

**TECHNICAL PAPER**

**LINKAGES BETWEEN POVERTY AND CLIMATE CHANGE: ADAPTATION FOR  
LIVELIHOOD OF THE POOR IN GHANA.**

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## **LIST OF ABBREVIATION**

ANOVA		Analysis of Variance
CSM		-Cerebro Spinal Meningitis
DA	-	District Assemblies
DDC	-	Data Distribution Centre
DFID	-	Department for International Development
EC	-	European Commission
GDP	-	Gross Domestic Product
GHG	-	Green House Gases
GPRS	-	Ghana Poverty Reduction Strategy
HIV/AIDS	-	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IMCPR	-	Inter Ministerial Committee on Poverty Reduction
IPCC	-	Intergovernmental Panel on Climate Change
MDAs		Ministries, Departments and Agencies
MDGs		Millennium Development Goals
NDPC		National Development Planning Commission
NEPAD	-	New Partnerships for Africa's Development
NIAPMG	-	National Inter Agency Poverty Monitoring Group
SEA	-	Strategic Environment Assessment
SLR	-	Sea Level Rise
TCOP	-	Technical Committee on Poverty Reduction
UN	-	United Nations
UNDP		United Nations Development Programme
UNFCCC	-	United Nations Framework Convention on Climate Change
VRA	-	Volta River Authority
WSSD		World Summit on Sustainable Development

## **ABSTRACT/EXECUTIVE SUMMARY**

Poverty can hardly be reduced in Ghana, particularly in the long term unless deliberate efforts are made to explore the linkages between poverty and climate change and mainstream these into national development planning.

Climate change/variability is fundamental driver of poverty reduction strategies. Unfortunately, climate change and climate variability issues are often given very little attention in national development planning and poverty reduction strategies.

# CHAPTER 1

## GENERAL INTRODUCTION

### 1.4 Background:

Despite the lingering scientific uncertainties surrounding the impacts of climate change, there is increasing recognition that a deep understanding of climate change/variability is crucial for poverty reduction strategies and national development planning as a whole. However, the persistence of the high incidence of poverty in Ghana appears to have created a more urgent place for poverty reduction compared to climate change in national development efforts.

Viewed to be far away from the immediate concerns of poverty, climate change, which in itself is relevant for poverty reduction, is usually considered a secondary issue. Indeed, the uncertainties surrounding climate change impacts make it appear abstract, futuristic and justifiably call for long-term solutions. How can *urgent* issues such as poverty reduction be balanced with seemingly long-term issues of climate change especially when change is so indeterminate? An assessment of the linkages between climate change and national development planning especially poverty reduction is therefore vital in this direction.

Accordingly, this technical paper explores the linkages between climate change and poverty reduction in Ghana. It focuses on the potential impacts of climate change/variability regarding the livelihood systems of, particularly, poor vulnerable communities. The paper demonstrates that whereas poverty and climate change may appear at the extreme ends of the tunnel, the attainment of poverty reduction goals, both nationally and globally, will hardly be realised without due consideration for mainstreaming climate change into national development and poverty reduction programmes. Thus, based on carefully identified gaps and focussing on adaptation measures including governance issues, the report proposes strategies to facilitate the process of mainstreaming climate change issues into national poverty reduction planning. The report is underpinned by a number of factors.

First, as a party to the United Nations Framework Convention on Climate change (UNFCCC), Ghana is required to meet certain conditions. One of the main things that the

UNFCCC recognises is the fundamental role that the climate system plays in national development. Article 3.4 of the United Nations Framework Convention on Climate Change (UNFCCC) states that

*“The parties have a right to, and should, promote sustainable development. Policies and measures to protect the climate system ...should be integrated with national development programmes, taking into account that economic development is essential for adopting measures to address climate change”*

Climate change issues are yet to be fully integrated into national development planning.<sup>1</sup> Although environment issues are recognised in our poverty reduction efforts, climate change and its impacts on poverty thereof are often overlooked or implicitly mentioned in key national documents. In fact, the Ghana Poverty Reduction Strategy addresses environment and poverty linkages; however, it hardly tackles the potential impacts of climate change and climate variability. While it is acknowledged that climate change issues can hardly be separated from the environment, appreciating the cardinal role of the environment does not necessarily deal with the fundamental issues of climate change. This phenomenon, in part, arises because climate change appears abstract to many policy formulators, planners and decision makers, who often have to grapple with the “urgent” issue of poverty rather than increases in global warming which on the face value seem negligible.<sup>2</sup> In this light the report aspires to deepen and create awareness about the potential impacts of climate change and convince policy makers and the private sector about the critical role of climate change in national poverty reduction efforts.

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<sup>1</sup> The production of GHGs via the burning of fossil fuel such as coal, oil and natural gas is expected to lead to a warming of the earth’s surface, rising sea levels and changes in precipitation patterns. These elements impact human health, agriculture, economic activity, biodiversity and ecosystem functioning.<sup>1</sup>

<sup>2</sup> The Intergovernmental Panel on Climate change (IPCC) Working Group’s Fifth Report; *Climate Change 2001: Impacts, Adaptation and Vulnerability*, forecasts an average global temperature increase of 1-3.5 degrees celsius over the next century. This appears negligible and meaningless when considered holistically. Nonetheless, the threat of human-induced climate change poses a major challenge to Ghana and Africa in general at efforts to improving standards of living.

Secondly, Ghana is heavily dependent on climate sensitive sectors such as agriculture and forest sectors.<sup>3</sup> In Ghana, majority of the population dwell in rural areas where agriculture is the main source of livelihood. The limited use of irrigation facilities and high dependence on favourable climatic conditions for the realisation of good harvest tend to introduce huge instability in the standards of living of the people. Rural communities tend to be characterised by: relatively higher incidence and depth of poverty; higher fertility rates; higher biomass usage; lower infrastructure facilities; lower educational status and lower health status, among others. The interplay of these features has made rural communities disproportionately vulnerable since they are most exposed to hazards such as bush fires, flooding earthquakes etc and are certainly least capable of adjusting or coping with such hazards. Thus the poor remain most susceptible to the potential damages and uncertainties inherent in climate change.<sup>4</sup> This report will therefore examine the linkages between poverty and climate change and the potential consequences of climate change. It will also examine the coping mechanisms of the poor to such potential effects.

Thirdly, in Ghana just like other African countries, the life of 'the poor' is a life of vulnerability, which reflects the deeper problem of insecurity. The poor tend to depend heavily on environmental goods and services. Their livelihoods are punctuated by dependence on agriculture, fisheries and forestry (which revolve on the use of land and water resources), and on the capacity of ecosystems to provide the services vital for environment balance without which food production and other productive activities cannot be carried out on a sustainable basis. This trend puts the poor at risk relatively to the rich. In both rural and urban Ghana, the poor are indeed highly vulnerable to environmental disasters and environment-related conflict and it is believed that the depth of vulnerability is correlated with the pace of environmental degradation including climate change. Droughts, forest fires, floods hit the poor in rural and urban areas more and these are on the increase.

Though some progress has been made especially with regards to the vulnerable in the society, there are some traces of doubt about the far-reaching impacts of climate change/variability on

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<sup>3</sup> Agriculture share of GDP is      and majority of the Ghanaian population also use about more than      % of energy comes from the forest.

<sup>4</sup> World Bank (2004) 'Climate Change',  
<http://lnweb18.worldbank.org/ESSD/envext.nsf/46ByDocName/ClimateChange>

the livelihoods of the poor. While in the very long term it is important that we aim at stabilising green house gas emissions, for some developing countries such as Ghana some amount of adaptation is recognised as inevitable. Adaptation measures are more costly and may affect poor people who have more limited coping mechanisms. This is coupled with the fact that the requisite financial, technical capability and social safety nets to cope with climate change and variability are often lacking in most African countries including Ghana. Often resource response systems are limited to prepare for early warning systems and disaster prevention. This paper identifies and proposes -adaptation mechanisms that can safeguard the interest of the poor and vulnerable.

Finally, in an era where the modern world is transforming into a “global village”, economic growth, poverty reduction and environment issues are gradually becoming a unified concern of nations at large. Initiatives such as New Partnerships for Africa’s Development (NEPAD) and the Millennium Declaration are therefore critical in the search for solution for a development dilemma facing this single world. Certainly, it is important that strategies are adopted to convince stakeholders about the importance of integrating environment including (climate change issues) into national poverty reduction planning.

The major questions that arise are as follows: how do we generate political attention to climate change risks among key policy decision makers and the public? Which policy options are available to mainstream vulnerability and adaptation issues into national development planning and how congruent are they with the GPRS?

## **1.2 Structure of the Report**

The paper is made up of five major chapters; Chapter 1 describes the general introduction. It basically summarises the whole paper touching on the background and purposes.

Chapter 2 explains key concepts such as poverty, climate change and adaptation.

Chapter 3 focusses on statistical analysis and attempts to establish a more scientific relationship between eco-climatic zones and the incidence of District Poverty.

Chapter 4 Examines climate change issues in the GPRS, MDGs and NEPAD.

Chapter 5 details out the key finding on the linkages between climate change and poverty, challenges for Ghana and strategic directions.

### **1.3 Methodology**

## CHAPTER TWO

### CLIMATE CHANGE-POVERTY NEXUS

#### 2.0 Introduction

The chapter shows the general relationship between climate change and poverty. It explores and explains key concepts such as climate change, poverty, adaptation and vulnerability. These concepts are not defined in isolation but rather attempts are made to relate them to real practical situations. The core issue is to be able to show the congruence between the various subsections and make a justification for encouraging adaptation practices.

#### 2.1 Perspectives on Climate Change and the Multi-dimensional Nature of Poverty

##### 2.1.1 What is Climate Change?

The UNFCCC defines climate change as *a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.*<sup>5</sup> The atmosphere contains gases such as water vapour, carbon dioxide, methane and other gases, which trap some of the outgoing heat energy from the sun thereby retaining heat within the earth's atmosphere. This maintains an average global temperature balance of 60<sup>F</sup>, without which would have resulted in very cold atmospheric temperature, perhaps not suitable for human habitation. However, what has aroused concern is the increasing amount of these atmospheric gases, which have enhanced the heat-trapping potential of the earth's surface. The consequential effects are increases in the earth's surface temperature, sea level rise, more precipitation, droughts and floods. These in turn have impacts on human and natural systems brought about by human activities which have a dual effect on increasing greenhouse gas emission at the same time have a direct effect on human and natural systems. (This description is diagrammatically represented as figure one.).

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<sup>5</sup> United Nations 1992-UNFCCC

While defining and explaining the process of climate change (centred on green house gas concentrations), it is worth to bear in

mind that in practice it may be very difficult to perceive these in isolation. Climate is part of a complex whole, which

functions as a component of the climate system and the entire ecosystem.<sup>6</sup> Perhaps this is partly the reason most

literature on Poverty and Climate Change hardly omits environment in the analysis.<sup>7</sup> As the focus of the paper is on climate

change and poverty, the paper recognises that climate change and environment are inextricably interwoven.<sup>8</sup> It is in accordance with this verity that the clear linkages between

climate change and poverty will be established, especially given the multi-dimensional nature of poverty reduction. Hence, occasionally the paper makes reference to the environment with the view that this includes climate change.

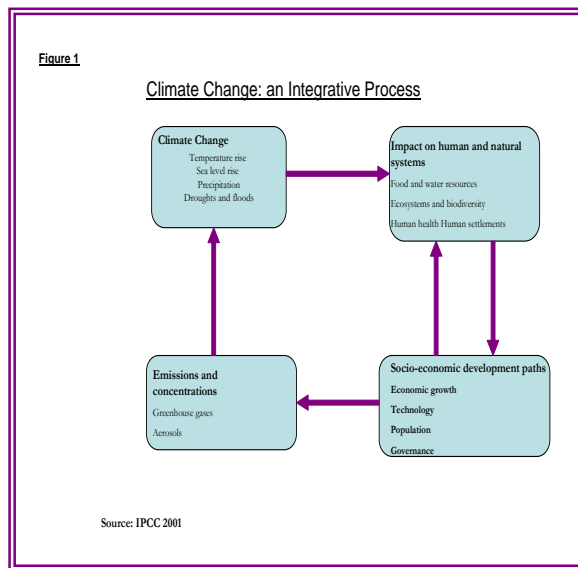
### 2.2.3 Poverty and its Multi-dimensional Attributes

There is no universally accepted standard definition of poverty. Opinions vary regarding the definition, cause, effect and the remedies to the problem of poverty. While the paper does not intend to argue extensively regarding the definition of poverty, an understanding of poverty will provide a basis for determining the various dimensions of poverty. In the past, many of the definitions focused

<sup>6</sup> The UNFCCC defines the climate system as the totality of the atmosphere, hydrosphere, biosphere and geosphere and their interactions. United Nations 1992. p.7

<sup>7</sup> Environment refers to the living (biodiversity) and non-living components of the natural world, and to the interactions between them, that together support life on earth. The environment provides goods (natural resources) and services (ecosystem functions) used for food production, the harvesting of wild products, energy, and other materials. The environment is also a recipient and partial recycler of waste products from the economy and an important source of recreation, beauty, spiritual values, and other amenities. (World Bank, Why the Environment Matters to people Living Poverty)

<sup>8</sup> Admittedly, the links between climate change and poverty reduction are complex. Considering the fact that climate change is part and parcel of the environment will perhaps enhance the understanding of the linkages between poverty and climate change.



on the capability to achieve standard of living, which was measured, based on a minimum income or a certain level of consumption.

It will be observed that the definition of poverty has widened to embrace issues of both income and non-income dimensions of deprivation-including lack of income and other materials means; lack of access to basic social services such as education, health and safe water; lack of empowerment to participate in the political process and in decisions that influence an individuals life. The major features of poverty also encompass extreme vulnerability to external shocks.<sup>9</sup> The 2000/2001 World Development Report, which defines poverty as “*pronounced deprivation in well-being*”, groups the dimensions of poverty as Opportunity (access to markets, resources and income generating opportunities), Empowerment (influence on the state institutions and participation in political processes and local decision making) and Security (reducing vulnerability to risks such as ill health, economic shocks and natural disasters).

In the quest for survival man depends on and certainly interrelates intimately with the natural environment. Society (poor and non-poor) functions in a natural environment, uses resources and discharges wastes. It is therefore important to examine the multi-dimensional and dynamic attributes of poverty in relation to the environment. The multiple dimensions of poverty highlights the fact that the poor suffer from multiple deprivations determined by factors such as natural resource base, ecological fragility, access to safe water and sanitation, which are all major components of the environment. Figure II provides a simplified framework illustrating the main conduit between environment conditions and dimensions of poverty. Although the authors recognise the interrelationships and the complex cause–effect between poverty and environment, the focus, is not to argue as to which category (the poor and the non- poor) degrade the environment the most. It is widely acknowledged that changes will occur so long as man interacts with the ecosystem. It is these changes that have direct and indirect effects on man. Man also in the quest for survival adjusts to suit the changes in the environment.

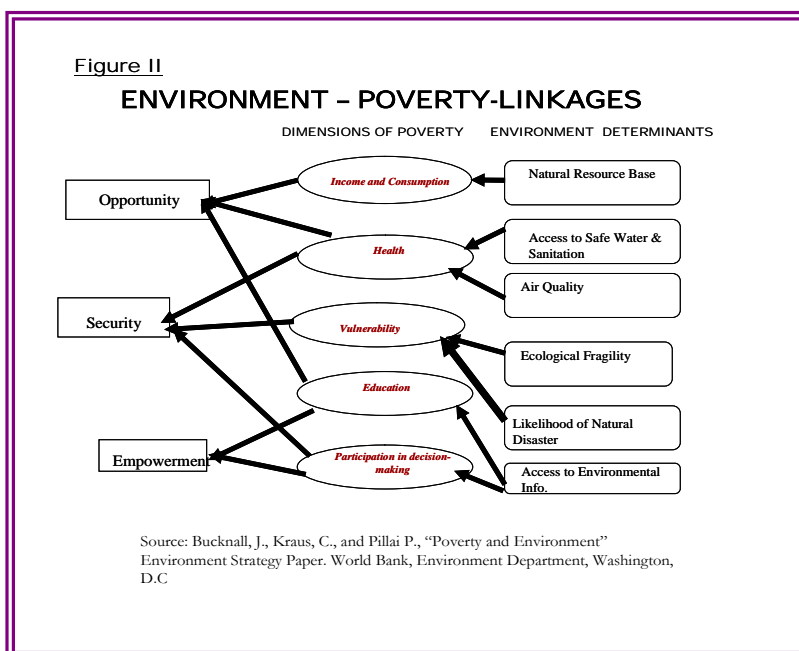
Poor people are sometimes compelled to exploit their immediate environment in order to survive. Rural population depend mainly on fuel wood for their energy sources since it is difficult for them to afford environmentally friendly energy sources. This results in deforestation resulting in the depletion

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<sup>9</sup> UNDP, 1997

of their energy source, which only exacerbates their situation. Indeed some of the fundamental reasons underlying the persistence of poverty can be traced to environmental causes. For example, indoor and outdoor air pollution is a major contributor to most ill health. Inadequate sanitation and poor hygiene practices, lack of access to safe drinking water are major causes of diseases. Poor people are more vulnerable and might suffer disproportionately from the effects of natural disasters such as flooding, earthquakes etc. The conceptual framework on environment and poverty has been elaborated in a document ‘Linking Poverty Reduction and Environmental Management’ by DFID, EC, UNDP and the World Bank (2002). The framework shows that accessibility to natural resources and ecosystem services affects the livelihoods dimension of poverty; accessibility to safe water and sanitation on the one hand and pollutants on the other affect the health dimension of poverty; and ecological fragility and likelihood of natural disasters affect the vulnerability dimension of poverty.

The above conceptual framework reveals that poverty is multidimensional and has links with the various components of the environment. The inferences that can be made is that it is crucial to consider the multidimensional traits of poverty and their environment relationship at the fore of devising strategies for poverty reduction.



### 2.1.3 Abstraction to Reality

The Climate Change debate as described above is shrouded with a lot of uncertainty. Global climate has been described by Maurice Strong (Secretary-General, 1992, Earth Summit) “like a cancer spreading through the body of our global society, the effects are likely to be irreversible by the time the symptoms have become painful”. Today it is widely agreed by the scientific community that Climate Change is already a reality. According to the Intergovernmental Panel on Climate Change IPCC (2001a)<sup>10</sup> current global happenings reveal some changes which has brought an awakening to various international bodies such as the United Nation Framework Convention on Climate Change. The change in climate is likely to worsen poverty and hinder efforts to achieve the Millennium Development Goals and GPRS.

Climate change matters to the poor in Ghana because it would increase the vulnerability of this group by adversely affecting their health, livelihood and undermining growth opportunities crucial for poverty reduction. In many poor countries like Ghana, Climate change will significantly aggravate water stress, reduce food security, increase impacts from extreme weather events, displace millions of people ( due to floods and sea level rise) and potentially increase the transmission of vector – borne diseases. Unfortunately, IPCC assessments reports illustrate that in general developing countries are most likely to suffer the negative impacts of climate change. This therefore calls for adaptive strategies to reduce the vulnerability of Ghana in other to achieve the GPRS..

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<sup>10</sup> The rate and duration of warming observed during the twentieth century are unprecedented for the past thousand years. Since the end of the nineteenth century, the global average surface temperature has increased by about 0.6 C, with the 1990s likely being the warmest decade in the instrumental record since 1861. While some uncertainty remain, the IPCC (2001a) concluded that the collective evidence suggest that the observed warming over the past fifty years can be mostly attributed to human activities (i.e., the human – induced changes in atmospheric greenhouse gas concentration and aerosols). The warming trend in the global average temperature is expected to continue, with increases projected to be in the range of 1.4 to 5.8 C by 2100 in comparison to 1990.

Past and present climatic happenings in Ghana reveal some symptoms of climate variability. Since the 1990s, scientists and policy makers alike have been focusing attention on the meeting point between environment and development. Some extreme weather conditions and climate variability that the country has experienced over the years are as follows.

- Floods
- Drought
- Bush fires
- Unpredictable rainfall patterns
- Sea level rise
- Increase desertification/land degradation
- Consistent loss of forest cover
- Loss of some biodiversity

**i) Increasing Surface Air Temperature and Rainfall**

In Ghana, temperatures are generally high. The mean annual temperature is above 24<sup>0</sup>C. Average figures for the nation range between 24<sup>0</sup>C and 30<sup>0</sup>C . The country has been experiencing high temperatures over the year... Mean annual temperatures from 1960 -2000 for six major ecological zones as shown below revealed evidence of increasing surface air temperature for the country.

**Table 2.1: Showing Mean annual Temperatures for six Ecological zones**

<b>Ecological Zones</b>	<b>1960 (°C)</b>	<b>1970(°C)</b>	<b>1980(°C)</b>	<b>1990(°C)</b>	<b>2000(°C)</b>
Rainforest	26.5	26.3	26.5	26.4	26.8
Decidious Forest	26.5	26.2	26.3	26.7	26.9
Coastal Savanah	27.0	27.3	27.0	27.1	27.7
Transitional	26.8	27.0	26.9	27.3	27.3
Guinea Savannah	27.2	27.8	27.8	28.2	27.8
Sudan Savannah	28.1	28.8	29.2	29.2	29.0

Source: Meteorological Services Department 1960-2000

From the table the mean annual temperatures for two ecological zones increased greatly over the 40 years. For example, Sudan savannah increased from 28.1<sup>0</sup>C in 1960 to 29.0<sup>0</sup>C in 2000, that of coastal savannah from 27.0<sup>0</sup>C in 1960 to 27.7<sup>0</sup>C in 2000 as compared to rainforest where mean temperatures increased from 26.5<sup>0</sup>C to 26.9<sup>0</sup>C over the same period..

Also rainfall (both magnitude and monthly distribution has decreased in some parts of the country), Annual totals of rainfall amount in Ghana has decreased over the years as shown in Table.....for the six ecological zones. The country experienced extreme weather events (drought) in 1983 .This resulted in severe hunger for the poor and reduce gross domestic product for that year.

### **ii      Sea Level Rise**

Ghana has been encountering sea invasion in various parts of the coastline. The country has a coastline of 565km. presently some part of the Volta delta is under inundation. Coastal area changes have probably been exacerbated by sea level rise (SLR). These have manifested as coastal erosion, flooding, salt water intrusion, mangrove degradation and related socio-economic problems. If the current rate of SLR continues to the year 2100, the rise is projected to reach 0.2m and SLR is projected to accelerate to 1.0m by the year 2100 (Ghana Initial National Communication).

### **iii      Unpredictable/unreliable rainfall patterns**

Farmers in Ghana are gradually loosing the skills of predicting major and minor raining seasons. Rainfall has been irregular, scanty in some parts of the country and this has affected the flow rates of many rivers like the Volta and other water resources. The implication of dwindling rainfall has led to observed changes in water levels in the Akosombo dam. Presently the Akosombo dam which use to supply 70% of the countries energy needs supplies only 30% of Ghana's energy due to the low water level. However, with the advent of climate change, it is believed Ghana would have to look for other alternative energy sources

#### **iv Desertification**

Desert encroachment has been a major national challenge, especially in recent years. The movement of the desert into arable land is fuelled by the increasing loss of forest cover and the changing climate system. It is estimated that desert land now covers about 49 of the 110 District Assemblies in Ghana. It is estimated that 35% of the country's land mass is desert and this is advancing at an estimated 20,000 hectare per year (sources Ghana Vision 2020)

## 2.3 Vulnerability

The ultimate effects of climate change on socio-economic or ecological system depend on the interplay of three factors, namely, the characteristics of the climate change, the sensitivity of the system to a given change, and the capacity of the system to adapt climate change. The vulnerability of a particular society is generally defined by the combination of sensitivity and adaptability.<sup>11</sup> Those societies or sectors that are especially sensitive or are least able to adapt are the most vulnerable.<sup>12</sup>

Poverty in Africa appears to be intensified by uncertain livelihoods and diminishing agro-climatic conditions, with the rural poor suffering the most. Africa and as such Ghana are highly vulnerable to the effects of climate change: droughts cyclones, floods and bushfires although it generates only 2-3% of the world's carbon dioxide emissions from industrial and energy sources.<sup>13</sup> The high proportion of the population concentrated along the coast is particularly vulnerable to sea level rise.

### 2.2.1 Underlying Factors Determining Climate Vulnerability in Ghana

The vulnerability of people in a given area to the effects of climate change depends on two key factors;

- the vulnerability of the surrounding natural landscape unit to weather extremes and climatic shifts, and
- the adaptive capacity of the local population.

Ghana tends to be more vulnerable to the impacts of climate variability and climate change because of factors such as widespread poverty, reliant on primary production, high population along the coastal zone, and over dependence on rain fed agriculture.

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<sup>11</sup> Vulnerability in the context of Climate Change mean the risk that Climate Change will cause a decline in the well being of poor people and poor countries. This means the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. This vulnerability is a function of the character, magnitude and rate of climate variation to which a system is exposed, and its adaptive capacity.

<sup>12</sup> See O'Neill et al (2001) for further exposition.

<sup>13</sup> Economic Commission for Africa 2002 p.21.

Vulnerability, which is also a function of adaptive capacity and capacity to cope, includes access to technology, infrastructure, information, stable and effective institutions, skills etc. Unfortunately, these are all considered to be beyond the economic means of the country because of low per capita, inappropriate adaptive policies, lack of significant investment coupled with inadequate institutional skills on Climate Change.

The factors considered in assessing the vulnerability of Ghana to climate change includes the Country's climate, Development status, Food supply, Dependence on natural resources, Biodiversity loss, Disease Burden level, Water and Energy Resources, Coastal zone and advancing of desertification.

**2.2.1.1 Climate:** Ghana lies on the south central coast of West Africa between latitude 4.5<sup>0</sup>N and 11.5<sup>0</sup>N and longitude 3.5<sup>0</sup>W and 1.3<sup>0</sup>E. Temperatures throughout the country are typically high and meteorological evidence reveals increases in temperature over the coming years. The mean annual temperature is generally above 24<sup>0</sup>C and consequences of the low latitude position and the absence of high altitude areas have resulted in average temperature figures ranging between 24<sup>0</sup>C and 30<sup>0</sup>C. Also extreme temperature conditions are experiences in some areas for instance, temperatures ranging between 18<sup>0</sup>C and 40<sup>0</sup>C or more are common in the southern and northern parts respectively.

Rainfall in Ghana generally decreases from the south to the north. The wettest area is the extreme southwest where annual rainfall is about 2000mm. In the extreme north, the annual rainfall is less than 1100 and the driest area is the wedge like strip from east of Sekondi-Takoradi, extending eastward up to 40km where annual rainfall is about 750mm<sup>14</sup>.

A change in climate will affect the general climatic conditions the people are used to with it's concomitant result on the lifestyle of the human's, plants and animal lives. Increase in temperature as predicted for African Countries would mean hotter climatic conditions for Ghana. This will affect agricultural productivity, because current plants/crops are not drought resistant and thus cannot withstand harsh climatic condition. Also a hotter climate will discourage tourist from patronizing the tourist industry, the result would be decrease in the earning from tourism (a sector that has been forecasted to be the highest contributor to

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<sup>14</sup> Source: Ghana National Communication

GDP in 2015) and increase in temperature would create an enabling breeding ground for mosquitoes, thus the spread of malaria and increase Governments expenditure for health as against its Poverty Reduction strategies.

Concerning rainfall, the country's agriculture is rain fed and this constitutes the mainstay of the economy. The sector employs 49.2% of the economically active population and about 85% of the rural population in Ghana's livelihood is dependent on agriculture<sup>15</sup>, thus a reduction or excess rainfall will affect valuable crops like cocoa, yam, maize, millet and many others.

**2.2.1.2 Development status:** The index of human well-being developed by the World Bank reveals that Ghana is among the poorest in the world. The per-capita income of Ghana is \$390 with a life expectancy of 60 years, infant mortality ..... and adult literacy of 54.1%<sup>16</sup>. Also the rural-urban ratio is 62:38 with population concentration in the Greater Accra region, Ashanti, central and western region. The general weakness of science and technology infrastructure (technically trained professionals), the focus of Government to reduce poverty and the dependence of the country on the export of primary products limits the country's capacity to respond immediately to climate change impacts.

**2.2.1.3 Food supply:** More than 60% of Ghana's population is rural and directly depend on locally grown crops of food harvested from the immediate environment for consumption and for the urban population. The major food crops grown are maize, millet, yam, cocoyam, plantain, cassava etc. These production are based heavily on rainfall, thus the country's agricultural output that contributes about 20% to GDP is influenced by weather patterns. It has been observed that during period of drought, crop production and livestock herd declined quite significantly. In the 1980's particularly in 1983, the severe drought and bush fires encountered nation wide affected food security in the country leading to starvation in some parts of Ghana. This shows the vulnerability of Ghana's agriculture to prevailing

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<sup>15</sup> Source: Ghana Statistical Service, 2000 Population and Housing Census, Summary Report of Final Results, March 2002

<sup>16</sup> Source: Ghana Statistical Service, 2000 Population and Housing Census, Summary Report of Final Results, March 2002

climatic condition and the consequences that a variation in climate would cause to food security.

**2.2.1.4 Dependence on Natural Resource:** The activities in the formal and informal sectors of Ghana are highly dependent on natural resources such as agriculture, cattle rearing, logging, tourism and mining. Presently, small scale activities to reduce poverty such as salt production, tie and dye production, block production, bee-keeping, mushroom cultivation etc are also dependent on climatic condition to some extent. Climatic variations such as flood, drought, that alter the viability of these activities for the better or worse would seriously have very high leverage on the economy, particularly GDP and poverty reduction programmes.

**2.2.1.5 Biodiversity:** Ghana has rich biodiversity and hosts several of the world “hot spots”. Unfortunately, limited adaptive capacity and technology would seriously put these hot spots which serve as the habitat for some endangered plant and animal species in danger.

**2.2.1.6 Disease Burden Level:** Insect-vector diseases such as malaria and trypanosomiasis are common in Ghana in addition to others such as typhoid, Cholera, tuberculosis and HIV/AIDS pandemic. Of recent, the HIV/AIDS pandemic, malaria and typhoid have been a headache for Government. Heavy mortality leads to great loss of productive potential and the government has a goal to improve health care for all by 2020. Unfortunately, studies conducted by health experts reveal that Climate variability or change would increase expenditure in the health sector. For instance increase in temperature would create a favourable breeding grounds for insect-vector diseases such as malaria and drought and flooding where sanitary infrastructure are inadequate will result in increased frequency of epidemic .

**2.2.1.7 Coastal Zone:** The coastline in Ghana covers an area of 565km and it harbours most of the important urban towns and the capital city. According to the population census 25% of the population resides in the coastal zone which makes up about 7% of the total land area in Ghana. The area also host majority of basic infrastructure for development such a transport, housing, services etc. Substantial of Government investment are located in the

coastal area. The land area of the coastal zone comprises all the area below the 30m contour. Sea level rise is predicted to increase flood frequency probability, inundate low-lying coastal areas, cause shoreline recession on sandy shores, increase the salinity of estuaries and aquifers and raise coastal water table. These extremes climatic conditions would result in damage to settlements and infrastructure affect human life and destroy people livelihood strategies along the coast.

**2.2.1.8 Desertification:** Climate Change and desertification remain inextricably linked through feedbacks between land degradation and precipitation. In Ghana, encroachment of the desertification is a major challenge. Currently 49 District Assemblies as against 110 districts Assembly are classified as desert. It is estimated that 35% of the country's land mass is desert and this is advancing at an estimated 20,000 hectare per year<sup>17</sup> . Ultimately, the adverse impacts of desertification leads to decreases in soil fertility, reduction in rangeland production, decreases in agricultural and livestock output all resulting in socio-economic and political instability. With Climate Change, potential increase in the frequency and severity of drought are likely to exacerbate desertification in Ghana.

**2.2.1.9 Water:** In Ghana, 73.1% of the total population has access to safe drinking water such as pipe-borne, a tanker service, borehole or well. The remaining one-quarter of the households (26.9%) depend on natural water sources such as rainwater, streams, rivers, ponds etc. In Africa, current trends in major river basins indicate a decrease in runoff of about 17% over the past decade.

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<sup>17</sup>Ghana Vision 2020



## **2.3 ANALYSIS OF THE RELATIONSHIP BETWEEN POVERTY LEVELS AND ECO-CLIMATIC ZONES**

This section shows a simple statistical relationship between climate variability and poverty levels in Ghana. It uses a statistical approach to analyse how poverty incidences vary in the various ecological zones in Ghana.

Despite the fact that climate appears to have relationship with poverty levels, it could be a chance variation. Thus, the need to test if there is a significant difference in poverty levels across the ecological zones or if the observed variation is simply due to chance arose.

### **METHODOLOGY**

Data from 110 districts across the ecological zones were obtained and the mean poverty levels of the ecological zones were derived.<sup>18</sup> Statistical tool, Statistical Package for Social Sciences (SPSS), was used to analyse the poverty incidence data from the 110 districts. Specifically, ANOVA was used to test the significance of the variation in the ecoclimatic zones and correlation was used to measure the level of association between poverty and climate.

The approach to the analysis was considered in two different dimensions

- 1) A map showing the six major ecological zones of Ghana was used to assign the ecology (climate) of districts. The zones are;
  - Coastal Savanna
  - Guinea Savanna
  - Rainforest
  - Semi-deciduous forest
  - Sudan Savanna
  - Transitional zone

However the limitation to this approach was that, there were districts that cut across two major ecological zones and in a way it did affect the precision of the results. For example choosing a district cutting across two eco climatic zones will certainly have to be analysed based on one of the zones. This would not give a clear ecological reflection of poverty incidence in that district. To reduce the error due to this limitation there was the need to further categorise districts cutting across two ecological zones.

- 2) A second part was considered which lead to a further re-classification into 11 zones. This took into consideration the districts that were cutting across two ecological

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<sup>18</sup> The analysis was based on the 110 districts since data was not available for the extra newly created 28 districts.

zones in order to arrive at more precise conclusions. Accordingly, the districts were classified as follows;

- Coastal Savanna (CS)
- Rainforest/Semi Deciduous Forest (RF/SD)
- Transitional zone (TZ)
- Guinea Savanna (GS)
- Sudan Savanna (SS)
- Coastal/Semi Deciduous forest (CS/SD)
- Coastal/Rainforest (CS/RF)
- Semi Deciduous/Transitional (SD/TZ)
- Transitional/Guinea Savanna (TZ/GS)
- Sudan/Guinea Savanna (SS/GS)

## **RESULTS AND DISCUSSION**

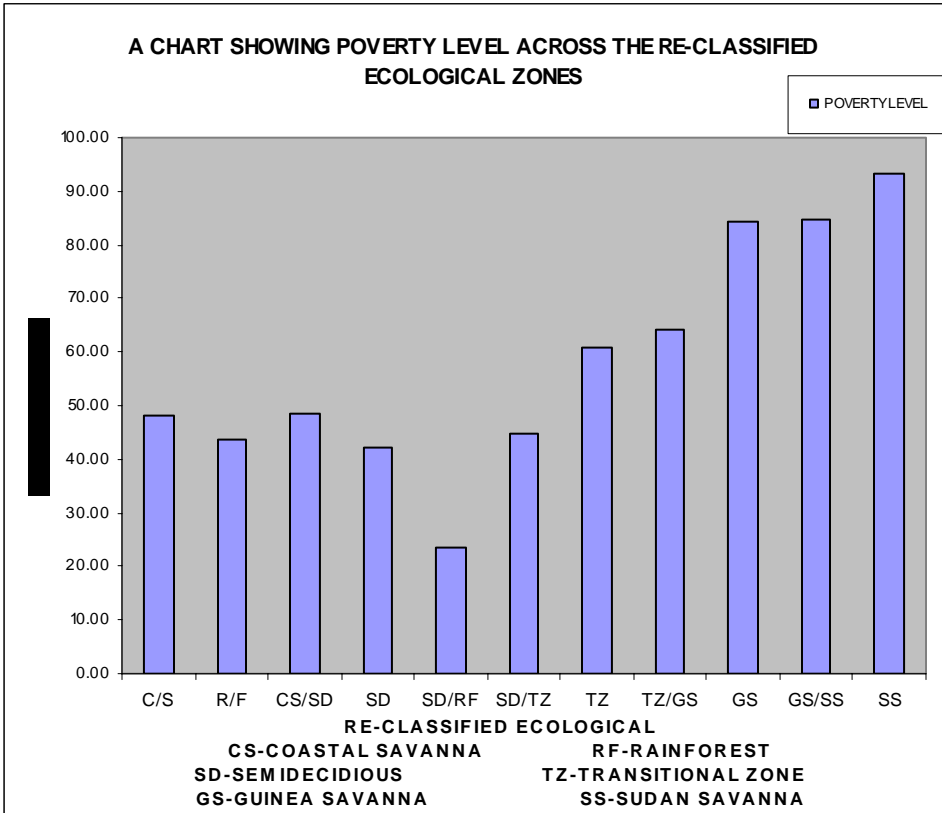
Districts that had MEAN poverty level above fifty (50) are those within the Guinea Savanna, Sudan savannah, Guinea savannah/Sudan savannah, Guinea Savannah and Transitional /Guinea savannah. Lastly, transitional zones in descending order. Also, districts with poverty level below Fifty (50) fell within Coastal Savanna, Rainforest, Semi-deciduous rainforest Semi deciduous/Transitional, Coastal/semi deciduous zones in ascending order. This is explained/shown in Fig III . The Analysis of variance (ANOVA) also done showed that there is a significant variation in poverty level across the ecological zones, thus climate was contributory. Correlation analysis also showed that there is a relationship between poverty and location of districts (Refer to Appendix 1). These are zones that have high temperatures, low rainfall and poor soil fertility. There is the likely hood that the negative impacts from climate variability/climate change increases the vulnerability of these regions and possibly make them poorer.

Table 2.2 Six Ecological zones and their mean poverty level

EKOCLIMATIC ZONE	TEMPERATURE			RAINFALL	MEAN POVERTY LEVEL
	MIN	MAX	MEAN	MEAN	
COASTAL SAVANNA	23.8	30.4	27.1	750	34.8
RAINFOREST	23.6	29.3	26.45	2250	45
SEMI DECIDIOUS	21.8	30.8	26.3	1605	60.89
TRANSITIONAL	22.2	31.9	27.05	1350	84.36
GUINEA SAVANNA	21.8	34.8	27.1	1175	93.1
SUDAN SAVANNA	22.6	34.8	28.7	870	90.6

*SOURCE; METEOROLOGICAL SERVICES DEPARTMENT 1960-2000*  
<http://www.ghanaweb.com/GhanaHomePage/geography/climate.php>

To further establish the relationship between Poverty levels and climate, the mean annual temperatures and mean annual rainfall for the six ecological zones in the country were use in comparism with the poverty level of the zones. Findings from the table indicates that the ecological zones with high rainfall and low temperatures had lower poverty level than those with low rainfall and high temperatures with the exception of coastal savannah ( have lower poverty level because of the influence of the capital city). This mean that climate variability would worsen the situation of the high poverty stricken zones.



To

**Figure 1 A map showing re-classified ecological zones and their poverty levels**



### **2.4.3 Some Adaptation Strategies**

During the past few years, case studies on the potential impacts of climate change for many countries have concluded that tropical developing countries including Ghana are vulnerable to climate variability. Table 2 shows some sectors, potential vulnerability and suggested adaptations strategies to help reduce future climate change impact.



## **CHAPTER 3**

### **LINKAGES BETWEEN CLIMATE CHANGE, GPRS AND GLOBAL INITIATIVES (MDGS NEPAD)**

#### **3.0 Introduction**

This chapter examines the relationships between poverty in Ghana (GPRS), climate change issues and relevant global initiatives such as MDG and NEPAD. The chapter starts by painting a picture of the poverty situation in Ghana and then touches on the purpose of the GPRS, its major objectives and the main strategies. Attempts are made to identify environment (climate change) issues in all the five major thematic areas of the GPRS. The importance of Strategic Environment Assessment of the GPRS highlighting the shortfalls of SEA in relation to Climate Change. Given the current global thinking of which Ghana is committed, Global Initiatives such as MDG and NEPAD are considered in relation to the GPRS and Climate Change.

#### **3.5 Poverty Diagnostics in Ghana**

In Ghana poverty is perceived as a multi-dimensional phenomenon. The dimensions of poverty include three main facets: income or consumption dimension, access to social services dimension, and participatory dimension of poverty. The income dimension of poverty refers to low levels of income or low levels of consumption that are socially unacceptable. The social services access dimension of poverty includes lack of access to health-care, education, good drinking water, decent housing, and healthy sanitation. The participatory dimension includes lack of voice and political rights. People who lack the ability to participate in decisions that affect their lives directly consider this as a sense of helplessness and a fundamental characteristic of poverty.

Poverty is also considered to have a dynamic attribute in the sense that it changes over time, across space and across individuals. These changes can occur owing to natural hazards; civil wars and even with change of governments. The effects of these social, economic, and political shocks on the well being of people show that poverty is not about not having

enough but also about being vulnerable to losing even the little that one has with changes in the environment which individuals do not have much control over. This type of poverty signifies the risk tendencies and expresses the vulnerable tendencies of the poor.

According to the GLSS 4, 40% of the Ghanaian population has incomes below the Upper Poverty Line, while about 27% (slightly more than a quarter) of the population has incomes below the extreme poverty line.<sup>19</sup> This forms nearly a third of the population of Ghana (about six million) who are unable to meet their basic nutrition needs, even if they devoted their entire consumption budget to food.

Poverty is still predominantly a rural phenomenon with the rural areas accounting for more than 70 % of the poor. Five out of the 10 regions in Ghana had more than 40% of their population living in poverty. The worst affected being the three northern savannah regions (the Upper East, Upper West and Northern Regions). Nine out of ten people in the Upper East or 88%; eight out of ten in Upper West or 84%; and seven out of ten in Northern Region or 69% of their populations lived below the poverty line. Out of every ten people in the Central Region five or (48%) were classified as poor. Eastern region had 44% of the population below the poverty line while other regions fell between the Greater Accra (5%), which has the lowest incidence and the Volta Region with 38% of the population living below the upper poverty line.

Another group vulnerable to Climate Change in Ghana are the urban poor. These usually live in unplanned settlement (slums and densely populated areas) and can be located along the coast, close to watercourses and stagnant drainage system (e.g *Sodom and Gomorra*). The likely climatic impacts to be faced by this group are flooding, sea level rise and health related diseases such as malaria and Cerebro Spinal Meningitis (CSM) as a result of rise in temperature.

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<sup>19</sup> The incidence of poverty is usually assessed at two levels: an Upper Level and Lower or extreme level. The Upper Poverty line in Ghana refers to incomes of up to 900,000 cedis a year, or 75,000 cedis a month or 2,500 cedis a day. The extremely poor are people with incomes below 700,000 Cedis a year or 58,000 cedis a month or 1,900 cedis a day.

### 3.2 Overview of the Ghana Poverty Reduction Strategy (2003-2005)

The Ghana Poverty Reduction Strategy is a comprehensive development policy framework designed to support poverty reduction and growth of the economy. Essentially, it is a package of poverty focussed programmes and projects with the requisite budget and measures for implementation.

*The main goal of the Ghana Poverty Reduction Strategy (GPRS) is to create wealth by transforming the nature of the economy to achieve sustainable equitable growth and accelerated poverty reduction and the protection of the vulnerable and excluded within a decentralised democratic environment*

The above goal is supported by five broad objectives. These are

- Ensure macro-economic stability
- Increase production and gainful employment
- Facilitate direct support for human resource development & basic services
- Expand special programmes to support vulnerable groups
- Enhance good governance

Each of the broad objectives above has specific targets and set of indicators. The broad targets however aim at reducing the incidence of poverty from 39.5 % to 32% and reducing extreme poverty from 27% to 21%.

Owing to the huge amount of funding required to implement the entire programme and projects of the GPRS, prioritisation was done across the five thematic areas to ensure effective implementation. These priorities known as the Governments Medium Term Development (2003-2005) are **infrastructure development** and **modernised agriculture based on rural development** to ensure increased production and employment; investment in education, health, and sanitation to **enhance the delivery of basic social services**; upholding the rule of law, respect for human rights and the attainment of social

justice and equity to **enhance good governance**; and **private sector development** through macro-economic stability and streamlining of public bureaucracy.

### **3.3 Environment (CC issues) in the GPRS**

The GPRS recognises a causal link between the environment and the poor. Accordingly, it focuses on the use of environmental resources in the creation of wealth while making sure that the environment is not depleted. Safeguarding the environment is an essential strategy in the GPRS process to ensure sustainable development and improve quality of life.

Generally, environmental issues in the GPRS are categorised into two types. These are the natural and the built environment. The natural environment constitutes natural conditions and resources including eco-systems that support life i.e. water bodies, land, forests, flora and fauna, air and the atmosphere. On the other hand, the built environment constitutes the human settlements and infrastructure created by man in pursuit of his economic, social and cultural fulfilment. However, the GPRS stresses deforestation, water and air pollution, inadequate sanitation and waste management, urban degradation, land degradation and soil and coastal erosion as well as the use of natural resources in the creation of wealth sustainably.

#### **3.3.1 Environment and the GPRS Process**

The need to integrate environmental issues into the GPRS was acknowledged right from the initial stages of the process. At the outset, issues related to environment together with gender and spatial were identified as cross cutting issues. In this vein, the GPRS does not contain any specific chapter on environment. Rather issues related to environment are well articulated in almost all the chapters with the chapter on *Production and Gainful Employment* containing a large portion of the environmental issues.

Considering the importance of environmental issues in the GPRS process, membership of the task force that managed the GPRS process was constituted to include expertise in environment and poverty respectively. The person was tasked to be responsible for

monitoring, coordinating and collaborating with all the sectors and other major stakeholders on issues related to environment.

As part of the general process, five core teams were formed. Members of the core teams were drawn from government ministries, department and agencies (MDAs), private sector, civil society organisations and the donor community. On the *Production and Gainful Employment* core team, the Ministry of Environment and Science and the Council for Scientific and Industrial Research (CSIR) were represented. All the five core teams were required to consider seriously in their deliberations issues on environment and how they relate to each of the themes.

Aside this, outputs from the local level consultations, which took the form of dialoguing, focus group discussions, information and dissemination, identified dimensions of poverty, how they relate to the environment and how to address these in a sustainable manner were fed into the work of the core teams.

The outputs of the core teams were subjected to a series of consensus building and a harmonisation workshop. The main purpose was to identify and harmonise cross cutting issues and emerging factors including environment and poverty reduction. The specific objectives of the workshops were to involve the various stakeholders engaged in formulating the GPRS to share insights and come to a consensus on the following aspects of the study. Identification and resolution of conflicts arising from incompatible sectoral and cross-sectoral policies, programmes, objectives and priorities derived from the MDAs. In the above series of meetings there was a wider participation from environment related organisations such as the Environmental Protection Agency, a number of Non-Governmental Organisations, Civil Society Organisations and the private sector.

### **3.4 Some Reflections of Environment in the GPRS**

#### **3.4.1 Production and Gainful Employment**

Among the major issues covered under this is Environmental Protection. This section stresses that increased production and gainful employment through enhancement of infrastructure (feeder roads, storage facilities and irrigation development) and mining activities will be strongly supported by environmental impact assessments and audits. Concerns on deforestation, land degradation through mining and farming activities, loss of coastal ecosystems and fisheries will be seriously addressed together with those from manufacturing industries. The section identifies key institutions such as the Ministry of Environment and Science, Environmental Protection Agency, Ministry of Local Government and Rural Development, Ministry of Food and Agriculture, Ministry of Lands Forestry, Ministry of Mines in collaboration with Ministry of Trade and Industry and Ministry of Tourism have been identified as institutions that are expected to collaborate.

The thematic area also underscores the use of biological diversity through community management of natural resources and the encouragement of the private sector investment in ecotourism and cottage industry. This is also backed up by the enhancement of access to land and provision of security of tenure

#### **3.4.2 Human Resources Development and Basic Services**

It highlights safe water and environmental health, ensuring safe liquid and solid waste management. Notable issues proposed for example are sanitation tribunals to be established and strengthened in every district. Other environment concerns highlighted are water borne diseases such as malaria and guinea worm infestations.

#### **3.4.3 Special Programmes for the Vulnerable and Excluded**

Issues on disaster management that may result from earthquakes, flooding, epidemic etc have been addressed under this section.

#### **3.4.4 Monitoring and Evaluation**

The GPRS seeks to monitor all projects and programmes through focus groups to capture conditions that can negatively impact the poor. Environmental monitoring will not be limited

to the Environmental Protection Agency but to all MDAs as well as the District Environmental Management Teams.

### **3.4.5 Long-Term Growth Strategy**

The GPRS document also recognises in the very long-term the need for transboundary management of environmental resources such as water, air, and biodiversity in collaboration with other countries in the West Africa sub-region. The long-term strategy is to maintain a sound environment and to prevent all forms of environmental degradation.

From the foregoing, it will be observed that climate change issues though appear to be part of the broad issues on the environment and hence occasionally mentioned are not well articulated. Furthermore the environmental consequences of policy interventions were not sufficiently assessed. Perhaps the complex cause-effect relationship and the abstract nature make it difficult to assess the magnitude and direction of climate change impacts especially on the poor. In sum, the GPRS does not make a deliberate attempt to address the linkages related to climate change and poverty. It was in part this reason that the need arose to conduct a Strategic Environmental Assessment of the GPRS.

## **3.5 The Strategic Environmental Assessment (SEA) and Climate Change**

The Strategic Environmental Assessment process was introduced basically to examine the GPRS (2003) and make it more environmental friendly.

The widely accepted definition of SEA is:<sup>20</sup>

- Identify key environmental issues, risks and opportunities of the existing GPRS 2003-2005
- identify 'win-win options' for environment and poverty reduction to ensure that sound environmental management contributes to sustainable economic growth in Ghana.

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<sup>20</sup> *The formalised, systematic and comprehensive process of evaluating the environmental effects of a policy, plan or programme and its alternatives, including the preparation of a written report on the findings of that evaluation, and using the findings in publicly accountable decision-making.* (Therivel et al 1992)

- Assess the compliance of District Plans with GPRS 2003-2005, as main mechanism for practical implementation of GPRS activities.

The SEA process involved a wide range of stakeholders including Ministers of State, the Ministries Department and Agencies, District Assemblies assemblies, parliamentary representatives, civil society, NGOs and business associates. The recommendations of the SEA has also served as form the basis for the update of the GPRS.

However, one major observation is that the SEA does not address issues of climate change directly though it recognises that Ghana has a programme on climate Change and recommends that these be fed into the National Development Agenda. Furthermore, SEA takes account of risks related to vulnerability which may be related to flooding as a result of climate change factors

### **3.6 Global Initiatives, Climate Change and the GPRS**

The New Partnership for Africa's Development (NEPAD), which is a long-term vision for Africa, is an initiative by African leaders to eradicate poverty and to place their countries both individually and collectively on a path of sustainable growth and development.

The main objective is to provide an impetus to Africa's development by bridging existing gaps in prioritising sectors to enable the continent catch up with developed parts of the world.

The long-term objectives and goals of NEPAD are to

- Eradicate poverty in Africa and to place African countries both individually and collectively on a path of sustainable growth and thus halt the marginalisation of Africa
- Promote the role of women in all activities
- Achieve and sustain an average gross domestic product (GDP) growth rate of above 7 percent per annum for the next 15 years
- Ensure that the continent achieves the agreed international Development Goals such as MDGs.

In achieving the stated vision, goals and the 7 percent annual GDP growth rate, African Heads of States came out with four main initiatives . These are as ff;

- The Peace, Security, Democracy and Political Government initiative.
- The Economic and Corporate Governance Initiative
- The Environment Initiative

- The Capital Flows Initiatives

Under the Environment initiatives for NEPAD, eight sub –themes for priority interventions are targeted, these are

- Combating Desertification
- Invasive Alien Spaces
- Coastal Management
- Global Warming
- Cross- border Conservation Areas
- Environmental Financing

Issues raised under climate change in the NEPAD policy document, focused mainly on monitoring and regulating the impact of climate change and integrating fire management projects. However considering the vulnerability status of most African countries with respect to climate variability, their limited adaptative capacity and dependence on climate sensitive sectors for their GDP growth, achievements of the long-term vision and goals of NEPAD would be hardly realized if climate change issues are not mainstreamed into National Development Plans and NEPAD Programmes

It is important to monitor and regulate the impact of climate change under the Environment Initiatives, but considering the importance of natural resource and the poor dependence on the immediate environment for their livelihood strategies, one would conclude that climate change should be valued high in national and regional poverty reduction programmes. This calls for integrating climate change at the planning, designing, implementing and monitoring anti poverty strategies and programmes nationally and regionally.

### 3.6.2 GPRS and the Millennium Development Goals (MDGs)

The MDGs are long term, universally accepted goals (basically aimed at reducing poverty and its various dimensions) resulting from the Millennium Declaration.<sup>21</sup> The overarching purpose of the MDG is to reduce the proportion of the world's

#### **The Millennium Development Goals**

1. Eradicate extreme poverty and hunger
2. Achieve universal basic education
3. Promote gender equality and empower women
4. Reduce child mortality
5. Improve maternal health
6. Combat HIV/AIDS, malaria, and other diseases
- 7. Ensure environmental sustainability**
8. Develop global partnership for development

*Source: UNDP website [www.undp.org](http://www.undp.org).*

<sup>21</sup> In year 2000 Global leaders from 189 nations including Ghana agreed on a resolute plan to support global development objectives referred to as Millennium Declaration. The Millennium Declaration came up with 8 goals, 18 targets and 48 indicators.

population living in extreme poverty by half by the year 2015. Achieving the goals might be difficult given the rate of growth of the economy; however, the consoling factor is that it is not impossible.

Table 3.1 shows the relationship between the MDGs and the goals/broad themes of the GPRS. The basic goals of the GPRS are to reduce poverty, which is clearly the overarching goal of the MDGs. In the long-term the major objective of the GPRS is to ensure equitable human resource development and basic services. These are consistent with the MDG 2 (Achieve universal basic education), MDG 4 (reduce child Mortality), MDG 5 (Improve maternal health), and MDG 6 (Combat HIV/AIDS, Malaria and other diseases). The third goal relates more to equitable growth through production and special programmes for the vulnerable and the excluded.

Aside from the linkages between the GPRS goals and the MDGs, the targets set in both the GPRS and the MDGs are related. For instance, in 1992, 51.7% of the population was poor and 36.5 % was extremely poor. By 1999, 40% the population was classified as poor and 27% classified as extremely poor. These show decline of about 2% and 1.5% respectively over a six year period. Comparatively, the MDG target is to halve extreme poverty by 2015. This will work out to reducing extreme poverty to 18% by 2015.

<b>Table 1: Consistency Between the GPRS and the MDG</b>	
<b>MDG Goals</b>	<b>GPRS Goal/Broad Objectives</b>
<b>I.</b> Eradicate extreme poverty and Hunger	Poverty Reduction/ all 5 thematic areas
<b>II.</b> Achieve Universal Basic Education	Equitable Human Development, Vulnerability and exclusion and Production and Gainful Employment
<b>III.</b> Promote Gender Equality and Empower Woman	Equitable Growth through production, Human Resource Development, Programmes for Vulnerable and the Excluded
<b>IV.</b> Reduce Child Mortality	Human Resource Development,
<b>V.</b> Improve Maternal Health	Human Resource Development,

<b>VI.</b> Combat HIV/AIDS, Malaria and other diseases	Human Resource Development, Programmes for Vulnerable and the Excluded
<b>VII.</b> Ensure Environmental Sustainability	Production and Gainful Employment, Programmes for Vulnerable and the Excluded
<b>VIII.</b> Global Partnerships for Growth and Development	Macro economy and Good Governance (decentralisation and democracy)

This requires about 0.72 percentage point decline in extreme poverty level per annum. The GPRS took cue from the MDG in arriving at its own target of reducing extreme poverty from 27% in 1999 to 21% by end of 2004, which is at an average of 1.2 % point decline a year. This rate is about 0.5 % percentage point above the 0.72 percentage point rate suggested by the MDG.<sup>22</sup> The foregoing indicates that the GPRS are in conformity with the MDGs.

What is worth noting is that the MDGs are not novel. These have been addressed in different ways particularly by African countries for a few decades now. Since the targets and goals are meant to be achieved in the long-term, it might not be fair to pass an immediate judgement on the performance in the attainment of the goals. In fact, the goals might not be easy to achieve. Nevertheless, the formulation and agreement of the MDGs have certainly created a momentum for not only eradicating poverty but also more particularly recognising the critical role of environmental concerns in national policy planning. This is attested by the fact that MDG7 specifically deals with the need to ensure environmental sustainability. One of the three main targets related to this goal is *integrating the principles of sustainable development into country policies and programmes and reversing the loss of environmental resources.* (table II).

**Table 3.2 Targets and Indicators of MDG7-Ensuring Environmental Sustainability**

<b>Targets</b>	<b>Indicators</b>
Integrate the principles of sustainable development into country policies and programmes and reverse the loss	<ul style="list-style-type: none"> <li>• Proportion of land area covered by forests</li> <li>• Land area protected to maintain biological diversity</li> <li>• Energy use per unit of GDP</li> </ul>

<sup>22</sup> The paragraph draws heavily from a Paper by Professor G. Gyan-Baffour on *Synchronising and Harmonising National Development Frameworks to Achieve the Millennium Development Goals –Experience from Ghana.* Presented at a forum on the Millennium Development Goals in West Africa. Dakar Senegal.

of environmental resources	<ul style="list-style-type: none"> <li>• Per capital CO2 emissions and consumption of ozone depleting substances</li> <li>• Proportion of population using solid fuels</li> </ul>
Halve by 2015 the proportion of people without sustainable access to safe drinking	<ul style="list-style-type: none"> <li>• Proportion of population with sustainable access to improved water source and adequate sanitation</li> </ul>
Achieve by 2020 a significant improvement in the lives of at least 100 million slum dwellers	<ul style="list-style-type: none"> <li>• Proportion of households with access to secure tenure</li> </ul>

Source: United Nations 2001

Whereas goals are usually broad, MDG7 appears to be too broad for one to presume that it directly addresses issues related to climate change. In fact, its first target (integrating the principles of sustainable development into country policies and programmes and reversing the loss of environmental resources) unlike the other targets does not indicate specific time and output. Perhaps, this illustrates the difficulty recognised by the formulators in even interpreting the MDG7. Furthermore, out of the 8 indicators for MDG7, only one of them (indicator 28) specifically focuses on climate change issues<sup>23</sup>. The rest focus on resources conservation, water and slum issues. African countries appear not to be very much interested in carbon and ozone depletion given the negligible amount of contribution by these countries.<sup>24</sup> Given this fact the focus could have been more on measuring the risk or vulnerability factor inherent in climate change impacts. Whereas it is acknowledged that the MDGs recognise the importance of environment for eradicating poverty, and while appreciating the interrelationships between several segments of the environment, broadly, the MDGs in themselves provide little focus for climate change concerns as mainly the MDG 7 tilt more towards biodiversity and water issues.

### **Congruence Between MDG 7 and the Others**

For the purpose of this report., it may be useful to explain MDG 7-Ensuring Environmental Sustainability. Environmental sustainability refers to the ability of ecosystems (communities of plants, animals and micro-organisms and their non-living surrounding interacting in a

<sup>23</sup> Target 9 is tracked by 5 indicators- the sustainable management of forestry resources, the preservation of biodiversity and genetic resources, the efficient use of energy , the greenhouse effect which is linked to global warming and damage to the ozone layer-monitored by the consumption of the ozone depleting substances.

<sup>24</sup> What amount of CO2 in the atmosphere emitted by Ghana. Etc Check human development report 2003.

dynamic complex unit) to sustain themselves and humans far into the future with critical ecosystem goods and services.<sup>25</sup>

To broaden the argument a bit, ecosystem goods and services are the benefits people obtain from ecosystems. These include **provisioning services** such as food, clean water, shelter and biomass for energy generation, regulation services such as flood, disease and climate control, **cultural services** such as spiritual, recreational, educational and **supporting services** such as climate stability, water and nutrient recycling that maintain the status for life on earth.<sup>26</sup>

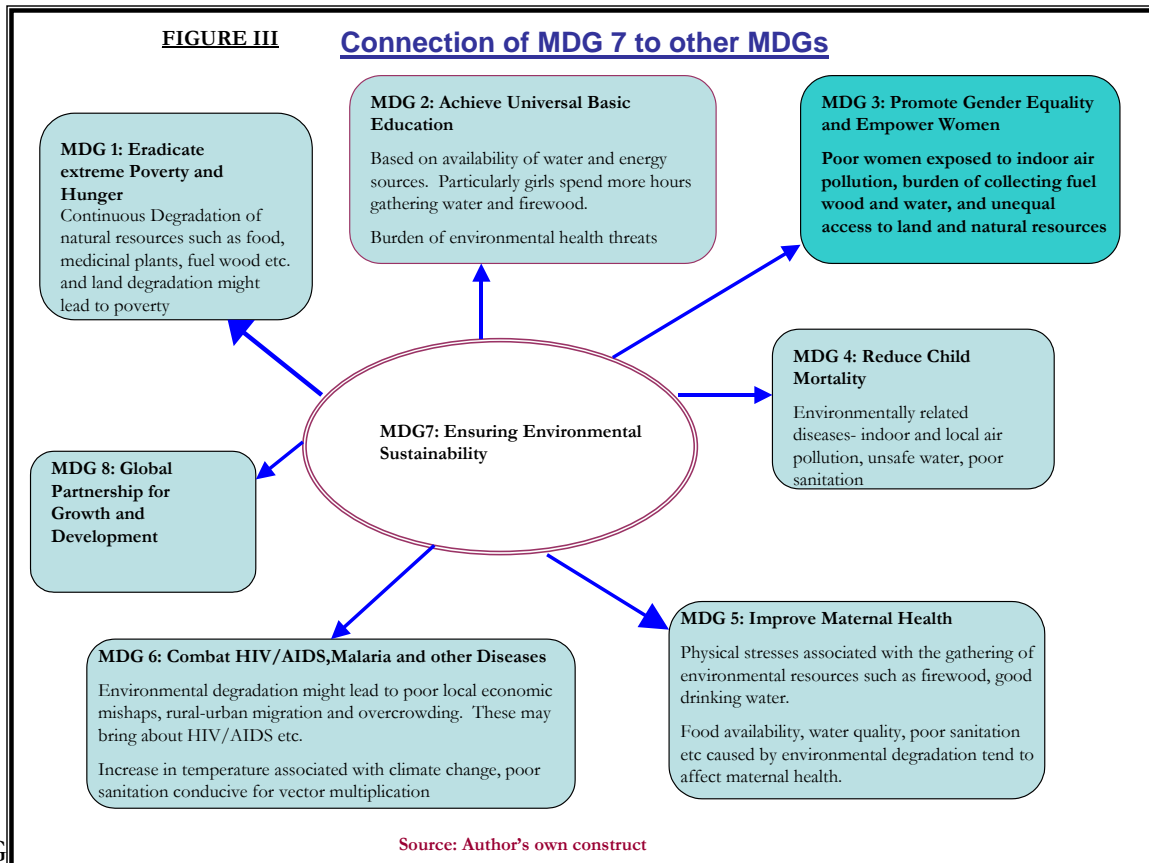
The above explanation suggests that environment sustainability contains a lot of synergies and interrelationships among the key components. In fact many such as Bolt K (2002) have argued and observed that addressing environmental issues will help achieve the other goals and vice versa.<sup>27</sup> Attaining the first seven goals, simply put attacking poverty in its multidimensional perspective is therefore jointly supportive. Figure III is a simple diagram that shows the centrality of the MDG 7 in meeting the other goals, which can more or less likened to the dimensions of poverty as illustrated in figure II. Although there are relationships even between the other goals, figures III demonstrate that goal 7 is critical for the attainment of the other goals. The linkages between MDG 7 and the other goals can be simplified when four key areas are considered. These are livelihoods, health, participation and empowerment and vulnerability.

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<sup>25</sup> See Kakabadse-Navarro, McNeely and Melnick 2004

<sup>26</sup> *ibid* p4

<sup>27</sup> Bolt K The Millennium Development Goals and the Environment in *Environment Matters* 2002



systems of especially the poor in Ghana. In addition, environmental mishaps such as floods, bush fires and droughts are key determinant factors for attaining goal 1.

This reason is often the poor suffer disproportionately since they live in more ecologically fragile ecosystems. Goals 2 and 3 tackle the issues of participation and empowerment through education and gender equality. Women tend to have limited opportunities available opportunities owing to the fact that they bear more of the brunt of environmental degradation than men. For example women are more susceptible to Acute Respiratory Infection than men owing to the relatively long exposure to indoor pollution from fuel wood usage.

Furthermore, adolescent girls who support their mothers at home, spend more time gathering fuel wood and fetching water. This implies spending less time at school. Goals 4, 5 and 6 together focus on health and poverty. For example in Ghana an environment related disease such as malaria which is encouraged by stagnant water and increases in temperature kills about .....children in Ghana every year.<sup>28</sup>

What is apparent is that the MDGs establish broad development agenda but they do not in themselves offer plans of action for a particular country to achieve the goals. Poverty is multi-dimensional with varying tremendous characteristics. Reducing it therefore calls for responses relevant to a specific location. Thus while both the GPRS and the MDGs are all aimed at the related goal of creating wealth and reducing poverty, it is remarkable that in a way, the GPRS is the Ghanaian programmatic instrument in pursuit of achieving the MDGs. The GPRS therefore offers opportunities for integrating the environment into policy making.<sup>29</sup>

Poverty reduction and climate change are fundamentals of global agreements of which Ghana is committed. Dily Roe et al have observed that it will be a tragedy if the internationally agreed framework for achieving the laudable MDGs succeeded only in being the obstacle to its own success.<sup>30</sup> Just attaining the goals is not the ultimate. What is relevant is achieving them in a sustainable manner. Talking about sustainability brings to the fore the reality of mutually reinforcing and integrating the three main pillars of sustainable development- economic, environment and social development- in the quest for reaching the MDGs. The challenge therefore is for Ghana to devise strategies as to how to mainstream effectively climate change into national poverty reduction strategies.

From the foregoing, the argument is clear that addressing climate change issues as part and parcel of national development planning and poverty reduction will result in rippled pay-offs not only for achieving the MDGs but also meeting the goals in the GPRS.

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<sup>28</sup> Ministry of Health or WHO

<sup>29</sup> The update of the GPRS has just begun and MDGs will be fully integrated into the process.

<sup>30</sup> See Roe D et al in Satterwaite D eds. 2003

### ***3.7 Institutional Landscape for Poverty Reduction in Ghana***

It appears there have not been any formalised structures solely responsible for environment and poverty. Though there have been attempts at reducing poverty in this country, there has hardly been any formalised institution for poverty reduction. However, in 1995, the Government of Ghana recognising the poverty situation in Ghana at the time set up the Inter-Ministerial Committee on Poverty Reduction (IMCPR) as the highest policy-making organ of Government on all issues pertaining to poverty reduction in Ghana<sup>31</sup>. The IMCPR was supported by a Technical Committee on Poverty Reduction (TCOP) set up in 1995 as the technocratic arm of the IMCPR.<sup>32</sup>

With the new government administration, however, a few changes were anticipated in the institutional structure to reflect the new emphasis on poverty reduction. The above structure therefore has not been functional in the last couple of years. Nevertheless, on the legislature front Parliamentary Committee on Poverty Reduction has been formed.

At the cabinet level, there is no specific committee/sub-committee that deals holistically with poverty reduction. Rather issues to do with poverty are dealt with on an ad hoc basis. In the regions, National Inter-Agency Poverty Monitoring Group (NIPMG) has been formed in all the five thematic outlined in the GPRS. It is worth noting that even though the NIPMG focuses on poverty monitoring, the proposed composition did not include any of the key environmental institutions<sup>33</sup>. Hence the feedback particularly on environment issues

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<sup>31</sup> The IMCPR which was chaired by the then Minister for Finance comprised all Ministers responsible for the social sector (Health, Education, Employment and Social Welfare, Local Government and Rural Development, etc.) and for Infrastructure (Roads and Electricity) as well as for Agriculture. In addition, the Heads of NCWD (for gender issues) and NDPC (for coordination of all inter-agency programmes) were also members of the IMCPR.

<sup>32</sup> The TCOP was chaired by the then Director General of the NDPC and included technical personnel from all sectors represented on the IMCPR and the National Council on Women Development, Ghana Statistical Service, and the National Population Council.

<sup>33</sup> Refer to page 22 of the Ghana Poverty Reduction Strategy Monitoring and Evaluation Plan 2003

(including climate change) which is supposed to inform policy making, is likely to be overlooked.

### **3.8 Mitigation and Adaptation in National Development Process**

In recent era, considering the direct relationship between poverty levels and climate variability, it is significant mainstream mitigation and adaptation strategies in international and national development programmes. The sections explains mitigation and adaptation

#### **3.8.1 What is mitigation?**

Climate change mitigation should not always be perceived as adverse especially for developing countries. Mitigation measures that are climate-friendly could bring benefits such as fuel saving from improved energy efficiency. It may be argued that climate friendly technologies require high capital. However, if well managed, it will bring long-term benefits. Thus while mitigation may not stabilise the atmospheric concentrations of green house gases and whiles developing adaptive capacity to minimise damage caused to the environment, it is critical to bear in mind that adaptation should not be perceived as a panacea as it cannot deal with all the repercussions of climate change. On the contrary, given the gloomy picture of the poverty situation as indicated above/below, including the intensity of vulnerability, and whiles not downplaying the role of mitigation, it is worth to concentrate on adaptation.

#### **3.8.2 Meaning of Adaptation**

Adaptation is adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. This term refers to changes in processes, practices, or structures to moderate or offset potential damages or to take advantage of opportunities associated with changes in climate. The key thing about adaptation is that it cannot prevent economic and other losses from climate change, but it can reduce and delay them<sup>34</sup>. It thus involves adjustments to reduce the vulnerability of communities, regions, or activities to climatic change and variability. Adaptation is important in the climate change issue in two ways – one relating to the assessment of impacts and

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<sup>34</sup> (Smith and Pilifosova, 2001).

vulnerabilities, the other to the development and evaluation of response options. Some adaptation options for Ghana is depicted in table 4.2

### 3.8.3 Determinants of Adaptive Capacity

Ability to adapt clearly depends on the state of development<sup>35</sup>. Naturally, systems have some ability to adapt to certain changes but not with extreme climatic variability and changes. This therefore calls for the development of adaptation strategy for the country in the face of climate change.

Ghana's ability to adapt will depend greatly on her adaptive capacity or the adaptability of regions, district assemblies, sectors and communities to cope with the impacts and risks of climate variability and climate change. Adaptive capacity depends on several socio-economic factors such as improved access to resources', level of poverty , Improved infrastructure, Respect for accumulated local experience , Adequate Financial Resources, Insurance mechanisms, Access to public health facilities, Level of education and training, Adequate information and skill, Access to Technology, Strong institutions and effective organisations, Existing early warning and protection from natural hazards.

Unfortunately, most of the regions, District Assemblies and local communities in Ghana are not adequately resourced as specified above to adapt to climate variability, thus the need for enhancement of their adaptive capacity.

Enhancement of adaptive capacity is a necessary condition for reducing vulnerability, particularly for the most vulnerable regions, district assemblies, and socio-economic groups in the country. Activities required for the enhancement of adaptive capacity are essentially equivalent to those promoting sustainable development.

In Ghana, there is limited research and knowledge on the dynamics of adaptation in human systems, the processes of adaptation decision-making, conditions that stimulate or constrain adaptation, and the role of non-climatic factors.

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<sup>35</sup> (Berke, 1995; Munasinghe, 1998). As Ribot et al. (1996) illustrate, underdevelopment fundamentally constrains adaptive capacity, especially because of a lack of resources to hedge against extreme but expected events. The events are not surprises. "It is not that the risk is unknown, not that the methods for coping do not exist... rather inability to cope is due to lack of – or systematic alienation from – resources needed to guard against these events" (Ribot et al., 1996)

However, to reduce the vulnerability of the poor in Ghana, it is important for the nation to undertake planned adaptation and integrate this in National Development Process. Planned adaptations can either be reactive or anticipatory (undertaken before impacts are apparent). This can be short or long term, localized or widespread, and they can serve various functions and take numerous forms. Adaptation should not only be the responsibility of Government but both the private and public interest should be motivated. Private decision-makers include individuals, households, businesses, and corporations

## CHAPTER 4

### FINDINGS, STRATEGIC DIRECTIONS AND CONCLUSIONS

#### 4.0 Introduction

This section discusses the challenges, key findings , Strategic Directions and conclusion for the poverty and climate change linkages..

#### 4.1 Challenges and Key Findings

- a) There is no doubt that there is a causal relationship between environment and poverty. However, the process of integrating environment into the GPRS has been limited by the absence of proper and effective data and information. This to a large extent limited the team's ability to quantify most of the issues and made it very difficult to set targets.
- b) How to convince policy makers and businesses to consider climate change as a priority for poverty reduction
- c) There is a strong relationship between climate and poverty levels. The report reveals that ecological zones that have high temperature and low rainfall such as Sudan Savanna, Guinea Savanna and transitional zone have high poverty levels, also most of the District Assemblies with harsh climate conditions have very high incidence of poverty levels as shown in Appendix 1. The implication is that harsh climate conditions will likely worsen the poverty levels of these districts and the nation in general.
- d) Ghana is highly vulnerable to the impact of extreme climate conditions. The poor (crop farmers, fishermen etc) who depend directly on the immediate environment for their livelihood are likely to suffer massively by the impact of climate change.
- e) Climate variability will reduce food security because agriculture depends heavily on rainfall with low level application of irrigation, also as underemployment and

unemployment in the agric sector will increase. This means 60% of the country's work price is at risk with regards to extreme weather conditions.

- f) The country's gross domestic product of 5% achieved annually is likely to reduce in the face of climate variability. This is because the sectors that contribute to the GDP (agric, tourism and service) are all sensitive to extreme climate conditions.
- g) Changes in precipitation, enhanced evaporation and severe drought has impact on the large reservoir of the Volta Lake. The Akosombo dam which used to provide 70% of the country's energy need presently produces only 30% due to low level of water in the dam. This has serious implications for industrialisation and private sector development.
- h) In Ghana, recent survey reveals that malaria (vector-borne diseases) is on the ascendance. This situation will increase with extreme temperature in the face of poor drainage facilities, also cholera and cerebro spinal meningitis and water related diseases have potential to increase.
- i) The country has limitation with regards to adaptation (reactive and preventive strategies) considering it human development indicators.
- j) Though there is a strong relationship between the state of the climate and poverty reduction, the GPRS (2003-2005) falls short of mainstreaming climate change into the policy framework and the programmes and projects for the various sectors.
- k) The MDGs, NEPAD and the GPRS mention environment and are all aimed at poverty reduction However, the linkages between climate and poverty reduction are not well articulated in all of them.

## **4.2 STRATEGIC DIRECTION.**

### **4.2.1 Reducing vulnerability to Climate Change**

Ghana's ability to reduce vulnerability to Climate variability and Climate Change are through mitigation and adaptation. Adaptation should be considered an important response option or strategy, along with mitigation. Enhancement of adaptive capacity represents a practical means of coping with changes and uncertainties in climate, including variability and extremes. In this way, enhancement of adaptive capacity would reduce vulnerability and promote sustainable development in the nation.

### **4.2.2 Effective Decision Making and dissemination of information**

It is important to involve policy-makers deeply in integrating climate change issues in National Development planning. Ultimately the policy formulator does not make a decision, crucial and final decisions will have to be made with policy makers (Politicians). Policy makers determine the path or they cut the path, policy formulators therefore have a vital role to identify whether the path are straight or not, this may call for lobbying, negotiation and sensitization through the use of policy briefs, news paper articles and policy seminars to conscience policy makers. Regarding the critical role of climate issues in national development

### **4.2.3 Climate Change Research and education**

Information is vital in the process of integrating climate change into national development planning. Appreciating research and information would call for a deep understanding of vulnerability and coping adaptation strategies. For example agricultural Research institutions should consider drought resistant varieties and construction industry should also consider results or recommendations from Building Research institutions. It is also worth to develop sustainable development indicators to monitor performance

### **4.2.4 Developing Insurance Schemes**

As established earlier, the economy is dependent on climate sensitive sectors which also place the economy in a vulnerable position. In designing policies it is worth putting in place insurance schemes for sensitive sectors like agriculture, health, housing and infrastructure,

since most of the repercussions of climate change can hardly be prevented. This may seem difficult since insurance schemes are not well developed. Nevertheless, it may be strategic to start on a pilot level at the local levels and the lessons thereof would be replicated nationwide.

#### **4.2.5 Funding Adaptation**

A critical factor in adaptation development is availability of funds. Thus for Ghana it is important that strategies are put in place to mobilise funds for effective adaptation. One of the grey areas is providing incentives such as tax incentives, encouraging corporate social responsibility etc for the private sector and other non governmental organisations to be deeply involved in adaptation issues. National budgeting process should also consider adaptation programmes and projects.

#### **4.2.6 Build and disseminate early warning systems**

Build early warning system for natural disasters and effectively disseminate these warning to stakeholders especially at the local level. Also provide efficient mechanisms for disaster management.

4.2.8 Other forms of measure especially regarding the MDGs are provided in table below

#### **Meeting the Millennium Development Goals (MDGs) in a Climate Friendly Manner**

**Table 4.**

<b>Millennium Development Goals (MDGs)</b>	<b>Proposed Climate Change Strategy</b>
1: Eradicate Poverty and Hunger	Minimise adverse effects of climate change and climate variability such as floods and drought
2: Achieve Universal Primary Education	Provide enough fuel wood, water so that time spent in water collection
3: Promote Gender Equality and Empower Women	Emphasise gender (women and children) issues in adaptation management plans Provide more financial access to the vulnerable to climate change
4: Reduce Child Mortality/5: Improve Maternal Health	Resettle expectant mothers from high risk areas
6: Combat HIV/AIDS, Malaria and other diseases	Reduce water borne diseases
7: Ensure Environmental Sustainability	Convince policy makers through lobbying and negotiation about the importance of climate change in policy formulation and policy making Create awareness about the importance of extreme events in the design and planning of national policies.
8: Develop a Global Partnership for Development	Build negotiation techniques Encourage private businesses to mainstream climate change into business plans Strengthen regional collaboration Source funding through global partnerships from Special Climate change Fund Potential Adaptation Fund

**Table 4.2: Showing sectors, potential climate impacts and proposed adaptation and mitigation Strategies**

Sectors	Potential Climate Change Vulnerability	Adaptation Strategies
Agriculture	<ul style="list-style-type: none"> <li>• Harvest failures from improper adaptive strategies</li> <li>• Reduce biological productivity and loss of forest cover</li> <li>• Progressive loss of non-timber forest products</li> <li>• Increased land degradation and loss of cropable land</li> <li>• Reduction in livestock size and nutrition.</li> </ul>	<ul style="list-style-type: none"> <li>• Development of drought tolerant and flood resistant varieties.</li> <li>• Breeding of early or extra early maturing genotypes.</li> <li>• developing food insurance schemes;</li> <li>• Educating farmers to plant in low population densities so as to reduce competition for scarce or limited soil moisture</li> <li>• Encourage farm level adaptation such as shift in planting dates and modifying the amount and timing of fertilizer application</li> <li>• Shifts in natural production centres for various food crops areas where comparative advantage can be obtained.</li> <li>• Enhancing food security measures by storing food in national banks</li> </ul>
Marine ecosystem and coastal zone	<ul style="list-style-type: none"> <li>• Potential risk from sea level rise such as coastal inundation and erosion</li> <li>• Salt water intrusion into fresh water</li> </ul>	<ul style="list-style-type: none"> <li>• negotiating regional water-sharing agreements;</li> <li>• providing efficient mechanisms for disaster management;</li> </ul>

infrastructure	<p>resources</p> <ul style="list-style-type: none"> <li>• Disruption of sources of livelihoods e.g. fishing and agriculture</li> <li>• Population displacement</li> <li>• Invasion and destruction of mangrove ecosystem, coastal wetlands and beaches along with their associated economic and social importance such as being sites for migratory birds</li> <li>• Loss of habitat of several species including marine turtles</li> <li>• Risk to life, structures and property</li> </ul>	<ul style="list-style-type: none"> <li>• developing desalination techniques;</li> <li>• planting mangrove belts to provide flood protection;</li> <li>• planting salt-tolerant varieties of vegetation;</li> <li>• improving drainage facilities;</li> <li>• establishing setback policies for new developments;</li> <li>• Devising flood early warning systems.</li> <li>• The use of set back policies for all underdeveloped areas within the coastal zone. This would prevent the construction of immovable structures within hazard areas.</li> </ul>
Human Health and Settlement	<ul style="list-style-type: none"> <li>• Possibility of emergence of new disease vectors in some areas</li> </ul>	<ul style="list-style-type: none"> <li>• establishing setback policies for new developments</li> <li>• improving drainage facilities</li> </ul>
Energy, Industry and Financial	<ul style="list-style-type: none"> <li>• Disruption in industry productivity due to possible crises in the energy sector</li> <li>• Disruption in the supply of raw materials</li> </ul>	<ul style="list-style-type: none"> <li>• Development of woodlot</li> <li>• Promote and develop energy efficient technologies</li> <li>• Promotion of energy conservation especially in large</li> </ul>

Services	<p>e.g from agriculture, fisheries and forestry</p> <ul style="list-style-type: none"> <li>• Potential impact on inter-regional trade</li> <li>• Disruption of rainfall patterns will affect Akosombo dam(30% of our energy sources)</li> <li>• Higher risk of property insurance</li> <li>• Possible disruption of banks' lending portfolios</li> </ul>	<p>energy consuming industries.</p> <ul style="list-style-type: none"> <li>• Monitor and control emissions from industries and transport sectors</li> <li>• Promote and develop alternative energy sources such as biomass, wind, biomass, mini-hydro etc.</li> </ul>
Biodiversity	<ul style="list-style-type: none"> <li>• Possible reduce biological productivity</li> <li>• Alteration of species (flora and fauna) composition in the different ecological zones.</li> <li>• Alteration of vegetation structure</li> </ul>	<ul style="list-style-type: none"> <li>• Reforestation</li> <li>• Ensure the cultivation of species in the environment that they are adapted to.</li> <li>• Establish land use plan for hot spots</li> </ul>
Water Resources and wetlands.	<ul style="list-style-type: none"> <li>• Loss of biological diversity</li> <li>• Pollution of fresh water resources</li> <li>• Disruption of fishing activities</li> <li>• Reduction in underground Water levels</li> <li>• Drying up of river courses resulting from forest losses in headstream areas</li> <li>• Threat to biodiversity e.g. migratory birds</li> </ul>	<ul style="list-style-type: none"> <li>• Devise flood/drought early warning systems</li> <li>• Provide alternative skill training for fishing communities</li> <li>• Desalinization of water</li> </ul>



### 4.3 SUMMARY AND CONCLUSION

The paper began with the aim of examining the relationship between climate change and poverty reduction and to consider these in line with adaptation livelihood for the poor in Ghana.

Chapter one which provided a general introduction to the study began by stating the purpose of the study. It then gave a background to the study emphasising its importance objectives and findings and how the whole document is organised.

Chapter two explained key concepts such as climate change, poverty, vulnerability, and adaptation and established poverty and environment linkages. The chapter also did a statistical analysis of districts poverty levels and ecological zones of Ghana.

Chapter three revealed that the GPRS though recognises environment does not focus on climate issues. It was also observed that other global initiatives such as MDGs and NEPAD though have a major objective of reducing poverty; do fall short of climate change as a way of reducing poverty.

The last chapter contains key findings strategic directions and conclusion. It is critical to appreciate that the relationships between poverty and climate change is a complex one which depends on specific contexts. Care must therefore be taken to integrate adaptation in national development. planning. Since the Ghanaian economy depends on climate sensitive sectors such as agriculture forestry, poverty reduction strategies without due consideration for climate change might not meet the desired targets.

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## APPENDIX 1

### Statistical Analysis on Poverty and Ecoclimatic Zones

Statement of Hypothesis

The statements of hypothesis for this research work are

**Hypothesis 1:**

**H<sub>0</sub>:** There is no variation in poverty incidence across the ecological zones as regards climate

**H<sub>1</sub>:** There is a variation in poverty incidence across the ecological zones

**Hypothesis 2:**

**H<sub>0</sub>:** Eco Climatic zones are not contributory to poverty level

**H<sub>1</sub>:** Eco Climatic zones are contributory to poverty level

From the above table, the F-value as calculated is greater than the tabulated F-value, also the probability value is less than .005, and thus we reject the null hypothesis and conclude that there is a significant difference in the poverty level across the six ecological zones. Hence climate is contributory to poverty level.

**Measures of Association**

The correlation value ( $r$ )

**R=.646**

**R<sup>2</sup>=.417**

100 R<sup>2</sup>=41.7

We can thus say that 41.7% of the poverty level can be explained by ecological factors.

The chart below depicts the averages of poverty level across the six main ecological zones

**ANALYSIS FOR THE ELEVEN ECOLOGICAL ZONES**

The table below shows the eleven ecological zones (Ecozones) each zone (N)

Ecozone	Poverty level	N
Coastal savanna	34.83	6
Rainforest	41.44	27
Semi deciduous forest	60.89	9
Transitional	84.36	11
Guinea savanna	93.10	10
Sudan savanna	46.47	15
Coastal/Semi deciduous forest	48.43	7
Coastal/Rainforest	43.67	3
Semi deciduous/transitional zone	44.73	15
Transitional/Guinea savanna	64.00	4
Sudan/Guinea savanna	84.67	3

Total	55.30	110
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Analysis of Variance ANOVA Table

Source of variation	d.f	Sum of Square	Mean Square	F-value	Probability value
Between groups	10	38029.55	3802.95	26.54	.000
Within groups	99	17063.54	172.35	5.68	.000
Total	109	55093.10			

From the above table, the F-value as calculated (26.54) is greater than the tabulated F-value, also the probability value (.000) is less than .005, and thus we reject the null hypothesis and conclude that there is a significant difference in the poverty level across the eleven ecological zones as grouped. Hence climate is contributory to poverty level.

APPENDIX 2

**POVERTY INCIDENCE MAP BY DISTRICTS**

**ECOZONES**

<b>ECOZONE</b>	<b>REGION</b>	<b>DISTRICTS</b>	<b>POVERTY LEVEL</b>	
<b>COASTAL SAVANA</b> " " " " " " " " " " " " " " "	GREATER ACCRA REGION	AMA	8	
	"	TMA	19	
	"	GA	26	
	"	DANGBE EAST	51	
	"	DANGBE WEST	54	
	"	VOLTA	KETA	46
	"	"	KETU	52
	"	"	SOUTH TONGU	58
	"	"	NORTH TONGU	64
	"	CENTRAL	CAPE COAST MUNICIPAL	36
	"	"	AWUTU	49
	"	"	MFANTSIMAN	50
	"	"	KOMENDA	56
	"	"	GOMUA	58
	"	"	AJUMAKU	61
	"	"	ABURA	63
	"	"	AGONA	68
<b>COASTAL SAVANA/RAINFOREST</b> " "	WESTERN REGION	JOMORO	42	
	"	AHANTA	44	
	"	NZEMA	45	
<b>COASTAL SAVANNA/SEMI DECIDOUS</b>	CENTRAL	ASSIN	52	

"	"	TWIFO	55
"	"	ASIKUMA	62
"	EASTERN	AKUAPIM NORTH	31
"	"	AKUAPIM SOUTH	32
"	*	WEST AKIM	47
"	VOLTA	AKATSI	60
<b>SEMI DECIDOUS</b>	CENTRAL	UPPER DENKYIRA	54
"	WESTERN REGION	JUABESO	22
"	"	BIBIANI	23
"	"	SEFWI	28
"	"	MPOHOR	29
"	EASTERN	NEW JUABEN	20
"	"	YILO KROBO	31
"	"	EAST AKIM	38
"	"	BIRIM SOUTH	43
"	"	KWAEBIBRIM	44
"	"	SUHUM	44
"	"	BIRIM NORTH	47
"	ASHANTI	KMA	10
"	"	ADANSI WEST	25
"	"	AFIGYA	36
"	"	EJUSU	40
"	"	ATWIMA	45
"	"	ASHANTI	45
"	"	AMASIE EAST	50
"	"	BOSOMTWE	50
"	"	AMASIE WEST	52
"	"	AHAFO ANO NORTH	55
"	"	ADANSI EAST	55
"	"	AHAFO ANO SOUTH	64

"	BRONG AHAFO	DORMAA	51
"	"	ASUNAFO	56
<b>SEMI DECIDOUS /RAINFOREST</b>	WESTERN REGION	WASSA AMENFI	25
"	*	WASSA WEST	16
"	"	AOWIN SUAMAN	29
<b>SEMI DECIDOUS/TRANSITIONAL</b>	ASHANTI	ASHANTI AKIM NORTH	35
"	"	AFIGYA SEKYERE	43
"	"	SEKYERE WEST	44
"	"	OFFINSO	47
"	"	SEKYERE EAST	53
"	EASTERN REGION	KWAHU SOUTH	35
"	"	FANTEAKWA	45
"	VOLTA	KADJEIBI	33
"	"	HO	45
"	"	HOHOE	49
"	"	JASIKAN	52
"	BRONG AHAFO	JAMAN	69
"	"	SUNYANI	34
"	"	BEREKUM	37
"	"	TANOSO	48
<b>TRANSITIONAL</b>	EASTERN	MANYA KROBO	58
"	"	ASOUGYAMAN	62
"	"	AFRAM PLAIN	84
"	ASHANTI	EJURA/SEKYEREDUMASE	52
"	VOLTA	KPANDO	44
"	"	KRACHI	53
"	BRONG AHAFO	TECHIMAN	41
"	"	NKORANZA	71

"	"	SENE	83
<b>TRANSITIONAL/GUINEA</b>	VOLTA	NKWANTA	43
"	BRONG AHAFO	ATEBUBU	69
"	"	WENCHI	71
"	"	KINTAMPO	73
<b>GUINEA SAVANNA</b>	NORTHERN	TAMALE	59
"	"	SAVELUGU	77
"	"	EAST DAGOMBA	84
"	"	EAST GONJA	85
"	"	BOLE	87
"	"	NANUMBA	88
"	"	CHEREPONI	88
"	"	WEST GONJA	89
"	"	ZABZUGU	89
"	"	TOLON	90
"	"	GUSHIEGU	92
<b>GUINEA SAVANNA/SUDAN SAVANNA</b>	NORTHERN	WEST MAMPRUSI	87
"	"	EAST MAMPRUSI	88
"	UPPER WEST	WA	79
<b>SUDAN SAVANNA</b>	UPPER WEST	LAWRA	88
"	"	JIRAPA	89
"	"	SISSALA	91
"	"	NADOWLI	96
"	UPPER EAST	BOLGATANGA	88
"	"	KASSENA	91
"	"	BAWKU WEST	92
"	"	BUILSA	98
"	"	BONGO	99

