gorilla unknowingly. This is because women were not allowed to eat gorilla. Also, no one was allowed to have sexual intercourse in the bush or forest. This practice and belief helped to prevent situations of infidelity and rape, as the people then had no hotels and brothels where they can hide to commit these immoral acts.

Male IDI/Butatong/74 years/August 25, 2014

This affirmed that this form of beliefs and knowledge served the communities well within the traditional power structures; as its success was based on good prognosis, close observation and a thorough understanding of the environment. The people instinctively knew that they needed to understand their environment well to be able to respond and cope with stresses and occurrences of extreme climate events. Community elders were identified as the ones responsible for predicting disasters and guiding response to either prevent or to adapt to climate change -induced challenges. Where signs of climate-induced disasters were obvious to everyone in the community, it was found that the people instinctively responded and prepared for such disasters without the need for prompting from the elders. At other times, according to a respondent, the signs could be complicated and required the interpretation of the elders and experts. Some of the interpretations were known to engender major conflicts in opinion depending on the decisions that had to be made.

All in all, indigenous peoples of forest-dependent Cross River revered the elders in their role of divining climatic conditions and inherent challenges. Elders monitored the progression of hazards and gave advice, which governed the behaviour of the communities. In the event of an ongoing climate-induced challenge or disaster, the communities would do what was asked of them without question. The culture and belief system of a community influenced its responses to climate change induced challenges or disasters. The people of Agoi-Ibam, for example, strongly believed that disasters only came when one was not at peace with God and the spirits. They knew they could not stop the disasters once they were triggered by certain causes but they could mitigate and adapt to their effects as every event, physical or spiritual, has a cause. The adaptation, or in cases mitigation, could take the form of measures that are preventive or remedial. The attitudes to natural disasters by the people of Agoi-Ibam are typical among other forest communities studied. Among the people of Butatong, for example, there is also

widespread belief that natural or climate-induced disasters are released by specific deities and God in response to human misbehaviour. Consequently, both adaptation and mitigation can largely be sought in acts of repentance ‘to restore the divine balance’²⁵.

In dealing with climate change-induced or natural disasters, forest-dependent peoples of Cross River were seen to have generally responded or reacted in two ways. The first is to wait until the disaster strikes and then try to adapt to the consequences by utilizing indigenous knowledge. The second way is to prepare for the disaster and take preventive action. However, the actual approach taken depended on the prediction of the disaster and its possible severity and consequences. If the disaster is considered to be impossible to be foretold with certainty, or the consequences foretold are manageable and not severe, the community would then adopt a ‘wait-and-see’ position. But if the disaster can be foretold with certainty and the consequences are known to be severe, then appropriate preparations are made. The community response had usually been in beginning to preserve food in anticipation of a prolonged drought or famine for example. Other response strategies include the adoption of efficient environmental resources management practices such as the planting of early maturing crops, adoption of special varieties of crops, development of early warning system for the prediction or forecast of extreme weather events. This involves the gathering, prediction, interpretation and decision-making in relation to weather. This was identified as being helpful to forest-dependent communities in managing their vulnerability and in helping them to make decisions on cropping patterns based on local predictions of climate, and decisions on planting dates based on complex cultural models of weather.

In broad terms, response to climate change challenges in forest-dependent Cross River was seen to occur in the following manner:

Floods – Adaptation strategies

- (i) Migration
- (ii) Learning to swim

Droughts – Adaptation strategies

- (i) Reduction of water consumption by households, per capita consumption of water is less than 50 litres per day in contrast to the minimum of 115 litres for developed societies

²⁵ This position had also been reported by Goduka (2012).

(water is reused, example from taking bath and washing clothes to water backyard garden and nurseries).

- (ii) Increased dedicated hours to search for water at the expense of other socio-economic activities
- (iii) Rainfall harvesting - a traditional way of collecting and storing rainwater in big barrels placed under the roofs of houses. This practice had largely been abandoned when wells and boreholes were installed in these communities. But rainfall harvesting has attracted interest again as a result of the drying up of government installed wells and boreholes. However most of the communities covered in the study reported that they are unable to harvest enough rainfall under the current climate.
- (iv) Migration

Strong Wind – Adaptation strategies

- (i) The tying of house roofs with strong robes to large pieces of stones and log of woods

Heat – Adaptation strategies

- (i) Sleeping on the open-air within the compound wearing only ‘inner-wears’

Cold – Adaptation strategies

- (i) Wearing more than one set of clothing
- (ii) Suspending to go the farm early until late mornings when dews (*babi-Boki*) are dried up.

Households in Agoi-Ibami, Butatong and Iko-Esai were clearly identified. Referring to the shared understanding of climate change as developed by those who participated in the study, participants identified each household status at the present time, twenty-five (25) years ago, and also for an intervening period of three to five years. In the study, households of today formed the unit of analysis. Within forest-dependent communities of Cross River, it was found that household composition had been relatively stable over the years. Participants showed preference for large-size households with manageable number of children. This preference for having many children was attributed to traditional pro-natalist belief systems that stressed the importance of the lineage and the economic advantages of children in terms of labour supply.

So far, it can be said that the subsistent or traditional economy among communities of forest-dependent Cross River had no ‘factor market’. This means that issues like land, labour, capital and entrepreneurship did not matter in these traditional societies. This is because the traditional

people of these communities did not accumulate wealth for the rational purpose or intention to reinvest it. Surplus capital among the people was re-circulated through gift-giving and inheritance. Also, the division of labour was not highly advanced and therefore there was no specialization of labour in the modern sense of the term. However, some rudimentary specializations were found to have existed since there were craftsmen, farmers, diviners/sorcerers, and blacksmith.

Every community member had a right to sufficient farmland within the area of his or her agnation (line of descent traced through the paternal side of the family) or residence. Land was not a saleable property at the time. Access to it as said earlier is only through patrilineal kinship and residence. Also, the factors of production did not enter the open market; instead, they were allocated on the basis of kinship and residence and not through the forces of demand and supply. Usually, the people of a compound formed a basic work unit under the control of the head of the compound. Within a family or compound, labour on the farm is assigned on the basis of sex, age and prestige. In cases where extra labour is needed, a man could reactivate 'latent' social relationships such as age-mates and other friends in order to accomplish the task. There is also co-operative labour (*elac - Bokyì*); where people come together to work in each other's farm on rotation basis. In this way labour is traded for labour. It is at the coming of the 'whiteman' that societies of forest-dependent Cross River witnessed changes in the informal wage sector, where people can now talk of 'job', a term used to refer to hired labour.

So far, impacts of climate change were found to have accelerated three forms of social processes within communities of forest-dependent Cross River: competition, conflicts and boundary maintenance. Accordingly, it was well conceived that it is social processes that make human adaptation possible. As stated severally, within forest-dependent Cross River, forests and natural-resources actually play a vital role in the culture and physical adaptation of the people. The forest does not only define the cultural traits of the people, but it also defines their occupational specialisation²⁶. Occupation is thus closely related to kinship identity and contrasting occupations are a very common way to illustrate kinship and tribal differences. This process of differentiation was also related to other stereotypical traits such as body posture, perceived intelligence, physical endurance and behaviour. This meant that not only is occupational transgression, or doing the work of another kin or tribal group, a challenge to kin or

²⁶ NAI, CSO/19/1914. File No.4607 *The Forestry Ordinance 1915 Enactment*

tribal status but also a potential source of conflict²⁷.

Drawing from seasonal calendar and interviews data, it was established that traditional agricultural practices within forest-dependent Cross River had also been affected by climate change. As stated earlier, evidence prevailed to show that there is always a central zone in the social structure of these communities; and this central zone accordingly impinged in various ways on members of the community and all those living within the ecological domain of the communities. Authentic 'belongingness' to a community is therefore not defined in terms of just being located within an ecological space and adapting to an environment. Instead, membership or 'belongingness' to a community is constituted by relationship to the central zone. The central zone is not, as such, a spatially located phenomenon, but it is a phenomenon of the realm of values and beliefs, especially in means and relations of production. It is this centre of order of symbols, of values and beliefs, which govern the society. With dwindling resources due to climate change events in recent times, the competition to access and retention within the central zone has become fierce. Respondents recognized and acknowledged that in recent times, there have been role displacement – the traditional central sphere losing authority to an external arm of a central government of which they have been suspicious.

To respondents, this external interference laid the foundation upon which subsequent interactions flowed. This sets the basic prerequisites to rational social action where community members now make rational calculations about the ways in which to attain their goals in the real world. In this way, strategies are always evolved to ensure that others are controlled to remind outside the 'central zone' of production. What came clear in all renditions was the understanding that local entities like forests, lands, and biodiversity which climate change adaptation policies seek to protect are not physically present at negotiations. Hence, representations – words, symbols, utterances – are created to stand for what cannot be brought into the negotiation table. Respondents bemoaned that since their contact with the 'outside world', the task of creating representations for forests and natural resources protection has largely been left to 'outsiders'. In order to adequately capture this plight in vivid terms, respondents underlined discourses from which social processes emerge within the milieu of climate change adaptation.

When assessing the current challenges that climate change posed to the community, elderly participants in Butatong especially cited several problems that were not present, or were less

²⁷ See Coulthard, Johnson and McGregor (2011) for a similar argument from India.

severe, when they were young. Some of these problems include regularity of more intense rainfall within few months of normal rainy season; availability of many water catchment ponds and severe contamination of the available water bodies; diminished plants life; and lower soil fertility. They felt that the indigenous knowledge system and communal efforts to manage forests resources had weakened. Examples were cited to explain a condition where local leaders used to lead teams and community members to protect community drinking-water sources. These elderly respondents also revealed that their communities had been proud of their drinking-water sources, but with increased deforestation in recent times, these drinking-water sources had been exposed and degraded. They confirmed that when government and non-governmental organizations came to the communities to dig boreholes, community people often perceived these boreholes and new drinking-water sources as being owned by outsiders; thus, the community people most often refuse to clean and take care of these boreholes unless paid. This response by local people was attributed to the fact that in an effort to ‘modernize’ these forest communities, outsiders did not recognize traditional leadership structures and did not deal with community leaders directly. Communities were therefore divided between looking to traditional leaders or taking money from external players; and outsiders’ money community members confessed had trumped indigenous practices and traditions²⁸.

Elderly participants in Agoi-Ibami recalled how women used to protect trees in various ways, such as by enforcing conservation-related taboos through songs, dances, dramas and stories. As a group, they were persuasive verbally and sometimes even physically. It was unclear why these women are no longer active in protecting trees, although most elderly women in both Iko-Esai and Agoi-Ibami still remember the songs. One of the songs in Iko-Esai was given as follows:

“... *orukoo aruna, orukoo aruna ne, orukoo aruna ne...*” (... these trees you watch our community, you watch our community you these trees...)

Male KII/Iko-Esai/90 years/August 30, 2014

Elderly respondents in Batatong vehemently acknowledged the intricate relationship between nature and culture. Their views culminated to affirm that many traditional cults and societies depended on specific forest resource for their rites and ceremonies. It is easy to suggest

²⁸ To modernization theorists, the acceptance and demand for money by community members, which represents a ‘market technique’ of capitalism, is indeed a sign of progress and modernity (Schultz and Lavenda, 1998). However, the study findings revealed that elderly men and women in forest-dependent Cross River were psychologically upset by the ‘new’ socio-economic order where community members now demand for money before rendering a community ‘service’.

what had happened to these cults and societies as forest resources have depleted. Also, the royal family of *Ikenne-Nkim-Osokom*, for instance maintains close spiritual links with animal species referred to as *esan* (totem). This family totem is believed to be responsible for the protection and general welfare of the royal family and community at large. It is believed that the death of a totem, often as a result of poaching and deforestation, result in the death of the royal family members.

Photo 4.8: Shrine of a totem (indigenous cults and societies depend on forest resources)



Source: Author, 2012

4.7 Source of Climate Change Response

In precise terms, the main source of response to climate change in forest-dependent Cross River was found to imitate Robert Merton's description of functionalism in the context of modernity. Participants vehemently affirmed that although their indigenous knowledge systems recognized the notion that every element in society contributed to the healthy existence of the society by working in accordance with others; yet they also recognized that not all traditional practices and values serve equal purpose for members of the community. This position no doubt contradicted the organism analogy which served as the mainframe of both functionalism and the modernization theory. From the study findings, it was revealed that climate change adaptation in Cross River was found not to be associated with other aspects of development planning & policy. Although there are attempts to integrate climate change adaptation planning into wider poverty reduction programmes, evidence reigned to show that this was not a priority to the local government councils in Cross River.

Events at the global context in terms of the dynamics of the two starvations were found to also have implications for climate change adaptation in forest-dependent Cross River. That is -

energy starvation for western countries and food starvation for African countries. This was found to have led to the adoption of cultural and behavioural practices to sustain energy sources and agriculture in forest-dependent communities of Cross River State. The World Commission on Forests and Sustainable Development (WCFSD) for instance had produced the first global estimate of the number of forest-dependent people who depend on forests for survival. According to them, about 350 million people depend almost entirely on forests for subsistence and a further 1 billion on woodlands and trees for their essential fuelwood, food and fodder needs (Forest Benefit Report, 2014). Currently, Chao (2012) had estimated that the number of forest-dependent people across the world is in the range of 1.2-1.4 billion people or just fewer than 20 percent of the global population.

The notion of universal functionalism which implied that every existing social and cultural element served a positive purpose in a given society emerged during discussions with participants in the study. Another point of interest that emerged in the study was the idea of indispensability of institutions, norms, values and behavioural patterns in a given society. Findings counteracted this idea as most participants believed that a particular institution can have the ability of performing so many roles while same roles may have more than one uses which may cushion the effects of a 'dispensed' institution.

Participants substantiated what constitutes modernity. Their conceptions dwelt on the understanding that the socio-economic and political formations of their communities at pre-colonial times were distinct from that created by colonialism and modernization. Participants insisted that colonialism and modernization have indeed exercised powerful influence in the shaping of the central parameters of forest communities' history and culture. An interviewee emphasized this fact in the following manner:

We have really witnessed new and different cultural patterns in how we now live our lives... We cannot say that we still have a pure way of doing things in our community, the knowledge we use for solving problems is often foreign knowledge. ... This has severe consequences for us no doubt.

Male IDI/Agoi-Ibami/45 years (September 17, 2012)

A ‘forest expert’ was quick to assuage contentions as what constitutes indigenous knowledge and scientific knowledge. She stated thus:

There is a difference between indigenous knowledge and scientific knowledge. Scientific knowledge is usually backed-up with data, this is not really so with indigenous knowledge. Scientific knowledge is generated through data collection, collation and analysis; this is not usually so with indigenous or traditional knowledge – there is no systematic way of documenting indigenous knowledge. Hence, most of climate change adaptation programmes emerge from scientific knowledge and not indigenous knowledge and practices.

Female KII/Iko-Esai/38 years (September 26, 2012)

Analytically, it can be said here that this conception of indigenous knowledge is void of the understanding that tendencies to expansion and building capability to tackle resulting problems are common to all societies. However, it is the ways in which each society copes with these problems that vary greatly. Even though indigenous or traditional societies, just like forest-dependent Cross River, vary widely, from the so-called primitive society to the differing literate societies: tribal federations, patrimonial, feudal, and imperial systems, city-states, and many other types of societies; there is one thing that all traditional societies share in common, the acceptance of tradition, of the ‘givenness’ of some actual or symbolic past event as the major focus of their collective identity. This indeed formed the delineator of the scope and nature of their social and cultural order and an ultimate legitimator of change and innovation.

Tradition and cultural practices in this context served not only as a symbol of continuity, but as the delineator of the legitimate limits of creativity and innovation. This indeed fostered ‘endogenous development’, a development approach where community people seek a balance between modern and indigenous practices. It involved a collaborative process for local institutional development that carefully blends internal and external processes. Forest dependent communities were proud of their knowledge of how to use local plants. One elderly participant explained that even though Butatong does not have ‘powerful hospitals’, the limited access to modern medicines has allowed community members to greatly utilize their ‘ancestor’s medicine’. Participants acknowledged that this knowledge of the use of ‘local plants’ for instance, needs to be conserved as modern medicines are almost entirely out of the communities’ reach. They also recognized that this knowledge is being threatened by the pull toward modernity. A description given by a colonial source acknowledged this threat in the following way:

From a material point of view, the District (tribes in present day Cross River) generally may be described as poverty-stricken in the sense that there is no accumulation of wealth and little desire for the comforts and luxuries associated with civilization. Actually the native is infinitely better off than countless thousands of Europeans. The meaning of starvation, un-employment and industrial discontent, has yet to be learned by this simple agricultural people. They are self-supporting and can supply their own needs. Housing, birth-rate and food supply have not yet become problems. Education has not yet denationalised them, nor has industrialism drawn them from the farm. Content with a simple standard of living they escape the struggle and unrest that wealth entails²⁹.

Intelligence Report, Ogoja Province, District of Ogoja, Sheet No. 2/1925

In critically examining this ‘pull toward modernity’, participants’ analyses followed Talcott Parsons (1951) views on social progress and evolution, where society’s progress is described as a process of ‘social evolution’ from simple to more complex forms. Parsons identified adaptation as the major driving force of social evolution. Meaning that the history of human society from the simple hunting and gathering band to the complex nation-state represents an increase in the ‘general adaptive capacity’ of society – where societies evolve into more complex forms, having more control over the environment. Parsons had argued that although economic changes provide initial motivation for social progress, in the long run, he showed that cultural changes – that is changes in values – actually determine ‘broadest’ patterns of social change and progress. Parsons identified two sets of cultural values: pattern variables A and B. Apart from family life, Parsons argued that pattern variables A are typical of simple societies; while pattern variable B are typical of advanced industrial societies. Social progress therefore requires a movement towards the adoption of pattern variables B (achievement, specificity, universalism, effective neutrality, and self-orientation). He stressed that if a society fails to move towards pattern variable B, the society will stagnate, that is pattern variables A (ascription, diffuseness, particularism, affectivity, and collective orientation), stop a society from developing. According to Parsons, these pattern variables consist of ways that society attempts to answer basic questions of how rewards should be allocated to individuals and whether members of society should look after their own interests or the interests of those of the social groups to which they belong. Drawing insights from Ake (2009), this Parsonian position can be

²⁹ Statement of a Colonial Official as found in the Intelligence Report, Ogoja Division. Ogoja Province, District of Ogoja, Sheet No. 2/1925

disparaged as being representative of the most subtle and most pernicious form of imperialism – that is imperialism in the guise of scientific knowledge. This also infer that the imposition of scientific or western knowledge in climate change adaptation within forest-dependent communities of Cross River amounts to imperialism because this foist on these communities - capitalist values, capitalist institutions, and capitalist development - making these societies look more like western societies, thereby propagating mystifications, and modes of thoughts and actions which serve the interests of capitalism and imperialism.

4.8 Synergy for Climate Change Adaptation in forest-dependent Cross River

Participants were quick to recognize that although there have been collaborative efforts from outsiders in forests management, the emerging programmes and practices do not largely place emphasis on the structural harmony of the social institutions of forest-dependent communities. Participants interpreted this structural disharmony in terms of the absence of shared norms and values upon which members of forest-dependent communities are socialized as regard forest-management. Their understanding resided on the fact that once norms and values are internalized by a given people or community, deviation from practices as promoted by these norms and values becomes minimal and social actions even as related to environmental management become predictable, leading to the maintenance of a stable balance or *structural social homeostatis* that surely benefit the entire community. Accordingly, it was stressed that if indigenous knowledge for forest management must survive and not go extinct, the stable balance must be achieved at all time, at all cost, thus placing much emphasis on conformity than dissent. Even when dissent is experienced, it must be quickly addressed for it is often considered inimical to the societal existence as every institution must function together as a unit even when they have their peculiar characteristics. Concepts like; cohesion, cooperation, harmony, agreement, integration, order, solidarity, persistence and continuity are therefore central to consensus theory while social change is considered gradual and orderly. A principal character of the existing synergy that participants confirmed that existed between indigenous peoples and communities lacked the competence of addressing the fundamental sociological concern of social order.

Outsider's forest governance strategies, especially those supported by the World Bank were seen to aim at helping to attain the goal of poverty reduction without jeopardizing forests environmental and economic values intrinsic to sustainability. These strategies were usually founded on three equally important and interrelated pillars which include: harnessing the

potential of forests to reduce poverty in a sustainable manner; integrating forests more effectively into sustainable development objectives; and protecting vital local and global environmental services and values. Climate change adaptation in this context is concerned not only with growing or protecting trees but it also involved a complex interaction of policy, institutions, and incentives. This strategy embodied a multi-sectoral approach that addressed cross-sectoral issues and takes into account the impacts of activities, policies, and practices outside the sector of forests and people who depend on forests for their livelihoods.

It was revealed that forest communities only played supportive roles in climate change adaptation programmes. Experts that drove these programmes were usually outsiders who most times were volunteers coming to work in these communities to gain more 'professional experience'. Participatory Rural Appraisal (PRA) exercises carried out during the study showed six principal local institutions that were interwoven in forest-dependent communities of Cross River in respect of issues of forest management. These include: Timber Dealer Development Cooperative (TDDC); Age grades (AG); Conservation organizations (CO); Youth Council (YC); Farmers' Council (FC); Church Groups (CG).

Table 4.8: Local institutional analysis in forest-dependent Cross River

Details of Institution	Brief note on membership	Objectives	Leadership/Management	Achievements	Institutional Needs
T.D.D.C (Timber Dealers Development Cooperative)	Above 12 years old, made up of timber dealers and community chiefs	Unity, mobilization of resources for community development	Chairman, Vice Chairman, Secretary, Treasurer and other officers based on constitution	Culverts in Iko-Esai, furnishing of paramount chief palace in Agoi-Ibami	Credit scheme, friendly government policies
A.G (Age Group)	Based on the community membership by age peer	Unity, group and community labour to support tree planting and other community development activities	Chairman, Secretary, Treasurer and other Task force officers.	Unity among diverse community groups in Iko-Esai, communal labour to support tree planting in Iko-Esai	Funds, orientation to enhance institutional development
C.O (Conservation Organizations)	Membership is opened to interested community members	Unity, communal efforts to encourage conservation of endangered species	Chairman, Secretary, Treasurer, Rangers.	Support to community forest management projects in Butatong, Iko-Esai and Agoi-Ibami	Funds, training and general re-orientation
Y.C (Youth Council)	Membership is made up of youths.	Unity, and general development of the community	President, Vice President, Secretary, Treasurer	Unity, general information dissemination on conservation activities across secondary schools in Cross River	Funds, training to enhance management abilities.
F.C (Farmers' Council)	Made up of registered farmers.	Unity, controlled farming and agroforestry information dissemination	Chairman, Secretary, Treasurer	Unity, general enlightenment as regards sustainable farming practices	Funds
C.G (Church Groups)	Membership is based church attendance	Support community development projects	Chairman, Secretary, Publicity secretary, Treasurer	Unity, the organizing of seminar and special meetings to disseminate sustainable farming information	Funds, training to enhance leadership abilities.

Source: fieldwork, 2012

Looking at the dynamics of local institutions in forest-dependent Cross River, responses of participants largely followed Gross (2012) position that hazards in present day ‘modern’ society are no longer communicated as external, unavoidable influences or perceived to be in the hands of the ‘powers-that-be’; instead, hazards are more likely attributed to decisions made by individuals and institutions. For instance, earthquakes, floods and other natural disasters are indeed no longer seen as inevitable natural catastrophes, as their causes can be attributed in large part to human decision-making. Thus, institutions at specific levels have a role to play in making future uncertainty less uncertain through risk and institutional analysis. Consequently, coincidences, misfortunes and gaps in knowledge are avoided at all costs.

Precisely, it is apparent that most of the climate change extreme events have eluded frameworks of actuarial prediction; the findings established that this is attributed to the fact that there is little or no direct historical experience to fall back on in actually evaluating the new dimension of climate change challenges. Central to this reality is the shift of forest-dependent peoples of Cross River from traditional strategies of risk management toward an enhanced capacity to cope with ignorance by relying more on strategies from outsiders. Risk was collectively conceived as the probability of a harmful event multiplied by the amount of harm the event is expected to inflict.

4.9 Preservation of Indigenous Knowledge for Forest-Management

Indigenous peoples in Cross River were seen to have adapted cultural belief systems which demonstrated an immense respect for forest resources. These systems contained rules which defined how the forest should be treated and how the knowledge for the treatment of forest should be preserved and disseminated to future generations. Forest communities treated the forest as an integral part of their day-to-day existence; they have organic conceptions of the forest. They believed that the animate and inanimate worlds are inextricably interwoven; and both forms of existence are regarded as sacred. In Butatong and Agoi-Ibami communities for instance, ancestral souls are said to reside in thriving forests, which also are used to provide for the daily needs of community members. For them, the forest is everything and they felt an affinity with it and were thankful for its supply of staple foods, building materials, medicines and raw materials for handicraft. The forest is their world and they lived in harmony with it and so guarded it jealously. At the heart of this deep bond was the awareness that all of life, mountains, rivers, skies, forests, animals, plants, insects, rocks, and community members were inseparably

interconnected. That is both material and spiritual worlds are woven together in one complex web. In Agoi-Ibami, Butatong and Iko-Esai, almost all living things were imbued with sacred meanings. Participants were very much aware that the living sense of connectedness of the people to forest objects is gradually disappearing due to modernization and globalization.

In terms of preservation of indigenous knowledge systems and practices for forest-management among forest peoples of Cross River, their conception follows Martin Heidegger's position that 'we do not exist inside time', '*we are time*'. To them, the relationship to the past is a present awareness of *having been*, which allowed the past to exist in the present. Hence, this allowed the future to exist in the present. Participants reasoned that they are always able to remember the past and project into the future – thus, this gave them a kind of random access to representation of temporal existence and how forests should be managed through basically *thoughts* and not written records per se.

In this way, the perception of participants in the study followed the functionalist description of the contributions that *sacred objects* make in meeting the needs of society. According to them, every society requires a certain amount of social solidarity, value consensus, and harmony and integration among its various parts. A participant put this in the following proverb:

'Odut ma otitimobo okumi ochima'. This means that once you eat and then put a reserve on the bed for another person, this will save your life. This proverb simply explains the basic principle of life that governed the lives of our fore-fathers. It entrenched values of kindness and cooperation among members of the clan.

Male IDI/Iko-Esai/paramount chief/58 years /September 23, 2012

Hence, the primary function of *sacred objects* in forests is the meeting of functional prerequisites, for instance, their contribution to social solidarity. Their position is no doubt in consonance with the thoughts of Emile Durkheim (1912) as found in his work, *The Elementary Forms of the Religious Life*, where he showed that all societies divide the world into two basic categories: the sacred and the profane (non-sacred). According to him:

By sacred things one must not understand simply those personal things which are called gods or spirits; a rock, a tree, a spring, a pebble, a piece of wood, a house, in a word anything, can be sacred.

Participants followed Durkheim's thought to maintain that social life in general and ecological sustainable behaviour in particular, is impossible without the shared values and moral beliefs that formed the *collective conscience*. Without these values and moral beliefs, they argued that there would be no social order, social control, social solidarity or cooperation for climate change adaptation within forest-dependent communities of Cross River. In short, they held that shared values and moral beliefs that emerge from *sacred objects* function to reinforce collective conscience. This accordingly was possible within their society because, by classifying certain things as *sacred* – they provided them with greater powers to direct human action. They recognized that this attitude of respect toward the sacred is what applied to social duties and obligations of forest management in their communities before the 'coming of the white-man'. That is in them worshipping and revering their natural environment; they were in effect recognizing the essence of community life and their dependence on this kind of life.

Participants stressed that their indigenous knowledge for forest-management included behaviours as well as beliefs and myths. They believed that gods, ancestral spirits, and other supernatural beings do take an active interest in their affairs and forests. Consequently, such supernatural beings which 'stay in our forests can be consulted for blessings or assistance, or at other times they are commanded to do things for or against people'. They also believed that supernatural beings and forces can make natural events occur and can intervene in human affairs, thus, they have certain prescribed cultural behaviours (rituals) that are used to interact with and influence these powers.

One participant defined these behaviours 'as organized performance of behaviours intended to influence spiritual powers'. These accordingly included definite patterns of speech or movement and sequences of events. Another participant collaborated:

We have to be engaged in these behaviours because we want supernatural powers to do things on our behalf. We want them to make us healthy and fertile, to give us rain, make our crops grow; in general, bring blessings to us. This explains why we make sacrifices and make prayers, to ensure that the gods and the spirits of our dead ancestors intervene favourably in our lives.

Male IDI/Butatong/68 years (November 17, 2013)

Rituals as we know the world over have symbolic aspects. They often occur in places that have symbolic significance to the performers. For instance, they may be held where some

mythological events occurred. Rituals often involve the display and manipulation of objects that symbolize an event, a person, a relationship and a variety of other things. For the people of Agoi-Ibami, Butatong and Iko-Esai, forests are the most symbolic places where rituals occurred. Their classification of rituals is similar to that of anthropologists who have classified rituals into two broad classes: the first classification had been based on conscious purposes for which rituals are intended. For instance, there are divination rituals which are performed to acquire information from a supernatural power about the future or about some past event. The second classification is based on when rituals occurred – that is whether they were held on a regular schedule (example, daily, weekly, monthly or yearly), or simply whenever some individuals or group need them (example, funeral, marriage rites). The regular rituals referred to *calendrical rituals*; whilst rituals organized and performed to meet specific needs referred to *crises rituals*.

Another source of preservation or documentation of indigenous knowledge in forest-dependent Cross River was the Forest Policy for Nigeria. Although most participants recognized this as a colonial creation, however, they were quick to assert that the forest policy represents the interest of indigenous groups in some ways. They argued that in theory, the main objective of the forest policy was shown to seek for the maximum benefit of local communities. When perused in the archives, the Forest policy was seen to be based on two main principles that provided that forest-management within forest communities served the purpose of ensuring that:

- (i) The climatic and physical conditions of forest communities were preserved by the control, maintenance or rehabilitation of vegetation of the rainwater run-off in those areas where lack of control would cause damage to other lands or waterways and endanger the water supplies and soil fertility.
- (ii) The supplies in perpetuity of all forms of forest produce to satisfy the wants of the people through an assured acquisition and preservation of an adequate forest estate.

Table 4.9 summarily showed suggested ways as given to respondents in effectively preserving and disseminating indigenous knowledge within communities of Cross River State.

Table 4.9: Analysis of effective ways of preserving and disseminating indigenous knowledge at community level

Preserving technique	Findings
Stories	→ majority of households in the survey (89%) affirmed that their indigenous knowledge is preserved in stories and folklores.
Proverbs	→ majority of households (57%) confirmed that indigenous knowledge for forest management is also preserved through proverbs.
Written books	→ as regards preserving indigenous knowledge in written form (books & journal), most households (61%) felt that indigenous knowledge and practices for forest management would be effectively preserved when documented in published books and journals.
Workshops	→ the organizing of community workshops from time to time to educate community members on issues of sustainable indigenous practices for forest management was identified as an effective way of both preserving and disseminating indigenous knowledge for forest management. Majority of households in the survey (80%) believed that community workshop is an effective strategy of preserving and disseminating indigenous knowledge and practices.
Video clip & film	→ About 47% of households were certain that video clips and films are effective sources of preserving indigenous knowledge and practices for forest management.
Drama	→ Drama performances within communities by various groups was seen to significantly influenced the preservation and dissemination of indigenous knowledge and practices (t = 22.800; df = 444; P<0.01).

Source: fieldwork, 2012

Table 4.10 roughly demonstrated underlying traditional religious beliefs that have significantly influenced the preservation and dissemination of indigenous knowledge for forests management in forest-dependent Cross River:

Table 4.10: Some conceptual affirmation of indigenous religious beliefs among forest dependent peoples of Cross River

1.	The Sacred and the profane	In traditional religious beliefs of forest-dependent peoples of Cross River, the sacred was found to co-penetrates the profane. This implied that any object that comes in contact with the sacred acquired a sacred status. This also meant that forest resources easily acquired a sacred status.
2.	The world	The world is divisible into two planes – the material world in which humans live, and a world beyond inhabited by the spirits of the departed.
3.	Time	To the people of forest-dependent Cross River, time is defined in terms of ‘here’ and ‘now’, the future is non-existent as actual time.
4.	Life	Human life is explained as a cyclical experience which begins from birth through death and then to re-incarnation or rebirth.
5.	Human beings	Humans are believed to have the capacity of manipulating the gods through sacrifices to get what they want. Humans are also believed to have capacity of manipulating other forces in nature, including forests and the climate system.

Source: fieldwork, 2012

Part of primary historical documentation in this work also emerged from sources outside forest-dependent communities of Cross River State. The aim here is to also gain understanding about other people’s ‘indigenous knowledge’ and ‘their environment’. On the whole, throughout the documentary analysis, the clear focus was to explore the emergence of new standards of behaviour and new ways of thinking about indigenous practices of forest-management and other things, and to then explore how these ideas and behaviours developed and changed over time to reach the present state of both concern about climate change as an anthropogenic concern as well as the contestation over the extent to which an *ecological sustainable culture* would solve the problem.

A new twist that emerged during both the documentary and oral evidence analysis was illumination on attitudes of the locales as regards the receptivity towards scientific explanations and scientific ‘experts’. This also involved analysing evidence that is ‘sceptical’ about climate

change. One of the basic reasons why these range of evidences were analysed was to explore how different types of evidence provided understanding about ‘human life’ and ‘nature’. By interacting with such a wide variety of evidence, it was possible to identify the variant changes that have developed in forest-dependent communities in Cross River and to also assess the transferability of ideas from one generation to the other.

The basic character of the variant changes summed up to establish that the social structures and processes which have shaped the ‘life experiences’ of forest-dependent communities in this era of climate change are often hidden or obscured by conventional beliefs, powerful interests, and official explanations. One of the most dangerous of these is how the impacts of climate change are understood as events or actions that are immediate in time, and explosive in space. Participants were certain that much destruction of climate change events takes the form of a “slow violence”³⁰ that extends over time. This means that the destruction is usually insidious, undramatic and relatively invisible. By ‘slow violence’, this also implied what Rob Nixon called ‘...*the long dyings*’, a destructive condition that occurs gradually and out of sight, and not usually viewed by all.

Emphatically, discourses that emerged aligned with Zygmunt Bauman’s (the iconic sociologist of modernity) submission that the present-day society, which is individualized by the decree of fate, therefore presses for change in ways that individuals-*by-decree* and *de jure* of the liquid-modern times may be lifted to the rank of individuals-*by-choice* and *de facto*. The strategy to achieve this hence consisted in engaging in an ongoing dialogue with “actor’s knowledge”, while at the same time, observing the principles recently suggested by Richard Sennett in his essay on the present meaning of “humanism”, that is: precepts of informality, openness and cooperation. “Informality” here refers to the rules of dialogue are not pre-designed; they emerged in the course of the dialogue. “Openness” meant: no one entered the dialogue certain of his/her truth and tasked with convincing the others (holders, a priori, of wrong ideas). And “cooperation” meant: in that dialogue all participants are simultaneously teachers and learners, while there are neither winners nor losers... The price to be collectively paid for neglecting,

³⁰ The South African Sociologist, Jacklyn Cock, had used the concept of “slow violence” to consistently and constantly explore the relationship between violence and inequality. In her work, *The War Against Ourselves*, she fashioned sociology to expose the major environmental injustices of our time.

collectively, that advice, in climate change adaptation can be the (collective) irrelevance of scientific solutions to climate change adaptation in forest-dependent Cross River.

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CHAPTER FIVE

SUMMARY, RECOMMENDATIONS AND CONCLUSION

5.1 Summary

The study examined indigenous knowledge for forest-management and its application to climate change adaptation in forest-dependent Cross River State, Nigeria. The results obtained revealed that:

Indigenous knowledge for forests-management in forest-dependent Cross River is “*at risk of becoming extinct*”. Findings confirmed that this is because oral paths are being blocked and community people no longer live in homogenous community blocks. Another reason was that indigenous knowledge systems in these communities were rarely documented. Indigenous knowledge was found to be documented, disseminated and preserved in forest-dependent Cross River through: taboos, festivals, plays-dramas; stories; and songs.

Findings revealed trends and challenges of climate change in the past 25 years; it was established that climate change have significant impact on rural water resources in forest-dependent Cross River. This impact was evident in three dimensions: too much water (flood); too little water (drought); and reduced water quality (contamination of freshwater).

The pattern of response to climate change challenges among forest-dependent peoples of Cross River State was observed to occur within two broad solutions: technological solutions from ‘outside’; and solutions that involved changes in economic structure, social organization and individual modification of behaviour among community members. Solutions that involved the modification of behaviour included the adoption of efficient environmental resources management practices such as the planting of early maturing crops, adoption of special varieties of crops, development of early warning system for the prediction or forecast of extreme weather events.

Events at the global context in terms of the dynamics of the two starvations were found to also be a source of climate change and had implications for climate change adaptation in forest-dependent Cross River. That is energy starvation for western countries and food starvation for African countries: this was found to have led to the adoption of cultural and behavioural

practices to sustain energy sources and agriculture in forest-dependent communities of Cross River State.

The study findings revealed that although there have been collaborative efforts from outsiders in forests management, emerging climate change adaptation programmes do not place emphasis on the structural harmony of the social institutions of forest-dependent communities. Participants interpreted this structural disharmony in terms of the absence of shared norms and values upon which members of forest-dependent communities are socialized as regard forest-management. Consequently, forest communities were found to only play supportive roles in climate change adaptation programmes; ‘experts’ from outside were indeed the principal actors in initiating adaptation programmes and activities in forest-dependent Cross River.

In terms of preservation of indigenous knowledge systems and practices for forest-management among forest peoples of Cross River, participants’ conception followed the notion that ‘the past is at present’ – this allowed the past to exist in the present. Hence, this also allowed the future to exist in the present. Participants reasoned that they are always able to remember the past and project into the future – thus, this gave them a kind of random access to representation of temporal existence and how indigenous knowledge for forests-management is preserved in thoughts and not written records per se.

5.2 Recommendations

The following recommendations are made to serve as key guidelines for the development of sustainable forest-management practices that integrate indigenous knowledge in climate change adaptation activities, projects and programmes in forest-dependent Cross River State, Nigeria:

- Development partners and governments should be made to be aware that most indigenous practices such as: preservation of special species of trees as homes of spirits; preservation of portion of land with big rocks as homes of spirits; the practice of shifting cultivation and crop rotation; weeding of farmlands instead of spraying chemicals; land inheritance from parents to children; prohibitions of outright land sale to especially external and non-communal interests - have provided forest-dependent communities in Cross River with

the capability of dealing with past and present vulnerabilities to climatic extremes and other stresses.

- The role of rural communities in forest management and the importance of forest resources to the rural poor should be recognized in legislation in State Houses of Assembly and the federal legislature (House of Representatives and Senate) Nigeria.
- Climate change adaptation projects and programmes in forest-dependent communities of Cross River should follow a bottom-up participatory approach that encourages the highest level of local participation. The benefits of this approach can be seen in two-fold: (i) this provides valuable insight into how communities and households interact and share ideas, and (ii) it allows the intended beneficiaries to develop the skills and practices necessary to forge their own path and sustain the projects or programmes.
- Forest-dependent communities of Cross River State should be seen as equal partners in the development process. Climate change adaptation in these communities should be viewed as an internal process, which is only enhanced by outsider assistance. Hence, local communities should progressively take the lead while external partners back their efforts to assume greater responsibility for their development. As reducing vulnerability really entails the strengthening of adaptive capacities of vulnerable individuals and groups. Capacity building that actually sustain development emphasize the need to build on what exists, to utilize and strengthen existing capacities, indigenous knowledge plays a significant role in the sum total of what exists in a local community.
- In as much as the importance of indigenous knowledge is well acknowledged, these practices should not be developed as substitutes of modern techniques. It is important that the two are complements and learn from each other in order to produce ‘best practices’ for adaptation.
- It is important to note that not all indigenous practices are beneficial to the sustainable development of a local community; and not all indigenous knowledge can a priori provide the right solution to the challenges of climate change. Thus, before integrating indigenous practices for forest-management into climate change adaptation activities, projects and programmes in forest-dependent Cross River, practices such as: preservation of special species of trees as homes of spirits; preservation of portion of land with big rocks as homes of spirits; shifting cultivation and crop rotation; weeding of farmlands

instead of spraying chemicals; land inheritance from parents to children; prohibitions of outright land sale to especially external and non-communal interests, need to be scrutinized for their appropriateness by the people, just as any other technology. In addition to scientific proof, local evidence and the cultural background in which the practices are embedded also need consideration in the process of validation and evaluation.

5.2.1 Policy Implications of the Study

1. **Government:** - The importance of forests to national development cannot be overemphasized; governments can address poverty and forest governance by promoting forest ownership and access rights. Governments should therefore ensure the recognition of the rights of local and indigenous groups and give greater attention to land tenure, ownership, and rights to resource and access issues. Government should also ensure participation of stakeholders in the formulation and implementation of policies, strategies, and programmes to foster ownership and long-term sustainability of forest resources.
2. **Private Sector:** - The private sector has a major role to play in facilitating responsible private investment. Most World Bank client country governments are working to attract responsible domestic and foreign private sector investments to achieve effective conservation and sustainable management of forest resources. Forests here are conceived as an engine of economic growth and development. Increase investments in plantations in this regard would surely expand forest certification and overall forest management, and encourage responsible private sector investments, including partnerships for on-site forest enterprise development, and for market access.
3. **Financial Institutions:** - The World Bank and other financial institutions have a role of mainstreaming forests in their agenda through greater inclusion of forest sector issues in Poverty Reduction Strategy Papers (PRSPs) and Country Assistance Strategies (CASs) and better alignment of Poverty Reduction Support Credits and Global Environment Facility (GEF) and International Finance Corporation (IFC)

resources with the overall lending programme to support climate change adaptation and at the same time address poverty and livelihood issues. Also, these institutions have a responsibility of ensuring efficacious application of the World Bank's safeguards policies (especially on the social front) in traditional forest lending projects, and strengthening due diligence for forest concerns in Development Policy Lending (DPL), through increased participation, better knowledge management and communication, and focused staff training. Thereby strengthening forest governance and integrating forest governance into World Bank policy dialogue and projects to achieve concrete outcomes in client countries.

- 4. Community Based Organization/Associations:** Forest communities should not only depend on government to support them with the necessary support to manage their forest resources. Rather, communities should learn to be independent of government by forming themselves into community based organizations or associations in order to utilize the World Bank's leadership position in the global forest dialogue and take advantage of emerging economic and environmental opportunities (such as the attractiveness of biofuels, for example) to foster sustainable forest management. This can be achieved through the integration of forest interdependencies into the design of agriculture, rural development, and natural resource management projects to ensure sustainable economic growth and rural poverty alleviation.
- 5. Non-Governmental Organizations (NGOs):** - Non-governmental organizations should also support sustainable forest management in a more pro-active manner. They should be more involved in carrying out needs assessments to develop a database that research institutes can work with for better understanding of the challenges of forest governance and climate change adaptation. They should also be involved in data collection to assist research institutes and other key stakeholders to have facts and figures about the role they could play in promoting indigenous knowledge systems and practices in climate change adaptation activities, projects and programmes.
- 6. Donors:** Bodies such as religious institutions, international development agencies like USAID, FAO, UNDP, EU, World Bank-WWF, IBRD, IMF, GEF and the likes

should help to sponsor programmes and projects that encourage the incorporation of indigenous knowledge and practices into climate change adaptation initiatives.

7. Educational and Research Institutions: Educational and Research institutions should encourage the establishment of the ‘Centre for Indigenous Knowledge and Development’ that generate, document, and disseminate indigenous knowledge for the purpose of development. University of Ibadan, through Centre for Sustainable Development (CESDEV) currently has a postgraduate programme in Indigenous Knowledge and Development, this is commendable.

5.3. Conclusion

This study asserts that forest-dependent communities of Cross River have indeed witnessed several changes in the use, management and governance of forests resources, and also the values attached to production, consumption and exchange processes of these forest resources. Consequently, these communities are confronted with two sets of divergent worldviews: the dominant, mainstream western-European, and other worldviews, referred to as indigenous knowledge systems (IKS), which are different from the mainstream and also include worldviews from non-western cultures. Evidence that emerged from this study prevailed to establish that predominant solutions for climate change challenges in forest-dependent Cross River showed an inherent bias towards modern-western worldview, preferring principles and actions advocated by ‘modern’ knowledge stream. Thus, the relevance of indigenous knowledge for forest management in climate change adaptation was found to be obscured, irrelevant, unnoticeable, and imperceptible in forest-dependent Cross River, even though communities of forest-dependent Cross River predominantly subscribed to indigenous and traditional worldviews; and that indigenous religious beliefs and practices of the peoples form the very heart of the people’s culture. In spite the cultural relevance of these beliefs and practices that also controlled much of the people’s social systems and formed the main source of their power – including the regulation of matters relating to forest exploitation upon which they hugely depend for survival, indigenous knowledge for forest management is significantly absent in climate change adaptation programmes and activities in forest-dependent communities of Cross River State.

5.4. Contribution of this Study to Knowledge

Considering the growing political, academic and local awareness of the necessity of adaptation to climate change in rural Nigeria, understanding that adaptation to climate change within rural Nigeria is defined by 'varied sensitivities' as exhibited by different groups of actors is crucial. This implies that adaptation to climate change will never be a homogenous process agreed upon by all members of societies, but one influenced by competition, conflict, and boundary maintenance. Acknowledging this must be a first step for governments, donor agencies, researchers, and civil society if climate change adaptation at the rural level is to be facilitated, supported and understood. This also reinvigorates the fact that human actions are limited or determined by the 'environment' – meaning that human beings become what they are at any given moment not by their own free decisions taken rationally and in full knowledge of the conditions, but under the pressure of circumstances which delimit their range of choices and which also fix their objectives and the standards by which they make choices. This describes social interaction and climate change adaptation in rural Nigeria: that individuals' behaviour in adapting to climate change extreme events is never entirely free but is always determined by forces outside the community.

Again, findings of this study have further shown the general importance of forest resources in climate change adaptation; as these have brought out the significant role of *beliefs* and *values* in the operation of society. This is because the state of things in society depends largely on *how* and *what* we think about nature. The capitalist tendency of competition and strive for material comfort expressed through conspicuous consumption has indeed led humans to relentlessly exploit the environment. The analysis of this study has also brought out the structural-functional view of society as a system with interrelated parts in which what affects one part affects the others; and consequently puts the entire system at disequilibrium.

Finally, this study has reaffirmed endogenous development as an attractive development paradigm. The study findings have increased understanding that indigenous and cultural institutional development is a 'necessary pre-condition' for strengthening capacities of communities for self-initiated mobilization and development. And that information for climate change adaptation does not only emerge from processed data of a scientific process, but also emerge as an outcome of a social learning process (socialization). This position is a volte face of

previous findings that had always attributed sustainable development to only technological capabilities developed through ‘western’ or ‘scientific’ knowledge.

5.5. Suggestion for further studies

1. Considering the enthusiasm of forest-dependent peoples of Cross River State to cooperate with government and development partners to improve livelihoods at the community-level, it is recommended that further studies be conducted to examine how indigenous knowledge systems and practices can be incorporated into other sustainable development programmes other than climate change adaptation. The incorporation of indigenous knowledge into development projects would definitely help governments to make appropriate policies as regard sustainable development.

5.6. Limitations of the Study

The primary limitation confronted in the study is related to the condition of some community records that were obtained. Many of these records were undated, which made interpretation in a linear timeframe difficult. Another limitation is related to the inability of some community leaders to remember events that occurred as long as 100 years ago. For some of these people, the memories they recreated had not been articulated to anyone prior to their interviews. For some, this process was emotionally difficult.

Appendix: Tools and methodologies for Participatory Rural Appraisal (PRA) as employed in this study

S/N	Research Questions	Research tools employed
1.	Types of Indigenous Knowledge Systems (IKS) for forest management among Indigenous Peoples of Cross River State	<ol style="list-style-type: none"> 1. Listing, ranking 2. Seasonal calendar 3. Trend Analysis 4. Questionnaire (frequency tables)
2.	Changes in climate conditions over-the-years	<ol style="list-style-type: none"> 1. Trend Analysis (includes climate changes in the last 25 years) 2. Interviews 3. Transects 4. Questionnaire (bar charts & histograms)
3.	How have forest-dependent Peoples responded to climate changes	<ol style="list-style-type: none"> 1. Seasonal calendar for food storage, availability, food habits, migration and income 2. Institutional analysis 3. Social or well-being mapping – who went to who for food, shelter, security, money, medicine 4. Vulnerability ranking 5. Questionnaire (correlation)
4.	Sources(s) of response to climate change – response emerged from communities or response introduced by outsiders	<ol style="list-style-type: none"> 1. Social or well-being mapping 2. Seasonal Calendar 3. Vulnerability Analysis 4. Focus Group Discussion 5. Questionnaire (multiple linear regression)
5.	Synergy in place in conjunction with outsiders to adapt to climate change	<ol style="list-style-type: none"> 1. Vulnerability Analysis 2. Interviews 3. Focus Group Discussion 4. Listing, ranking 5. Questionnaire (correlation)

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**DEPARTMENT OF SOCIOLOGY
FACULTY OF THE SOCIAL SCIENCES
UNIVERSITY OF IBADAN, IBADAN**

ANNEX A: Sample of Consent Form

Below is an example of a verbal consent form

My name is Godwin Odok, I am from the Department of Sociology, University of Ibadan, Oyo State, Nigeria. I am talking to people about indigenous beliefs and practices about forest-management. The information that you will give me will be used for my Ph.D thesis. I will ask you a number of questions about indigenous ways of forest-management and climate change adaptation related issues in your community. Some of the questions will be about what had been happening in your community before you were born. Some of the questions will be about things you have personally experienced. I am interested in your experiences and opinions. There is no right or wrong answer. You are free to refuse to answer any question. You have been selected to participate because you have been recommended as someone who has knowledge about issues related to indigenous knowledge and climate change adaptation in your community. Your participation is anonymous and identifying information will not be recorded or reported in any way against you. I mean, whatever you will say will be reported as anonymous quotations.

You may withdraw your participation in this interview at any time without consequences. The interview will last for about 60 minutes. If there are some important issues, we may come to interview you again.

May I have your permission to undertake this interview? Yes/No

If you do not want to participate, why:

.....

.....

Signature of the interviewer that a verbal consent was obtained:Date.....

ANNEX B: Semi-structured interview guide for farmers, traditionalists, chiefs, and community members

CODE:

Date: Start Time:

Location:

Interviewer name:

Interpreter name:

Interviewee: Gender M/F

***Size of forest land owned in plots:**

Below is a sample of the interview guide. No interview lasted more than one and a half hour; participants were told that they may be interviewed a second time if any need arise.

Introduction: Thank you for agreeing to participate in this interview. Do you have any questions? Thank you, I would like to start now.

1. **First we would like you to tell us a little bit about yourself** (*These questions are for background information only*).
 - a) Do you live here (selected community for the study)?
 - b) Who do you live with?
 - c) How long have you lived here?
 - d) Where do you come from?
 - e) What is your ethnic group and nationality?
 - f) What is your religion?
 - g) How old are you?
 - h) How do you earn money?
 - i) What is the highest grade of schooling that you have completed?
2. **Now I want to ask a more general question. Can you kindly tell us the main difficulties that people in this community face?**
3. **Also, kindly tell us about how your forest is being managed in this area.**
4. **What kind of traditional or indigenous practices and customs are commonly used in managing your forests?**

*A plot of forest-land here is approximate to the size of a football field.

- a) How many proverbs, songs, festivals, taboos, and wise-sayings in this community that reminds you about the sustainable use of the forests for the benefit of both present and future generations?
- b) How were forests cultivated, created, or established and managed, protected in this community before the coming of the 'Whiteman'?
- c)

5. How are these traditional practices and customs engaged in forest-management; that is how these practices and customs are carried out?

- a) What is the form of display (e.g. signs and symbols, masquerades, festivals, proverbs & wise sayings, taboos)?
- b) Do the practice(s) or custom(s) involve other people or just an individual (specify, for example, nuclear family-group; extended family-group; entire community)?
- c) Where do the practice(s) or custom(s) occur (home, stream, hill, public space, bush); in or outside the community?
- d) When and how often do the practice(s) or custom(s) occur (time of day, day of the week)?
- e) Is its occurrence generally approved by the community?
- f) How has the occurrence of these traditional forest-management practices and customs changed since you came to this community?
- g) Where do you think the change came from?
- h) How much has this change cost you?
- i) What are the perceived benefits of this change to the community?

6. Do you know of any benefits or problems associated with living in a forest-dependent community?

- a) Do you know of anyone in financial difficulties because he or she is living in this community?

7. Where or to whom do people in this community go to when faced of any climate change natural disaster like flood, drought, wind-storm, etc?

- a) What could be done to solve climate change natural-disaster problems in your community?
 - b) What services should be provided?
 - c) By whom?
- 8. Can you tell us about your own experience with climate change?**
- a) Have you ever been affected by any of the climate change extreme events like drought, flood, wind-storm, etc?
 - b) How did you respond or adapt to the event?
 - c) Was the knowledge you used to respond or adapt to this event come from people in this community or it came from people outside this community?
 - d) How did you get to know about this knowledge?
 - e) How much did it cost you to get the knowledge?
 - f) Does the source and cost of this knowledge vary from time to time (time of day, season) etc?
 - g) Is the knowledge always available for whoever needs it?
- 9. In your own opinion, what would help you to avoid problems related to climate change?**
- 10. Is there anyone else who you feel we should also interview?**
- 11. Is there anything else you would like to tell us about the ways your great-grand fathers managed your community forests?**
- 12. Would you like to know about the findings of this research?**

I have no more questions. Do you have any questions for us?

Thank you very much for participating in this research work and for spending time to be interviewed today.

End time: _____

ANNEX C: Semi-structured interview guide for NGOs, service provider, and policy makers

CODE:

Date: Start Time:

Location:

Interviewer name:

Interpreter name:

Interviewee: Gender M/F

Below is a sample of the interview guide. No interview lasted more than one and a half hour; participants were told that they may be interviewed a second time if any need arise.

Introduction: Thank you for agreeing to participate in this interview. Do you have any questions? Thank you, I would like to start now.

1. First I would like you to tell us a little bit about yourself. (This information has to do with the background of the interviewee).

- a) What is your profession?
- b) What is your role in your agency/organization?
- c) How long have you been working here?
- d) Where do you come from?
- e) What is your ethnic group?
- f) How old are you?

2. Can you tell us about forest-management and climate change in this population?

- a) Are there any climatic changes you have witnessed recently in this community?
- b) Do you see any trends developing?
- c) Is this the same pattern of climate conditions since when you came here?
- d) What do you think are the main causes of climate change in this community?
- e) Are there any climate change associated problems in this community? Please describe them.
- f) Are there people who are more affected?

- g) Are there any reasons why some people are more likely to be affected by these climate change related problems?
- h) What are some of the other problems faced by members of this community?
- i) Is climate change related problems more or less important than these other problems?
- j) What forest management philosophy guides your operations as an expert in this field – in other words, what really motivates you to be doing this kind of work?

3. How is your agency involved with this population?

- a) Does your agency provide any services to people affected by climate change extreme events or does your agency have any policies towards sustainable forest management?
- b) If no - why not?
- c) If yes - describe them. How long have they existed? How long do you plan to maintain them?
- d) Comment generally on the role of forests in solving the problem of climate change?

4. In your own opinion, are there any services, activities or policies that could be put in place to manage hazards associated with climate change extreme events in the community?

- a) What are the different types of capital – financial or economic; human; social (livelihood resources), which you think can help to encourage forest-dependent communities to support forest conservation activities?
- b) What forest assets do forest-dependent communities of Cross River have free control and access to?
- c) Describe how you think these communities are utilizing these assets to adapt to the impacts of climate change?
- d) Do these communities depend on outsiders for these assets are they have these assets within?
- e) Who are those from your community who participated in the decision of placing embargo on how forests are exploited in the community?
- f) Comment on how this embargo is affecting the lives of community members?

5. What barriers hinder the provision of services, conducting activities or carrying out policy towards sustainable forest management in this community?

- a) What institutional processes, in terms of formal and informal organizations, do you think is hindering sustainable forest management in this community?

6. Do you have any other comments that you want to make on forest management and climate change in this community?

7. Is there anyone else who you feel we can also interview?

I have no more questions. Do you have any questions for us?

Thank you very much for participating in this research work and for spending time to be interviewed today.

End time: _____

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ANNEX D: Focus Group Discussion Guide

CODE:

Group name/type:

Date: Start time:

Location:

Facilitator name:

Interpreter name:

Note-taker(s) name(s):

Number of participants:

***Size of forest land owned in plots:**

Focus groups discussions were held according to context. The researcher took into account the other methods being used to gather information, the type of information required and the feasibility of assembling a group of people among whom discussions were encouraged on a particular question. The questions explored in each focus group were decided following initial data collection through observation and key informants. Some questions that were explored in focus groups are given below. Not all questions were addressed in one focus group. Each focus group was made up of six to eight participants with similar cultural experiences (for example, farmers whose entire livelihood is on forest-resources; elders who have the responsibility of preserving indigenous practices and customs). Further groups of the same type of participant discussing the same question were convened until no new information was obtained.

Introduction: Do you have any questions?

Thank you, I would like to start now.

- 1. What are the main difficulties that the people of this community face?**
- 2. Tell me about climate change here in this community.**

*A plot of forest-land here was approximated to the size of a football field.

- a) Tell us about climate change extreme events in this community.
- b) How would you describe the nature of these events in terms of rainfall, temperature (cold/heat), storms and other natural disasters over the years - can you say these events have changed over the years?
- c) Do you think it is your deforestation that cause of this climate change or it is caused by outside forces?

3. How do people here respond or adapt to the impacts of these events?

- a) What traditional signs do you know that help to tell you that a natural disaster for example, storm, heavy rain, wild fire etc, is about to happen?
- b) How is the knowledge of these signs preserved and transferred to the next generation?

4. Do you know where the people of this community get the knowledge that they use to respond or adapt to the problems associated with climate change?

- a) What are you doing now either as a community or in collaboration with outsiders to solve climate change related problems?
- b) How are forests products harvested and utilized in your community?
- c) How do you preserve the knowledge that was given to you by your forefathers in respect of how to maintain your forest so that your children-children will also enjoy the benefits of the forest?

6. What could be done to solve the problem of deforestation in this community?

- a) What kind of help is available for households or families whose entire livelihood is dependent on forest-resources?
- b) What kind of help is available for families or households affected by climate change extreme events?
- c) What could be done to help people whose livelihood is solely dependent on forests?
- d) What could be done to help families or households that are affected by climate change extreme events?

7. Could you provide proverbs, taboos, festivals, songs, wise sayings, beliefs, practices as found here that encourage the use of forest resources sustainably to benefit the present and future generations?

8. Comment generally on how community people established and managed their forests before the coming of the ‘Whiteman’?

I have no more questions.

Are there anymore comments you would like to make on the topic? Do you have any questions for us?

Thank you very much for participating in this research project.

End time: _____

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ANNEX E: Questionnaire for indigenous knowledge users, farmers & community members

Introduction: I am a postgraduate student in the Department of Sociology, University of Ibadan, Nigeria carrying out research on the role of indigenous knowledge for forest- management in adaptation to climate change within forest-dependent communities of Cross River State, Nigeria. The purpose of this study is to examine how indigenous knowledge helps in moderating the harm or helps in exploiting beneficial opportunities associated with climate change.

Your honest responses would be of great benefit. All responses shall be treated with utmost confidentiality.

Thank you.

G.E. Odok

Instruction: Please tick or circle the option/response that is most appropriate to you.

**SECTION A
SOCIAL AND DEMOGRAPHIC DATA**

S/n	Variables	Response	Code
1.	Name of Community	(a) Agoi-Ibami.....	1
		(b) Butatong.....	2
		(c) Iko-Esai.....	3
2.	Age	(a) 0 – 17.....	1
		(b) 18 – 25.....	2
		(c) 26 – 35.....	3
		(d) 36 – 45.....	4
		(e) 46 – 59.....	5
		(f) 60 – above.....	6
3.	Sex	(a) Male.....	1
		(b) Female.....	2
4.	Level of Education	(a) Postgraduate Qualification	1
		(b) Degree/HND	2
		(c) NCE/OND or equivalent.....	3
		(d) SSCE or equivalent	4
		(e) Primary school or colonial standard...5	
		(f) Only informal education.....	6
5.	How many years have you lived in this community?	(a) Less than 1 year.....	1
		(b) 1 – 5 years.....	2
		(c) 6 -10 years.....	3
		(d) 11 -15 years.....	4
		(e) 16 – 20 years.....	5
		(f) 21 – 25 years.....	6
		(g) 26 years and above.....	7
6.	What is your occupation?	(a) Farmer.....	1
		(b) Carpenter.....	2
		(c) Carver	3
		(d) Herbalist.....	4

		(e) Timber Dealer.....5 (f) Forest Guard.....6 (g) Knowledge Manager.....7 (h) Others (Specify)
7.	Marital status	(a) Single.....1 (b) Married.....2 (c) Divorce.....3 (d) Widow.....4
8.	Religion	(a) Christian.....1 (b) Islam.....2 (c) Traditional.....3 (d) Others (Specify).....
9.	How much money do you and your entire family get in a month	(a) 0 - 999 naira.....1 (b) 1,000 - 4,999 naira.....2 (c) 5000 - 9999 naira.....3 (d) 10000 - 19,999 naira.....4 (e) 20,000 – 29,999 naira.....5 (f) 30, 000 - 49,000 naira6 (g) 50,000 – 99,999 naira.....7 (h) 100,000 – 500,000 naira.....8 (i) 500,000 – above.....9
10.	Would you say in broad terms that your life and that of your family members is?	(a) Good.....1 (b) Fair.....2 (c) Poor.....3
11.	What is your family size?	(a) 1 -3.....1 (b) 4 -6.....2 (c) 7 -10.....3 (d) 11 – 14.....4 (e) 15 – above.....5
12.	What is the estimated population of your community?	(a) Below 1,000 persons.....1 (b) 1,001 – 5,000 persons.....2 (c) 5,001 – 10,000 persons.....3 (d) 10,001 – 15,000 persons.....4 (e) 15,001 – above.....5
13.	How many plots of forest-land does your family have, if a plot of forest-land is equivalent to the size of a football field?	(a) None.....1 (b) 1-3.....2 (c) 4-6.....3 (d) 7-10.....4 (e) 11-15.....5 (f) 16 and above.....6
14.	How many plots of this forest-land does your family destroy each year for purposes of farming?	(a) None.....1 (b) 1-3.....2 (c) 4-6.....3 (d) 7-10.....4 (e) 11-15.....5 (f) 16 and above.....6

15.	Where do you normally learn about your traditional practices and customs from?	(a) Shrine.....1 (b) The family.....2 (c) Age-grade.....3 (d) Village library.....4 (e) Church.....5 (f) Others Specify).....
SECTION B		
Documented Indigenous Knowledge – Practices for Forest Management		
16.	To which extent are you aware and have complied with the following indigenous knowledge and traditional practices in managing forests in your community?	
i.	Zero Tilling Practices in Cultivation	(a) Aware and always use it.....1 (b) Aware but not interested in using it at all.....2 (c) Not aware and not ready to use it.....3 (d) Willing to use when aware.....4 (e) Others (specify).....
ii.	Soil Mulching	(a) Aware and always use it.....1 (b) Aware but not interested in using it at all.....2 (c) Not aware and not ready to use it.....3 (d) Willing to use when aware.....4 (e) Others (specify).....
iii.	Bush Fallow Practices	(a) Aware and always use it.....1 (b) Aware but not interested in using it at all.....2 (c) Not aware and not ready to use it.....3 (d) Willing to use when aware.....4 (e) Others (specify).....
iv.	Crop Rotation	(a) Aware and always use it.....1 (b) Aware but not interested in using it at all.....2 (c) Not aware and not ready to use it.....3 (d) Willing to use when aware.....4 (e) Others (specify).....
v.	Green Manure	(a) Aware and always use it.....1 (b) Aware but not interested in using it at all.....2 (c) Not aware and not ready to use it.....3 (d) Willing to use when aware.....4 (e) Others (specify).....
vi.	Taboos	(a) Aware and always use it.....1 (b) Aware but not interested in using it at all.....2 (c) Not aware and not ready to use it.....3 (d) Willing to use when aware.....4 (e) Others (specify).....
vii.	Forest creation through planting trees	(a) Aware and always use it.....1 (b) Aware but not interested in using it at all.....2 (c) Not aware and not ready to use it.....3 (d) Willing to use when aware.....4 (e) Others (specify).....
17.	Do the following easily	I Proverbs (a) Yes.....1

remind you of not destroying the forest whenever you or anyone close to you has reasons to destroy the forest?			(b) No.....2
	ii	Songs	(a) Yes.....1 (b) No.....2
	iii	Festivals	(a) Yes.....1 (b) No.....2
	vi	Taboos	(a) Yes.....1 (b) No.....2
	vii	Presence of government officials (forest guard)	(a) Yes.....1 (b) No.....2
	viii	Religious beliefs	(a) Yes.....1 (b) No.....2
	ix	Others (specify).....	

Trends of Extreme Weather Events in Forest-Dependent Cross River

18.	How would you describe the following natural events in your community in the past few years?	Rainfall	i	The rains now start late and end early	(a) Yes.....1 (b) No.....2	
			ii	The rains now start early and end late	(a) Yes.....1 (b) No.....2	
			iii	There is no difference in the pattern of rainfall since the last 25 years	(a) Yes.....1 (b) No.....2	
		Storms	i	We now experience severe and unusual winds and storms since the past years	(a) Yes.....1 (b) No.....2	
			ii	We now experience lesser winds & storms since the past years	(a) Yes.....1 (b) No.....2	
			iii	There is no difference in the pattern of winds and storms since the last 25 years	(a) Yes.....1 (b) No.....2	
		Ice-stone (Hail)	i	We have not witnessed the fall of ice-stones since the past years	(a) Yes.....1 (b) No.....2	
			ii	The falling of ice-stones is a regular occurrence in our community in the past few years	(a) Yes.....1 (b) No.....2	
			iii	There is no difference in the pattern of the falling of hail since the last 25 years	(a) Yes.....1 (b) No.....2	

		Flood	i	We have been witnessing increase in river/sea level since the past few years	(a) Yes.....1 (b) No.....2
			ii	We have been witnessing decrease in river/sea level since the past few years	(a) Yes.....1 (b) No.....2
			iii	There is no difference in the pattern of flood since the last 25 years	(a) Yes.....1 (b) No.....2
		Drought	i	We have experienced difficulty in getting water since the past years because our water-sources dry up easily	(a) Yes.....1 (b) No.....2
			ii	We have not experienced any water scarcity in the past few years as our water-sources hardly dry up	(a) Yes.....1 (b) No.....2
			iii	There is no difference in the pattern of water scarcity since the last 25 years	(a) Yes.....1 (b) No.....2
		Heat waves (Temperature)	i	We have been experiencing excessive hot weather even when we are supposed to experience cold in the past few years	(a) Yes.....1 (b) No.....2
			ii	The weather has remained as hot as it used to be since the past 25 years	(a) Yes.....1 (b) No.....2
		Cold waves (Temperature)	i	We have been experiencing excessive cold weather even when we are supposed to experience cold in the past few years	(a) Yes.....1 (b) No.....2
			ii	The weather has remained as cold as it used to be since the past 25 years	(a) Yes.....1 (b) No.....2
Nature of Community Response to Extreme Weather Events					
19.	Have you ever been affected by the following extreme weather events?	i	Flood	(a) Yes.....1 (b) No.....2	
		ii	Drought	(a) Yes.....1 (b) No.....2	

		iii	Storm	(a) Yes.....1 (b) No.....2
		iv	Excessive Heat	(a) Yes.....1 (b) No.....2
		v	Excessive Cold	(a) Yes.....1 (b) No.....2
		vi	Delayed Rainfall	(a) Yes.....1 (b) No.....2
		ii	Early Rainfall	(a) Yes.....1 (b) No.....2
				(c)
20.	Indicate the practical actions you have taken to respond to the extreme weather events that have affected you?	I	Changing of period of planting crops	(a) Yes.....1 (b) No.....2
		Ii	Rainwater storage	(a) Yes.....1 (b) No.....2
		Iii	Planting trees	(a) Yes.....1 (b) No.....2
		iv	Building flood defences	(a) Yes.....1 (b) No.....2
		v	Constructing culverts and drainages	(a) Yes.....1 (b) No.....2
		vi	Signing insurance contracts	(a) Yes.....1 (b) No.....2
		vii	Migrating to another community, town or city	(a) Yes.....1 (b) No.....2
		viii	Planting of special species of crops	(a) Yes.....1 (b) No.....2
		ix	Use of fuel efficient cooking devices	(a) Yes.....1 (b) No.....2
		x	Fish farming	(a) Yes.....1 (b) No.....2
		xi	Purchase simple weather forecasting equipment	(a) Yes.....1 (b) No.....2
		xii	Bee keeping	(a) Yes.....1 (b) No.....2
		xiii	Snail keeping	(a) Yes.....1 (b) No.....2
		ixv	Planting early maturing crops	(a) Yes.....1 (b) No.....2
		xvi	Poultry farming	(a) Yes.....1 (b) No.....2
21.	How would you describe the origin of the knowledge that enabled you to take these actions to cope with these extreme events?	i	The knowledge for these actions came from our ancestors; it is my parents that taught me about these actions	(a) Yes.....1 (b) No.....2

		ii	I learnt about these action from people who are not indigenes of this community	(a) Yes.....1 (b) No.....2
		iii	I cannot really remember where I got this knowledge from	(a) Yes.....1 (b) No.....2
		iv	It is the knowledge I got from my parents and the one that I got from people outside this community that I combined to learn how to take that action	(a) Yes.....1 (b) No.....2

Perceptions of Community Members to Outsiders' Interventions

22.	Which of the following statements best describe the way you think about the programmes and activities that government officials and agents bring to your community?	i	We, the community people are always consulted before the formulation of these programmes and activities; hence, our culture and knowledge is respected.	(a) True.....1 (b) False.....2
		ii	These programmes and activities were imposed on us without them respecting our culture and knowledge.	(a) True.....1 (b) False.....2
23.	What would you say about these programmes and activities that are introduced by outsiders to help cushion the impacts of extreme weather events in your community?	i	These programmes and activities are better than our traditional methods of solving natural disaster-related event.	(a) True.....1 (b) False.....2
		ii	Our own traditional way of handling natural disaster-related events is always better than these programmes brought by outsiders.	(a) True.....1 (b) False.....2

Strategies of Preserving Indigenous Knowledge at Community Level

24.	What are the ways that you adopt to ensure that the knowledge that your parents or grandparents passed to you is passed to your children and your children's children	(a) Through story-telling.....1 (b) Through proverbs and wise-saying.....2 (c) Through books3 (d) Through archival deposit.....4 (e) None of the above.....5
25.	In your use of the forest to meet your everyday needs, which of the following needs is most important to you and ranks highest in your priority?	(a) Need for food.....1 (b) Need for medicine.....2 (c) Need for timber (for carpentry works or sale)...3 (d) Other (specify)

26.	Indicate whether you have traditional or indigenous methods of performing the following tasks/activities?	i	Preparing the soil for planting	(a) Yes.....1 (b) No.....2
		ii	Pests and diseases control	(a) Yes.....1 (b) No.....2
		iii	Soil fertility maintenance	(a) Yes.....1 (b) No.....2
		iv	Weeds control	(a) Yes.....1 (b) No.....2
		v	Crops harvesting	(a) Yes.....1 (b) No.....2
		vi	Crop storage	(a) Yes.....1 (b) No.....2
		vii	Early warning about natural disasters	(a) Yes.....1 (b) No.....2
		27.	Which of the following methods in your own opinion would best preserve indigenous knowledge in your community?	i
ii	Frequent brain storming sessions with community members	(a) Yes.....1 (b) No.....2		
iii	Organizing village workshops	(a) Yes.....1 (b) No.....2		
iv	Documenting IK in video clips and films	(a) Yes.....1 (b) No.....2		
v	Recording IK in radio cassettes	(a) Yes.....1 (b) No.....2		
vi	Writing of books and journals	(a) Yes.....1 (b) No.....2		
vii	Documentation through descriptive texts – drawings, maps, reports, inventories, matrices, decision trees, charts, calendars	(a) Yes.....1 (b) No.....2		
viii	Drama performances	(a) Yes.....1 (b) No.....2		
ix	Songs	(a) Yes.....1 (b) No.....2		
x	Stories	(a) Yes.....1 (b) No.....2		
xi	Local communities databases	(a) Yes.....1 (b) No.....2		
xii	Prolonged observation	(a) Yes.....1 (b) No.....2		
xiii	Any other (specify).....			
27.	In your own opinion, what are the best ways of	i	Conducting village workshops and group discussions with the	(a) Yes.....1 (b) No.....2

	disseminating IK in your community?		local people	
		ii	Publishing newsletters in local languages for the exclusive communication of traditional technologies	(a) Yes.....1 (b) No.....2
		iii	Construction of village libraries	(a) Yes.....1 (b) No.....2
		iv	Any other (specify).....	

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