



HANS AWUDE

***CLIMATE CHANGE AND ITS EFFECT ON
AGRICULTURAL EMPLOYMENT IN GHANA: THE
ROLE OF TRADE UNIONS***

***MUDANÇA CLIMÁTICA E SEUS EFEITOS SOBRE O
TRABALHO AGRÍCOLA EM GANA: O PAPEL DOS
SINDICATOS***

**Campinas
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UNIVERSIDADE ESTADUAL DE CAMPINAS
INSTITUTO DE ECONOMIA

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EMPLOYMENT IN GHANA: THE ROLE OF TRADE UNIONS”**

Orientador: Prof. Dr. Bastiaan Philip Reydon – orientador

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**ESTE EXEMPLAR CORRESPONDE À VERSÃO FINAL
DA TESE DEFENDIDA PELO ALUNO HANS AWUDE E
ORIENTADA PELO PROF. DR. BASTIAAN PHILIP
REYDON.**

A handwritten signature in blue ink, which appears to be "Bastiaan", is written over a horizontal line. Below the line, the word "Orientador" is printed in a small, sans-serif font.

Orientador

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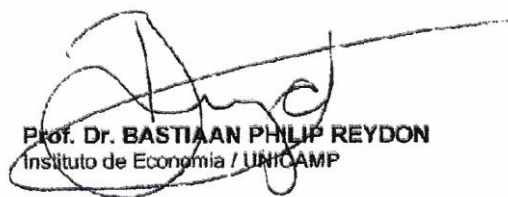
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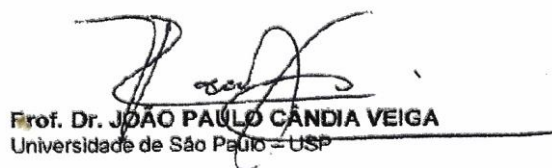
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LIST OF ACRONYMS

AGRA	Alliance for Green Revolution Africa
ALA	Agricultural Land Area
AMCEN	African Ministerial Conference on the Environment
APADEP	African Workers' Participation Development Programme
AU	African Union
CAADP	Comprehensive Africa Agriculture Development Programme
CBA	Collective Bargaining Agreement
CBNRM	Community Based Natural Resource Management
CCAFS	Climate change, Agriculture and Food Security
COP	Conference of Parties
CSIR	Council for Scientific and Industrial Research
DCL	District Council of Labour
DSW	Department of Social Welfare
EB	Executive Board
EC	Executive Committee
ECA	Economic Commission for Africa
ENAPT	Environmental Application and Technology
FAO	Food and Agriculture Organization of the United Nations
FASDEP	Food and Agriculture Sector Development Policy
FNV	<i>Federatie Nederlands Vakbeweging</i>
FWSC	Fair Wages and Salary Commission
GAWU	General Agricultural Workers' Union
GDP	Gross Domestic Product
GHG	Green House Gases
GLSS	Ghana Living Standard Survey
GSD	Ghana Survey Department
GSFP	Ghana School Feeding Programme
GSGDA	Ghana Shared Growth and Development Agenda
GSS	Ghana Statistical Service
GSSP	Ghana Strategy Support Programme
GTUC	Ghana Trade Union Congress
GTZ	German Agency for Technical Corporation
GUSS	Ghana Universal Salary Structure
HDI	Human Development Index
ICLS	International Conference of Labour Statistician
IOE	International Organization of Employment
IPCC	Intergovernmental Panel on Climate Change
ITUC	International Trade Union Conference
LEAP	Livelihood Empowerment against Poverty programme
LESDEP	Local Enterprises and Skill Development Programme
MASLOC	Microfinance and Small Loan Centre
MDG	Millennium Development Goal
METASIP	Medium Term Agricultural Sector Development Plan

MoFA	Ministry of Food and Agriculture
MoFEP	Ministry of Finance and Economic Planning
NADMO	National Disaster Management Organization
NCCP	National Climate Change Policy
NCCPF	National Climate Change Policy Framework
NCCPS	National Climate Change Policy Strategy
NDC	National Democratic Congress
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organization
NHIS	National Health Insurance Scheme
NPP	New Patriotic Party
NTFP	Non-Timber Forest Product
PAC	Policy Advocacy and Campaign
PSIA	Poverty and Social Impact Analysis
REDD	Reducing Emissions from Deforestation and Forest Degradation
RIW	Rights in Work Programme
RLC	Regional Council of Labour
RLS	Revolving Loan Scheme
RWOP	Rural Workers' Organization Programme
SC	Steering Committee
SCI	System of Crop Intensification
SRI	System of Rice Intensification
SRID	Statistics, Research and Information Directorate
SSSS	Single Spine Salary Structure
STEPRI	Science and Technology Policy Research Institute
TLA	Total land Area
TUC	Trade Union Congress
UK	United Kingdom
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development
VNRC	Village Natural Resource Management Committee
WSM	Wildlife Society of Malawi
YIAP	Youth In Agricultural Programme

RESUMO

Sindicatos poderiam desempenhar um papel chave na minimização dos efeitos de mudanças climáticas para os pequenos proprietários de terra no setor informal, cuja maioria é analfabeta e carece de proteção legal, segurança trabalhista e acesso ao sistema de saúde, caso fosse dada a essas instituições a chance e se elas aceitassem tal papel.

Mudanças climáticas tornam o emprego agrícola cada vez mais precário e, portanto, acrescentam uma nova dimensão às atividades e riscos contra os quais os sindicatos devem buscar proteger seus membros. Isso se torna mais evidente no contexto dos países em desenvolvimento que contribuíram menos para o problema das crescentes alterações nos padrões climáticos e sofrerão seus maiores impactos. A agricultura em particular será afetada, com implicações potencialmente sérias para a segurança alimentar, pobreza e emprego. Isso provavelmente abrirá espaço e relevância para a atuação dos sindicatos, mas o modo como irão enfrentar os novos desafios e oportunidades ainda não está claro.

Mudanças climáticas sazonais afetarão os sistemas produtivos e recursos e ferramentas necessários para uma colheita bem sucedida. Mudanças no clima podem afetar também as necessidades por água e energia, além dos espécimes de sementes e os tipos de culturas que serão economicamente viáveis. Tudo isso, por sua vez, afetará o número de empregos, sua sazonalidade e as habilidades exigidas, além dos salários. Oportunidades de emprego podem desaparecer ou se tornar significativamente menos confiáveis, uma vez que as mudanças climáticas apresentarão um desafio fundamental aos negócios, como é comum no mercado de trabalho, pois mais trabalhadores serão empurrados para a economia informal.

Cada vez mais os sindicatos terão que se engajar na questão climática através da capacitação de seus membros face à crescente variação do clima. A advocacia e a construção da consciência também precisarão ser interligadas a estratégias definidas para assegurar que o bem estar individual (não apenas a situação macroeconômica) permaneça como o centro do debate e da ação. Isso irá potencialmente colocar os sindicatos no centro dos debates sobre direito ambiental, justiça e equidade.

ABSTRACT

Trade unions could play a key role in minimizing the effect of climate change on smallholder farmers in the informal sector, the majority of whom are illiterate and lack legal protection, job security and healthcare, if given a chance to do and if they too accept such a role.

Climate change makes agricultural employment increasingly precarious and therefore adds a new dimension to the activities and risks against which trade unions must seek to protect their members. This is even more so in the context that developing countries who have contributed the least to the problem of increasing alteration of weather patterns and the environment will suffer the worst impacts. Agriculture in particular will be affected, with potentially serious implications for food security, poverty and employment. This is likely to open space and relevance for Trade Unions; but how they will stand up to these new challenges and opportunities remain to be seen.

Seasonal weather changes will affect production systems and necessary resources and tools needed for successful harvest. Changes in climate could also change water and energy needs as well as types of seeds and crops which will be economically viable. All of these will in turn, affect the number of jobs, the seasonality of jobs, and the skills required as well as wages on offer. Employment opportunities could disappear or become significantly less reliable, as climate change will present a fundamental challenge to business as usual in the labour market as more workers will be pushed into the informal economy.

Trade Unions will increasingly need to engage in climate change issues by building capacity of their members in the face of increasing climate variability. Advocacy and awareness building will also need to be matched with defined strategies to ensure that individual's wellbeing (not just the macro-economic situation) remains the center of the debate and action. This will potentially place Trade Unions at the center of the debates on environmental rights, justice and equity.

CLIMATE CHANGE AND ITS EFFECT ON AGRICULTURAL EMPLOYMENT IN GHANA: THE ROLE OF TRADE UNIONS

People wade through flood waters in Ghana's Upper East Region in September 2007



Source: GhanaWeb

INTRODUCTION

In 1992, countries around the world joined an international treaty, the United Nations Framework Convention on Climate Change (UNFCCC), to cooperatively consider what they could do to limit average global temperature increases and its resulting climate effects, and to cope with whatever impacts were, by then, likely to be irreversible. By 1995, countries realized that emission reductions provisions in the Convention were very inadequate. They launched negotiations to strengthen the global response to climate change, and, two years later, adopted the Kyoto Protocol with two objectives: the policy and the quantitative. The quantitative requirements include a commitment by developed countries to reduce GHG emissions while the policy objectives seek to enhance energy usage of carbon sinks and to promote sustainable forms of agriculture and forestry including finance and transfer of technology. The Kyoto Protocol legally binds developed countries to emission

reduction targets and also recognized two approaches; mitigation and adaptation. While mitigation looks at actions that limits Global

Climate Change through the reduction of GHGs and enhancing the sink of GHGs, adaptation looks at the ability to adjust economic systems to the effect of climate change or to respond to its impacts (IPCC, 1990). These Kyoto Protocol objectives can be defined as activities of society to diminish the damaging effect of climate change or take advantage of the beneficial opportunities which may arise from the change in climate (Mendelsohn, 2001). The Protocol's first commitment period started in 2008 and ended in 2012. At COP17 in Durban, governments of the parties to the Kyoto Protocol decided that a second commitment period, from 2013 onwards, would seamlessly follow the end of the first commitment period. At the UN's annual climate change conference concluded in Doha, Qatar, 194 countries agreed to an extension of the Kyoto

Protocol through 2020. But the second phase still omits the world's two biggest greenhouse gas emitters: China and the United States. Governments agreed to work towards a universal climate change agreement covering all countries from 2020 to be adopted by 2015. COP 18 in Doha reaffirmed that significant share of new multilateral funding of the Green Climate Fund for adaptation should flow through the Green Climate Fund and also appealed to the Board to balance the allocation of resources between adaptation and mitigation activities. The conference also reiterate that parties' efforts should be geared towards the bases of equity and common but differentiated responsibilities and respective capabilities and the provision of finance, technology transfer and capacity building to developing countries. These actions are necessary in order to support their mitigation and adaptation actions under the convention. The member governments also agreed to take into account the imperatives of equitable access to sustainable development, the survival of countries and the protection of the integrity of Mother Earth.

Climate change is a complex problem, which, although environmental in nature, has consequences for all spheres of existence on our planet. It either impacts on or is impacted by global issues, including poverty, economic development, population growth, sustainable development and resource management. It is not surprising, therefore, that proposals for solutions continue to emanate from all disciplines and fields of research and development. At the very heart of the

response to climate change, however, lies the need to drastically reduce emissions below the internationally agreed maximum of 2°C annually.

An important outcome of COP17 at Durban was the establishment of Durban Platform for Enhanced Action which spelt out a path to negotiate a new legal and universal emission reduction agreement by 2015, to be adopted by 2020. Parties to the Kyoto Protocol also made few amendments to the Protocol, among others, the range of greenhouse gases covered. In the interim, all developed country governments and 48 developing countries affirmed their emission reduction pledges up to 2020.

Significant progress was also made on building the institutions that form the pillars of an enhanced international response to climate change, which were laid out in the Cancun Agreement of COP16. Developing countries will receive institutional, capacity and technological support to act on climate change, while ensuring that, in the bigger picture, climate change policies do not lead to unintended or negative economic and social consequences, particularly the latter. Climate finance has become more concrete in terms of both infrastructure and coordination. There has been a considerable increase in adaptation finance from dedicated climate financing instruments in 2011. The Least Developed Countries' Fund and the Special Climate Change Fund have disbursed the most finance for adaptation; while the Adaptation Funds, and the EU Global Climate Change Alliance have substantially added to the volume of finance available. While significant acceleration in climate-change funds between 2008 and 2009 period have been made, and the number of active projects signifies critical progress, the current bias towards mitigation should be a cause for concern. Some 87% of the funds currently allocated are being channeled to mitigation actions, compared to only 8% for adaption. Less than 5% of the resources are being targeted to multi-focused actions (IPC-UNDP, 2011).

The Green Climate Fund was officially launched in Durban, and a Standing Committee established to advise the COP on exercising its functions with respect to the financial mechanism, among other things, to improve the coherence and coordination in the delivery of climate change financing.

Still, the distribution of adaptation finance to highly vulnerable countries and to the most vulnerable

people and population groups within recipient countries remains uneven; and the scale of finance is not commensurate with estimated needs. Meeting the cost of adaptation to climate change in developing countries has become a major challenge for the international

community. Studies suggest that developing countries' need for adaptation action may be in the range of USD 100 billion – USD 450 billion a year (Montes 2012; CFU 2012).

Notwithstanding, the failure in Copenhagen of the last Conference of the Parties to the UNFCCC to generate a significant commitment on the part of governments, despite a broad consensus on the threat at hand, illustrates the inherent political difficulty in addressing a threat whose effects are not quite immediate (or at least are still rather diffused compared to other problems) and which affects people unequally. Indeed, the very policies that have the potential to stem the problem (i.e. keep the rise in temperature below 2°C) involve an ambitious transition away from a carbon-intensive economy and will themselves impose costs on all societies. It is becoming increasingly clear that the only way to get the sort of commitments needed to effectively deal with the climate challenge is to create a global consensus that involves all stakeholders. Such a consensus will only arise if there is a seemingly “just” sharing of the burden in this battle to keep the world hospitable to human beings. This is particularly true when it comes to employment. It goes without saying that climate change and policies to mitigate it will in time have an enormous impact on industries, jobs and workers.

The agricultural sector, which employs 65 per cent of Africa's labour force, is particularly vulnerable. Seasonal changes will affect productive systems and the resources and tools necessary for successful harvests. Changes in climate could also change water and energy needs as well as the types of seeds and crops which will be economically viable. All of these, in turn, will affect the number of jobs, the seasonality of jobs, the skills required as well as wages on offer. Employment opportunities could disappear or become significantly less reliable, and climate change will present a fundamental challenge to business as usual in the labour market as more workers are pushed into the informal economy. The result of these new dimensions to labour is likely to pose challenges to trade unions, but whether the unions will be able to stand up to these new challenges and perhaps the attendant new opportunities remains to be seen.

In Ghana, it was from the informal economy sector that trade unionism originated. This unionism became widespread among agricultural labourers, cooks, motor-drivers, and artisans, especially after World War I. Ghana's informal sector has existed from as far back as colonial times, but one of the largest expansions of informal work came after the World Bank implemented a structural adjustment programme in the 1980s. But as unionism became consolidated, the majority of members became formal workers. Now, many informal workers still lack the ability to influence policy decisions and conditions affecting their livelihood. Informal employment in agriculture tends to derive from small or family farms, where work is predominantly carried out by women. The majority of them is illiterate and lack legal protection, job security and healthcare as well as training and education.

Trade unions will increasingly need to engage in climate change issues by building the capacity of their members in the face of increasing climate variability. Adaptation to varying rainfall patterns through such technologies as aquaponics (in which fish and plants grow together in one integrated, soil-less system) and hydroponics (the cultivation of plants in nutrient solution rather than soil) could help position agricultural workers to adapt to new farming conditions and needs.

Climate change could create both new challenges and opportunities for trade unions as agents of participation and collective bargaining. In shaping the debate as well as policies to reduce social risk to marginalized groups, unions can make the case for the potentially damaging effects of volatility, variability and uncertainty from climate change on employment. Unfortunately, however, many trade unions have yet to address climate change and may not be seen as obvious stakeholders for policy and discourse around the issue. While Ghana's General Agricultural Workers Union (GAWU) has, recognized that the informal agricultural sector is where the greater percentage of the labour force is located, it remains to be seen how GAWU will equip itself to manage the expectations of workers and anticipate changes that are not fully clear.

Advocacy and awareness building will also need to be matched with defined strategies to ensure that individual well-being, not just the macro-economy, remains the center of the debate and action. This will potentially place trade unions at the center of debates on environmental rights, justice and equity.

The Draft Ghana National Climate Change Policy (NCCP) is Ghana's integrated response to global climate change. It has been prepared and designed within the context of national sustainable development priorities. The policy document is aimed at achieving the objectives of the Ghana Shared Growth and Development Agenda (GSGDA). It provides a clearly defined pathway for dealing with the challenges of climate change within the socio-economic context of Ghana.

Food security is of crucial concern and a major issue. Ghana reduced hunger by nearly three-quarters between 1990 and 2004; but food security disparities continue to affect the delivery of the country's development objectives. About 18 percent of Ghanaians who fall below the extreme poverty line are chronically food insecure (NCCP: 2012). Generally, those whose livelihoods are most dependent on agriculture are most affected especially the smallholder farmers. Analysis in the poorest regions that are also most vulnerable to climate change found that 34 percent of households in the Upper West region were experiencing food insecurity, compared with 2 percent in greater Accra. It is therefore important that policy responses to climate change look beyond the environment to the broader social issues faced by specific social groups.

Several staple cereal crops as well as roots and tubers are beginning to be impacted by the shortening of the growing season. This is likely to have immediate effects on nutrition. Anecdotal evidence points at transition zone farmers experiencing heavy losses due to dry weather as well as inability to harvest tubers due to the hardness of the soil. Modernization of agriculture, as a way to increasing yields, requires a transformation of current agricultural practices. For example, the development and application of new crop varieties that are better suited to the changing climate conditions, higher energy and water inputs to support large-scale irrigation, and mechanization (NCCP: 2012) are some of the policies that need special attention.

One key challenge identified by the Draft Ghana National Climate Change Policy document is the inadequate human resource and managerial skills needed to face the challenges and opportunities posed by this phenomenon and how to create awareness among this vulnerable group. It is in this light that Trade Unions have become more relevant since their most important constituent is under attack.

PROBLEM STATEMENT

In Ghana, two-thirds of the labor force is in the agricultural sector. The sector is largely rain-dependent and less than one percent agricultural land is under irrigation. The Northern sector of the country which stretches from part of Brong Ahafo, Northern Volta to Upper East and Upper West Regions could well be over 60 percent of the land surface of the country, and this sector experiences one raining season in a year which lasts not more than 5 months. Certainly, climate change has a devastating effect on agricultural employment, poverty, livelihood, and migration particularly for a larger part of the country. About 52 percent of the labour force is in the heart of the informal sector and are made up of smallholder farmers where climate change poses great employment risk in the sector by job losses, reduction in wages notwithstanding other social dimensions of huge consequence. As a result of the dwindling fortunes, this informal agricultural sector's jobs no longer serve as a source of livelihood and affects people's capacity to survive and further distance the sector from inclusive development.

QUESTION

What should be the role of Ghanaian Trade Unions in reducing the impact on smallholder farmers in the informal agricultural sector which has begun to be mostly affected by the Global Warming?

At the launch of climate change adaptation research project by The Alliance for Green Revolution Africa (AGRA) together with the Council for Scientific and Industrial Research and the Science and Technology Policy Research Institute (CSIR-STEPRI) on November 30, 2012 in Ghana, Dr. Nelson Obiri-Prempeh, the national policy hub coordinator, AGRA, admonished policy makers that climate change and weather variability is having negative impact on agricultural productivity and livelihood in Ghana but that little is being done to protect the smallholder farmers. Research indicates that average temperature increases recorded in Ghana over the last 20 years are adversely affecting the production of food such as maize, millet, sorghum, rice, beans and yams. The impact of climate change has been exacerbated due to policy gaps and low level of awareness by stakeholders including government, policy makers and the farmers themselves.

Though government is credited for taking steps to develop two draft policies on climate Change – the National Climate Change Policy Framework (NCCPF) which provides strategic direction for coordinating issues relating to climate change, and seeks to ensure that Ghana pursues a development path that is attuned to climate change; and National Climate Change Adaptation Strategy (NCCAS) which also strives to enhance the country’s current and future response to climate change impacts by strengthening its adaptive capacity and improving social and ecosystem resilience. However, these policies do not adequately address the specific vulnerability of smallholder farmers according to Dr Obiri-Prempeh (2013).

Government’s strategies, he added, have so far failed to set priorities, interventions and targets to appropriately respond to climate change. That is why there is “the need for improved inter-sectoral integration in the interest of climate change adaptation,” he insisted. In the mist of the gap created in the protection, defense and championing the course of this vulnerable group, Trade Unions could play a very vital role in advancing the course of the smallholder farmers.

HYPOTHESIS

Trade Unions can influence policies to reduce the effect of Global Warming and increase the wealth of smallholder farmers thereby reducing poverty and sustaining the source of livelihood in the most vulnerable Regions which are vulnerable to climate change in Ghana.

JUSTIFICATION

Trade Unions have failed to recognize and address the realities of Climate Change and conversely those who are talking about Climate Change need to consider the realities of the informal sector of agricultural employment in Ghana. Generally, this research seeks to shed light on the implications of Climate Change on agricultural employment which is very much in the heart of the informal sector and the role of Trade Unions in addressing the threat of global warming to livelihood and poverty of smallholder farmers in Ghana in particular and in Africa in general. How the unions strategically position themselves to shape the debate on issues of climate change has to be well defined in the scheme of things.

METHODOLOGY

This thesis is exploratory and involves political economy analysis combined with secondary information such as journals, academic studies, and internet-based sources. Thus, the study is an exploratory attempt to evaluate and reconstruct the approach Trade Unions must take to be relevant in the face of their commitment to workers through protection and creation of employment, decent work and collective bargaining within the context of climate change. Mitigating the effect of climate change on agriculture and agricultural employment in Ghana is critical because of its importance to wage employment and rural development in Ghana.

Chapter One analyses some theoretical background of key issues on climate change, adaptation, poverty and the informal sector. It also critically addresses the demography of Ghana, the economy and the political situation.

Chapter Two will critically look at global warming and its consequences as a global concerned and on Ghana in particular. It will also address the debate on human and natural drivers of climate change and its impact on the agricultural sector. Social vulnerability to climate change and the informal sector of Ghana will also be addressed.

Chapter Three examines broader issues of Sustainable Development and how it can minimize the impact of global warming and increase the wealth of the country and smallholder farmers. It will also look at the System of Rice Intensification (SRI) as a possible way forward for sustainable agriculture for smallholder farmers. Policy experiences on global warming in other countries will be part of this chapter.

Chapter Four will examine the role of trade unions and organized labour, with propositions on restructuring and repositioning of the unions in dealing with environmental issues particularly climate change which has become a very important developmental issue in recent times.

1 A PRELIMINARY LITERATURE REVIEW AND GHANA'S POPULATION AND ECONOMIC ANALYSIS

This chapter analyses some theoretical background of key issues on climate change, adaptation, poverty and the informal sector. It also critically addresses the demography of Ghana, the economy and the political situation.

1.1 HALTING CLIMATE CHANGE – WE CAN ONLY DO IT TOGETHER

An article written by Babel Kofler and Kristina Muller-Kuckelberg reiterate International Climate Change cannot be tackled by individual states. A global effort is needed by every country in the world to combat this phenomenon. The International Climate Conference under the UN umbrella is an attempt to establish an international framework within which global solutions might be found. However, conferences in recent years have also highlighted the difficulties that a multilateral and unanimity-oriented negotiation process brings with it. The United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1992 at the UN Conference on Environment and Development in Rio de Janeiro, Brazil, coming into force in 1994. It has now been ratified by 194 states, including those states with the largest share in global greenhouse gas emissions: the United States, Russia, the European Union, China and India. The main aim of the UNFCCC is to stabilize the atmospheric concentration of greenhouse gases at a level that prevents dangerous disruption of the global climate. In order to keep the global temperature rise within the 2 degrees Celsius limit, which is internationally recognized as critical, global greenhouse emissions must be reduced by at least 80 per cent by 2050 in comparison to 1990. However, this can be achieved only by means of an international agreement within the framework of the UNFCCC, with legally binding emission reduction targets.

Since the coming into force of the UNFCCC in 1994, so-called Conference of Parties (COP) has been held annually. The protocol adopted at the international climate conference in Kyoto in 1997, although it came into force only in 2005, it nevertheless, for the first time, established targets binding under international law and implementation instruments for global climate protection. The agreement provides for an annual reduction (in comparison to 1990) in the developed countries' greenhouse gas emissions of an average 5.2 per cent during the so-called first commitment period (2008-2012). This represents a decisive step towards international

responsibility for climate change, even though the United States still refuses to ratify the protocol.

1.1.1 LABOUR MARKET INSTITUTIONS AND EMPLOYMENT

Trade Unions have been widely adopted in many parts of the developing world but are often considered to cause unemployment and informality. One influential example of this thinking is the Doing Business report from the International Finance Corporation of the World Bank group.

It ranks countries according to their “ease of doing business”, regulations concerning hiring and firing of workers, working hours and social security are seen as barriers to private investment, thus causing poverty.

In the authors’ article “Labour market institutions and employment” Tzannatos, Z. (2008), since the early 1980s, neoclassical economics has come to dominate policy debates. Unemployment is no longer attributed to a lack of demand in the economy; rather it is believed to be the result of market impediments. In this view the labour market is a fair exchange between two equal parties with wages being determined by supply and demand. The theory assumes full employment and any attempt to regulate labour relations are believed to impede the workings of the market by artificially raising the wage leading to unemployment or informality. If “rigidities” are removed then the theory postulates that the market will return to full employment, thereby resolving the labour market problems of any economy.

Labour institutions guide the labour market. They comprise rules, practices and policies whether formal or informal, written or unwritten all of which affect the labour market works. They are as explicit as certain labour laws that we have come to consider as universal rights, but also span the scope of informal practices that reflect the views of society, as well as short-term laws and policies that fade and resurge depending on the policy mode. All countries, irrespective of their economic development, have labour institutions. The distinction between countries lies in the degree to which they are embedded in law; whether the law is applied in practice and the extent that government policies are used to pursue certain objectives.

Trade Unions and Employers Associations are labour institutions. These institutions bargain over national labour laws and policies. How they bargain and what they bargain over will depend on underlying social norms as well as constraints and demands of the production system as well as

the national labour laws on freedom of association and collective bargaining. Similarly, the organization of jobs within the firm is a labour institution that is determined by the production system and perhaps national laws, but that can also reflect underlying social norms, such as occupational sex segregation.

The rules, practices and policies that are inherent in labour institutions influence almost every aspect of our working lives: how we enter a job, the training we receive to qualify for the job and while on the job, the conditions under which the job is performed – the employment contract including hours, pay, benefits and safety measures associated with the work as well as what happens when the job ends. Although labour institutions are pervasive, not all are desirable or defensible. Labour laws and labour market policies are needed for prevention of abuse and for improving working conditions. The concerns that prompted the enactment of law to regulate working conditions nearly a century ago are as valid today as they were then. The smallholder farmers seem to lose out of the protection of the law and are often neglected.

1.1.2 WHAT CAN BE DONE ABOUT INFORMAL EMPLOYMENT?

Effectively addressing informal employment needs to start by reinforcing the advantages of the formal sector according to Jutting and T. Xenogiani (2008). At the same time a better understanding of the complexity of informal employment and a more nuanced approach to address the specific needs of informal workers are urgently needed. In the past, many reforms have failed to address those who have no choice but to work informally. Such people need a different approach from those who voluntarily opt out of the formal sector. Policy makers need to develop different policy measures and institutional reforms in order to respond to each group's particular needs. For those who have no choice but to work informally, the “lower tier” of informal employment that in most developing countries represent more than 50% of the working population – an enhanced productivity and social protection strategy is required. Such a strategy should aim to raise productivity, improve skills, increase upward mobility, and most importantly, create jobs of a decent quality.

The agenda for the upper tier looks different. Here, there is the need for providing appropriate incentives either through lower transaction cost related to business creation and operation, or through increased benefits of formalization. At the same time, enforcement needs to tighten in

order to make tax and social security evasion less attractive. What both cases have in common is that they call for a social contract between the state and its citizens.

Policies can go a long way but they are no substitute for trust. Informality is, above all, an expression of the lack of trust in public institutions; the negative perception of the role of the state and the limited understanding of the benefits derived from social security.

Long term sustainable change requires a transformation of people's attitudes and beliefs.

Mechanisms that recognize the rights of informal workers and entrepreneurs as economic actors must encourage them to embrace labour protection and formal practices as they are means to this end. Providing informal entrepreneurs with tools that enables them to apply business logic and recognize upcoming opportunities will not only increase the profitability of their business but potentially the productivity of the economy at large. Besides granting informal workers more rights, access to services and a voice, they should also be reminded of their duties as citizens. Such a strategy will contribute to the economic and social development of a country and bring members of that society closer together.

1.1.3 WHERE PEOPLE, POVERTY, ENVIRONMENT AND DEVELOPMENT MEET

In her article, "Where People, Poverty, Environment and Development meet" Leisa Perch (2012) (Poverty in Focus), recognized that often, the backdrop for the discourse on sustainability has been characterized by tension, rather than by reconciliation, among the economic, social and environment. Overall, the successful combination of social and environmental co-benefits in policy and practice has remained elusive. The sustainability of the supply of resources (environment), sustained access to resources in securing livelihood (society) and the equality of financial resources (investment) are essential to stabilizing environmental change cycles, reducing or mitigating ecological scarcity, and enhancing the renewal of the ecological system.

Given the predominant view of the role of capital and labour (in the economic system) as factors of production and growth, competition and tensions are manifest in policy and institutional frameworks. Natural capital is still seen as another, even abundant, factor of production, and the capacity of institutional checks and balances, environmental ministries who are supposed to drive the agenda are often relatively weak. Social sectors remain peripheral to many of the debates,

national and global alike, about how to arrest the devastating environmental change.

1.1.4 INTEGRATING POVERTY AND ENVIRONMENT POLICIES: ISSUES, CHALLENGES AND OPPORTUNITIES

The integration of poverty and environment policies has taken center stage in the development debate for their potential to generate substantial benefits. Contrary to accepted benefits, these policies do not produce systematic win-win situations for all sectors of society and therefore implementation faces political difficulties according to Gabriel L. (Poverty in Focus).

For the rural sector, small scale agriculture and improved water and soil management hold great potential for integrated poverty and environment policies. In many settings, it can reverse ongoing processes of land degradation, improve food security, and diminish the vulnerability of poor populations (Barbier, 1987, Holt, 2011). It is true that in many rural settings, realizing the benefits of poverty-environment policies can require addressing land tenure issues, land concentration and power asymmetries, underscoring the observation that environmental investments are insufficient, in themselves, to lift people out of poverty.

Current efforts at Reducing Deforestation and forest Degradation (REDD+) provide another avenue with tremendous potential for win-win poverty and environment policies. A mosaic of improved land use practices and forested areas supported by economic incentives and technical support is probably the best option currently available to stabilize frontiers in large centers of developing countries and to reduce rural poverty. Such efforts alone will not reverse deforestation trends; they should be accompanied by efforts to tackle large-scale agriculture, real estate speculation, and other forces that promote forest cutting.

1.1.5 ACCOUNTING FOR GREEN GROWTH FROM THE LENS OF GENDER EQUITY: WHY IT MATTERS!

The world is shifting away from economic growth models based on fossil fuels and towards a new “green” economy based on low-carbon development. The financial and economic crises have prompted increased investments in environmental infrastructure through economic stimulus packages, while countries continue to make commitments and substantial monetary pledges to support emerging financial mechanisms to mitigate and adapt to climate change.

The author of this article, Lucy Wanjiru (Programme Specialist, Gender and Environment, UNDP/BDP Gender team), sees Green economy initiatives that aim at creating more

environmentally-sound economies as not automatically inclusive of fundamental social requirements such as income equity, job quality and gender equality. In failing to account for social factors, they could maintain or even aggravate the negative social and destructive trends of the traditional economy, such as existing inequalities and gender gaps.

In many developing countries, women are living on the frontlines of climate change. As primary producers of staple foods, a sector that is highly exposed to the risk of drought and uncertain rainfall, women are disproportionately impacted by climate change and are often excluded from even household decisions that affect their lives. During natural disasters such as floods for example, women suffer disproportionately and often count higher among the dead.

In addition, women tend to possess fewer assets and have insecure forest and land tenure rights. Even where legislation to secure women's land rights exists, the process of implementing the laws remains a challenge. Despite suffering from socio-economic disadvantages, women are already responding to climate changes while they work to maintain their families and communities. They are at the frontlines of everyday adjustment and adaptation to changing conditions and environments.

As primary caretakers of families, communities and natural resources, women are energetically supporting rural food security and maintaining agricultural biodiversity. They have accumulated specific knowledge and skills about local conditions and ecological resources and have the power to contribute to economic transformation and sustainable development. But to reach their full potential, they need support in scaling up and upgrading their activities related to sustainable agriculture, renewable energy and the conservation of water supplies, forest and other natural resources so that they can generate greater economic benefits from their labour.

1.2 POPULATION AND GEOGRAPHY OF GHANA

Fig 1 The Administrative Regions of Ghana

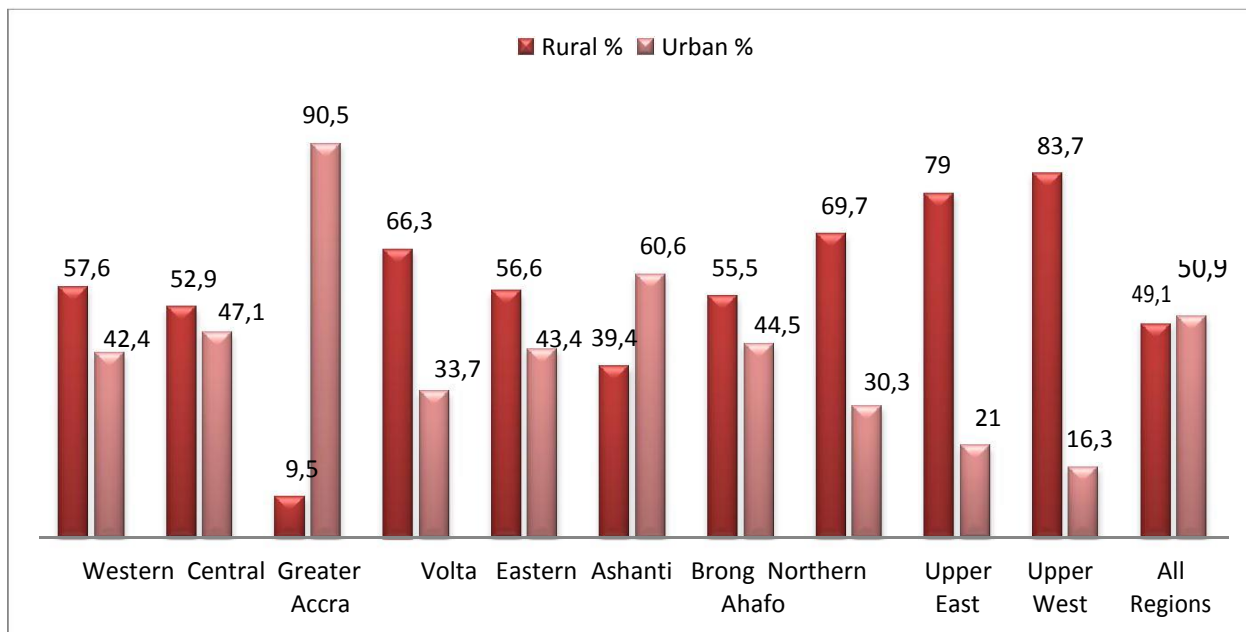


Source: Ghanaweb

The country Ghana covers an area of 238,535 sq. kilometers (92,098 sq. miles) and shares borders to the west with Cote d'Ivoire, to the north with Burkina Faso, to the east with Togo while the southern part is on the Gulf of Guinea. The population, according to the 2010 census, stands at 24,658,823. This figure represents an increase of 30.4 percent over the 2000 census population of 18,912,079 with ratio of male to female being about 50 percent. There has been a growing urbanization in Ghana. While only 23 percent of the population was in the urban areas in 1960, the ratio increased to 43.8 percent in 2000 and in 2010 increased to 50.9 percent. However, the level of urbanization

varies from region to region. Greater Accra has the highest proportion of urban population (90.5%), followed by Ashanti (60.6%) while Upper West has the lowest proportion of urban population (16.3%). The concentration of industries and commercial activities in Greater Accra and Ashanti may partly account for the relatively high urban population in these regions. The remaining eight regions are predominantly rural, with the level of urbanization below the national average. (Ghana Statistical Service 2012: Population and Housing Census Summary Report of Final Results).

Fig 2: RURAL AND URBAN POPULATION BY REGION – 2010



Source: Government of Ghana: Ghana Statistical Service.

The Government of Ghana 2010 census further indicates that the most populous region is Ashanti, with a population of 4,780,280 representing 19.4 percent of the country's total population followed by Greater Accra, with a population of 4,010,054 (16.3%). The least populous regions are Upper West with 702,110 persons constituting 2.8% of the total population and Upper East with 1,046,545 persons or 4.2% of Ghana's population.

At the regional level, Greater Accra is the most densely populated region with a density of approximately 1,236 persons per square kilometer compared to 895.5 persons per square kilometer in 2000. It is followed by the Central region with a population density of 224 persons per square kilometer. The Northern region still remains the most sparsely populated region with a population density of 35 persons per square kilometer. It further showed that the proportion aged less than 15 years declined from 41.3 percent in 2000 to 38.3 percent in 2010. The proportion of the population 65 years and older has also declined slightly from 5.3 percent in 2000 to 4.7 in 2010.

1.2.1 CLIMATE

Tropical eastern coastal belt is warm and comparatively dry, the south west corner is hot and humid, and the north is hot and dry. Annual average temperatures range from 26.1°C in places near the coast to 28.9°C in the extreme north. Temperatures can move into the 40s though. The highest temperatures are recorded in the Upper East Region, specifically at Navrongo.

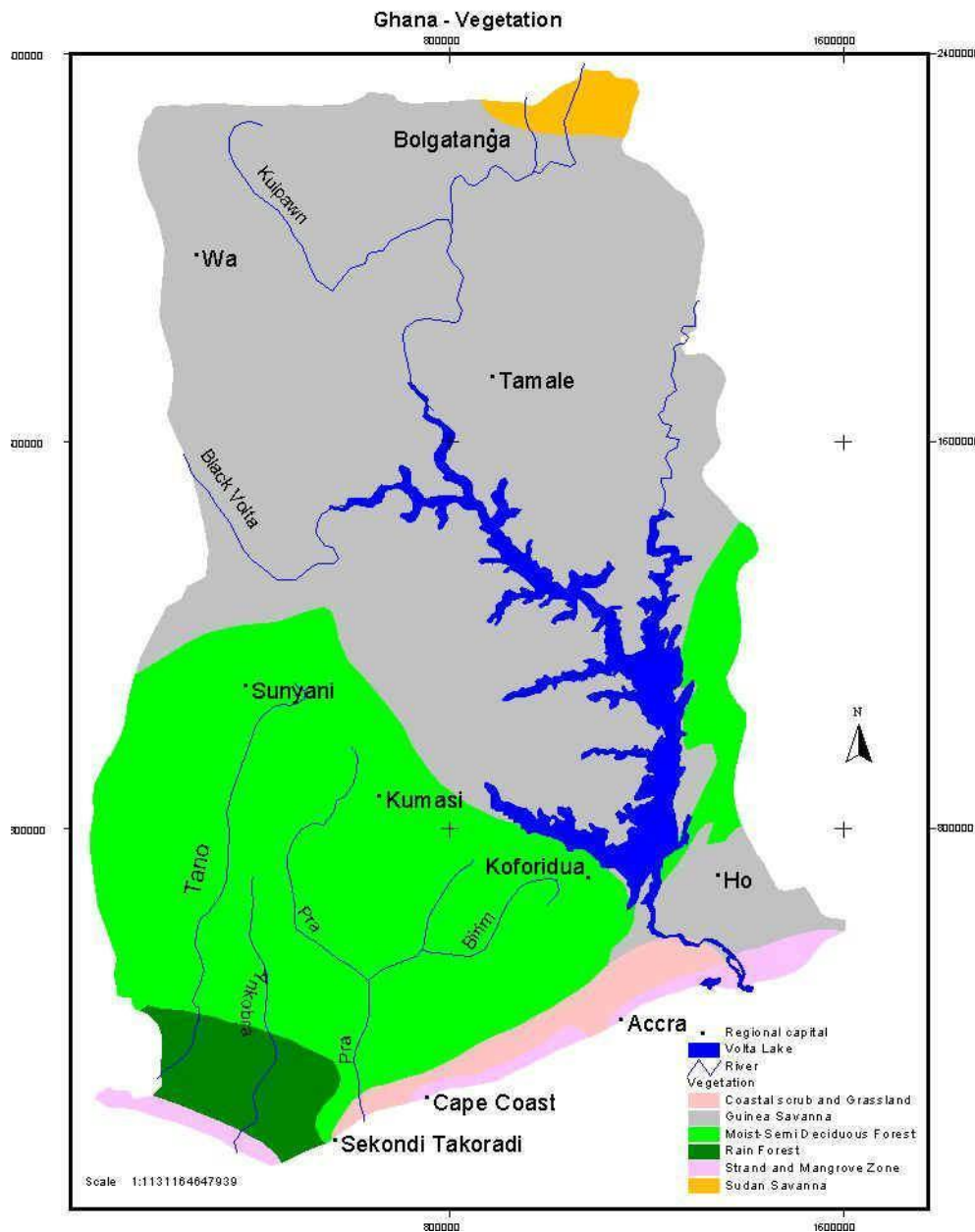
1.2.2 TOPOGRAPHY

The topography is predominantly undulating, with slopes less than 1 percent. Even though the slopes are gentle, about 70 percent of the country is subject to moderate to severe sheet and gully erosion.

1.2.3 NATURAL RESOURCES

Ghana is endowed with many natural resources including gold, diamond, bauxite and manganese. It is currently the second world producer of cocoa and has a vibrant timber industry. In 2007, oil was discovered in commercial quantities and oil production started in December 2010.

Fig 3: VEGETATION ZONES IN GHANA



Source: www.fao.org/ag/AGP/AGPC/doc/Counprof/ghana/ghanaveg.htm

Ghana has three main vegetation zones, the forest belt which is made up of Evergreen and Semi-deciduous forest where most of Ghana's cocoa is grown is found in the middle and the South-Western portion of the country. The Transitional coastal belt is good for rearing cattle while the

Savanna belt is to the Northern part of the country where most of the grains (maize, millet, sorghum, and rice) and livestock are raised.

1.2.4 RIVERS

The Volta Lake which is 1900km in length is the main and largest man-made lake in the world. There are other smaller rivers like the Afram River, Oti River, Tano River, River Ankobra, Birim River, Denso River and several others, and they all flow into the Gulf of Guinea.

1.3 THE ECONOMY OF GHANA

Available information on the economy of Ghana indicates that the country has witnessed the longest period of macroeconomic stability in its recent economic history. In 2010, Ghana updated its methodology used in computing the national accounts by changing the base year from 1993 to 2006 in order to capture the significant changes that have taken place in the socio-economic landscape of the country. After the rebasing, the new GDP estimates for 2006 was GH¢18,705.00 million against the previous estimate of GH¢11,671.97 million based on the 1993 series. This translates into an increase of 60.3 percent in the level of the GDP portraying a much richer economy than previously measured. The per capita GDP estimates for the 2006 and 2010 were GH¢ 854.9 and GH¢ 1,908.0 respectively. By this performance, Ghana is said to be a lower middle income country. In 2012, GDP growth rate is estimated at 8.3% (7.6% non-oil).

December 2012 inflation of 8.8 per cent not only shows a drop in three consecutive months (October – December), but also marks 31 consecutive months of single digit inflation in the country. This is as a result of fiscal policy and continued monetary restraint and lower food prices. Despite the impressive economic stability, the country faces a number of challenges. Notable among them are unemployment and underemployment, rising cost of living, gender inequality, informalization, health delivery, infrastructure and sanitation.

1.3.1 POLITICAL SITUATION IN GHANA

Since the return to constitutional rule in 1992, Ghana has had six (6) elections. Politically, Ghana is relatively stable and is often described as the island of peace and stability in a troubled West African

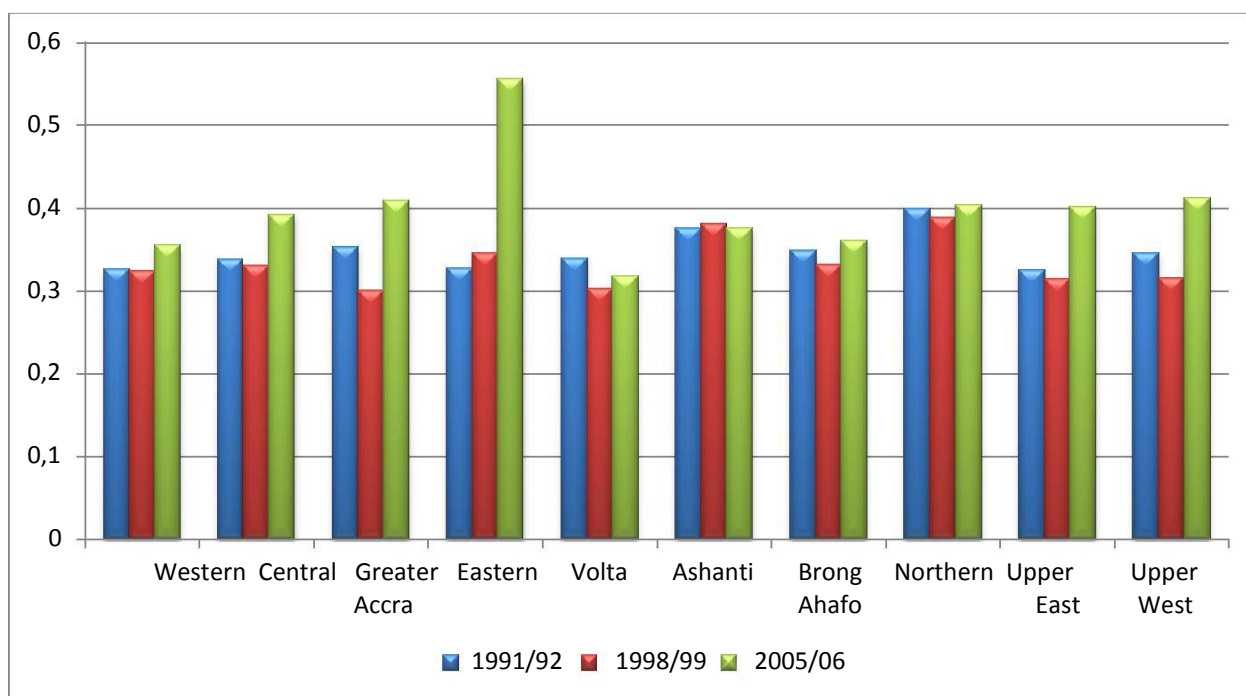
sub-region. Political competition in Ghana since its democratic transition has become increasingly intense with the margin of victory between the two main dominant parties: the National Democratic Congress (NDC) and New Patriotic Party (NPP), shrinking in each election. In December 2008, the current ruling party (NDC) beat the then party in power (NPP) by about 40,000 votes. The recent presidential and parliamentary elections held on December 7, 2012 has also passed the test with the NDC retaining power by over 300,000 votes over their closest contender NPP, to run the affairs of the country for the next four years. The result of the election is however being contested in court by the NPP.

The constitution of Ghana prescribes separation of powers among the three arms of government namely, the executive, the legislature and the judiciary. However, Ghana's political system is predominantly controlled by the executive. While both the executive and the legislature are elected to a four-year term and in the case of the former renewable only once, the judiciary is appointed. To a large extent, Ghana's politics, as in many other areas, is male dominated. Currently only 10.9 percent of the membership of Ghana's parliament are females. However, the immediate past head of Ghana's parliament, the Speaker which is an appointed position, was a female. In addition, the head of Ghana's judiciary, the Chief Justices, is a female. It appears the females do not do so well when it comes to elected political positions.

1.3.2 GINI INDEX

Current data on regional disparities in incomes does not exist. However, an analysis based on the 1991/92 and 2005/06 Ghana Living Standard Surveys (GLSS) shows that income inequality has increased between 1991/92 and 2005/06, (0.3729 in 1991/92 to 0.3880 in 1998/99 finally to 0.4059 in 2005/06) though overall poverty level in Ghana declined from 51.7% to 28.5% over the same period. All regions recorded improvements in income inequality in 1998/99 except the Eastern and Ashanti regions. However, income inequalities worsened for all regions in 2005/06, except Eastern and Ashanti regions which experienced marginal improvements in income inequality. In 2005-06 income inequality as estimated by the Gini coefficient was 0.3988.

Fig 4 REGIONAL DISPARITIES IN INCOME INEQUALITY (GINI INDEX) – 1991/92 – 2005/06



Source: GSS, 1991/92, 1998/99 & 2005/2006

1.3.3 POVERTY IN GHANA

Although over the years, the country has made significant economic gains, this economic gain has not been equitably distributed. One of the main challenges of the Ghanaian economy is job creation. According to the 2010 population census the overall unemployment rate 5 years and above was estimated at 6.9 percent with approximately 53.3 percent of the adult population aged 5 years and above being economically active. This rate of unemployment is a result of the definition used to determine unemployment which excludes the numerous young men and women who sell on streets in Ghana's urban centers as a coping mechanism while waiting for the opportunity for a formal job. Males recorded a slightly higher economic activity rate (52.2%) than females (50.8%), (Ghana Statistical Service 2012: 2010 Population and Housing Census, Summary Report of Final Result).

Over the years Ghana's record on poverty reduction has been impressive, according to the GLSS V (2005/2006), 28 percent of the population is estimated to be living below the internationally-accepted poverty line of \$1.25 a day (see Table 1 below)

Table 1 OVERALL POVERTY HEADCOUNT AND POVERTY GAP TRENDS

	Higher Poverty line (GH¢ 90)	POVERTY HEADCOUNT RATE (Po)			POVERTY GAP (P1)		
		1991/91	1998/99	2005/06	1991/91	1998/99	2005/06
Urban		27.7	19.4	10.7	7.4	5.3	3.1
Rural		63.6	49.5	39.3	24	18.1	13.5
Total		51.7	39.5	28.5	18.5	13.9	9.6
	Lower Poverty Line (GH¢ 70)	POVERTY HEADCOUNT RATE (Po)			POVERTY GAP (P1)		
		1991/91	1998/99	2005/06	1991/91	1998/99	2005/06
Urban		15.1	11.6	5.7	3.4	2.5	1.6
Rural		47.2	34.4	25.6	14.9	11.2	8.1
Total		36.5	26.8	18.1	11.1	8.3	5.7

Source: Based on the GLSS III, IV and V dataset of the Ghana Statistical Service

1.3.4 COMPARATIVE HUMAN DEVELOPMENTS INDEX (HDI)

Table 2 HDI TRENDS – (1980 – 2011)

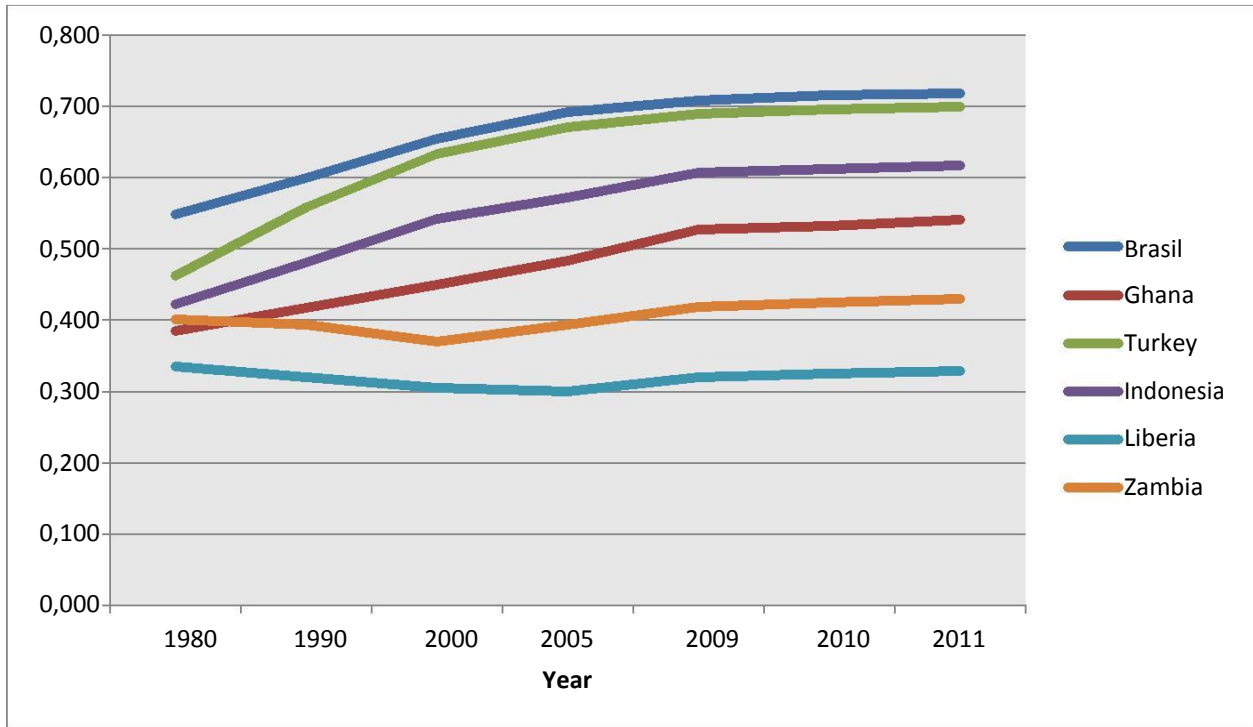
Country	1980	1990	2000	2005	2009	2010	2011
Brasil	0.549	0.600	0.655	0.692	0.708	0.715	0.718
Ghana	0.385	0.418	0.451	0.484	0.527	0.533	0.541
Turkey	0.463	0.558	0.634	0.671	0.690	0.696	0.699
Indonesia	0.423	0.481	0.543	0.572	0.607	0.613	0.617
Liberia	0.335	0.321	0.306	0.300	0.320	0.325	0.329
Zambia	0.401	0.394	0.371	0.394	0.419	0.425	0.430

The value of 0.321 of Liberia in 1990 is the mean between 1980 and 2000

Source: Human Development index trends, 1980 -2011

Human Development Index Trends

Fig 5



Comparative analysis of the HDI of Brazil, Ghana, Turkey, Indonesia, Liberia and Zambia shows that Ghana, among the three African countries, has a better positive trend and has better improvement over the years under review in its life expectancy index, educational index and income index than Zambia and Liberia; but will have to do more to catch up with Brazil, Turkey and Indonesia. Brazil, Turkey and Indonesia between 2000 and 2011 were considered as having medium HD while Ghana could only attain that level in 2009 probably as a result of a more stable economic, political and democratic environment in which the country finds itself.

1.3.5 LITERACY

According to the 2010 population census, majority (74.1%) of the population (11 years and older) is literate. In terms of sex, males (80.2%) are more likely to be literate than females (68.5%). Regional variations exist in literacy levels, with the three northern regions having less than 50 percent of the population aged 11 years and older as literate while the other regions have at least 69 percent of their population being literate. (GSS, 2012)

1.4 SMALLHOLDER FARMERS AND THE AGRICULTURAL SECTOR IN GHANA

This section addresses smallholder farmers in Ghana and examines the agricultural sector in the light of climate change and the labour market.

‘Smallholder’ is a connotation of limited land availability. In a broader view ‘resource-poor’ farmers for example, those with limited capital, fragmented holdings, limited access to inputs. Poverty and Social Impact analysis (PSIA: Asumeng-Brempong et al, 2004) implicitly makes a similar argument for Ghana’s farmers, arguing that different resources and risk conditions better define smallholders than simple measures of land holding

1.4.1 CHARACTERISTICS OF GHANAIAN SMALLHOLDER FARMERS

In Ghana, the various definitions of smallholders are accompanied by differing estimates of such things as their contribution to the agricultural economy and incidence of poverty among them. Nyanteng and Seini (2000) state that over 90% of the country’s food production derives from holdings of 3 ha or less. Owusu-Baah (1995) reports an estimated average farm size of 3.9 ha and noted that more than 50% of households own less than 3 ha. An IFAD project report (IFAD 2006) for the Upper East region estimated that in 1986 two-thirds of those farming less than 4 acres (1.6 ha), were living in poverty. Baden et al (1994), in discussing agricultural labour use for the rural sector in general, stated that even among smallholders farming less than 1.6 ha, about half hired some form of labour, underscoring the fact that resource-constrained farmers are still labour users.

Landholding

From an analysis of household data using a sample of 8687 households from the GLSS5, there are differences in the distribution of landholding size at the ecological zones as well as by region.

The savanna zone (with a mean landholding of 4.0 ha) has larger holdings compared to the coastal and forest zones (with 2.3 and 3.1 ha respectively)

There is also a significant difference between smallholder landholdings and large land holdings. In terms of the distribution of landholding, over 70% of farmers own the average landholding or less whether at the national level or the ecological level. The table below gives the distribution of land holding in Ghana by ecological zone. The majority of agricultural households in the forest

and coastal zones operate 2 or less hectares (52% and 67%), while the proportion of savanna households with 2 or less hectares is nearly 45%.

Table 3 DISTRIBUTIONS OF LANDHOLDING SIZES, 2005/2006

Ecological zones	Share of smallholders by holding capacity (%)							Average holding size
	< 0.5ha	0.5-1ha	1 - 2ha	2 -3ha	3 -4ha	4 -5ha	> 5ha	
Coast	26	18	23	14	4	4	10	2.3
Forest	16	15	21	16	8	8	16	3.1
Savanna	10	12	22	18	8	9	20	4
Regions								
Western	15	15	23	18	8	8	13	3.6
Central	10	17	22	17	9	8	18	3.5
Greater Accra	17	14	21	15	7	7	19	1.6
Eastern	27	18	21	14	5	5	10	2.1
Volta	23	22	28	14	4	5	5	2.2
Ashanti	3	6	16	23	10	14	30	2.7
Brong Ahafo	9	20	34	12	4	5	17	3.5
Northern	7	11	29	26	10	8	10	5.6
Upper East	31	19	19	11	7	5	9	3.6
Upper West	15	10	18	18	8	10	21	2.7
National	16	15	22	17	7	8	16	3.2

Source: GLSS 5, Ghana Statistical Service

Holding sizes vary considerably. Northern Region has the highest average holding sizes followed by Upper East and Forest Transition zones. Average holding sizes are smallest in the densely populated Southern Regions. In the Northern Savanna Regions there is considerable variety in holding size distribution especially in the large and relatively heterogeneous Northern Region.

1.5 AGRICULTURAL POLICY ENVIRONMENT IN GHANA

The Comprehensive Africa Agricultural Development (CAADP) is at the heart of efforts by African governments to use agriculture to realize the desired economic growth; this is under the initiative of the African Union (AU) and New Partnership for Africa's Development (NEPAD) to accelerate growth and eradicate poverty and hunger in African countries. NEPAD's overall vision for agriculture is to maximize the contribution of the largest economic sector in Africa to

achieve broad economic progress, to which, other economic sectors such as manufacturing, petroleum, minerals and tourism, may also contribute significantly.

CAADP as a common framework for development and growth of agriculture in African countries which has set a goal of attaining MDG 1 of reducing poverty and hunger by half by 2015 through sustained national agricultural growth of at least 6 per cent per year. In line with the Maputo Declaration, governments are also committed to allocate at least 10 per cent of national budgets to agriculture.

The Ghana Comprehensive Africa Agricultural Development (CAADP) Compact, signed in October 2009, is a regional framework from which the Food and Agriculture Sector Development Policy (FASDEP) was derived as a policy document specific to Ghana and from which the Medium Term Agriculture Sector Development Plan (METASIP) was prepared in September, 2010. The investment plan which spans from 2011-2015 benefitted from a broad consultative process as well as technical inputs from local experts supported by various development partners. Key stakeholders include Ministry of Food and Agriculture (MoFA), other relevant Governmental bodies, and Development partners, NGOs, academia, civil society, farmers and other on-farm and off-farm private sector operators, researchers and service providers. The investment plan corresponds with the policy document: Food and Agriculture Sector Development Policy (FASDEP) II with programs clustered under six themes:

- Food Security and Emergency Preparedness
 - Increased growth in incomes
 - Increased and enhanced integration into domestic and international markets
 - Sustainable management of land and environment
 - Science and Technology applied in Food and agricultural development
 - Improved institutional coordination
 - Critical climate change issues for food and agricultural policy.

Even though the FASDEP II document acknowledges climate change as a factor in the development of agriculture in the country, it did not give comprehensive strategies to mainstream it into the policy implementation document. It recognizes though that climate change is not just

an environmental issue but a developmental issue because its impact affects all sectors of the Ghanaian economy especially agriculture and energy.

The objectives and strategies of the document were silent on:

- The analysis and assessment of the effects of higher atmospheric carbon dioxide levels, higher ultraviolet (UV-B) radiation, higher near-surface ozone concentrations, higher temperatures and changing precipitation /evapo-transpiration ratios on plant growth and food production.
- The provision of an overview of the state of knowledge of farmers on climate change and the role climate change can play in their farming activities is also missing. The discussion of climate change and how it affects various sectors of the economy is recent and complex. It is therefore important that the policy develops a strategy to sensitize farmers on the implications of climate change on their livelihood.
- The individual and combined effects of climate change including a description of the processes, and availability of data for specific crops.

It is recommended therefore that in order for agricultural production to be sufficient to meet the demand of the ever-growing population in the country, the impact of the climate change must be understood and integrated into the sector and district planning.

1.5.1 YOUTH IN AGRICULTURAL POLICY

The Youth in Agricultural Programme (YIAP) is a Government of Ghana Agricultural Initiative as a policy, strategy and sustainability of food production of the country. Development must include the youth and therefore the Ministry of Food and Agriculture (MOFA) seeks to encourage their participation in the agricultural sector. This effort seeks to change the negative perception the youth has of participation in agriculture, where they regarded farmers as uneducated, unskilled, physical labourers with extremely low economic return. Modern agriculture is more than tilling the soil and rearing animals. The sector today offers career opportunities in research, environment, financial management, engineering and other technical areas for the youth to explore. In 2010, the Youth in Agricultural Programme records indicate that 57,319 youth were involved in the initiative, of which 39,841 were males (69.9%) and 14,094 females (30.5%).

1.5.2 THE BLOCK FARM PROGRAMME

The Block Farm is under the Youth in Agricultural programme where state land or land acquired from chiefs or private individuals is ploughed and shared in Blocks among young farmers under the supervision of MOFA staff. For now, the crops under YIAP include maize (seed and grain), sorghum, soybean, tomato and onion.

The programme provides farmers with tractor services, inputs at subsidized prices, all on credit and at interest free rates. The land is ploughed and shared amongst young farmers in blocks. In the long run, big commercial farmers are to be made from Block Farm and the other component of the Youth in Agricultural Programme.

The Block Farm Programme involved the cultivation of crops like maize, rice, soybean, vegetables and sorghum. Other initiatives were vegetable production, aquaculture, dry season farming, and input support. A total of 38,751 youth comprising 27,125 males (69.9%) and 11,326 females (30.1%) were both direct and indirect beneficiaries from all the 10 regions.

1.5.3 LAND USE SYSTEMS IN GHANA

The most recent National land Policy formulation was initiated in 1994 and enacted in 1999. The policy seeks to address some fundamental problems associated with land management in the country and to provide the framework and direction for dealing with the issues of land ownership, security and tenure, land use and development and environmental conservation on a sustained basis.

One of the key guiding principles underlying the Government of Ghana's land policy is the fact that land is considered as a common national or communal property resource held in trust for the people and which must be used in the long term interest of the people. Access to land is governed through the existing land tenure systems. Ghana maintains a plural land tenure system. Land tenure in the Ghanaian context is the relationship (legal and customarily defined) among people as individuals or as groups with respect to land. Rights to land are normally viewed as a bundle of rights. This is the result of the fact that an individual can hold multiple rights to one piece of land. Rights to land can take the following forms:

Transfer rights: The right to sell or mortgage the land to convey the land to others through intra-community re-allocations or to heirs and to reallocate use and control rights.

Control rights: Right to make decisions on how the land should be used and to benefit financially from the sale of the crops etc.

Use rights: The right to use the land.

Very often the vulnerable in society especially women have only use rights to lands within their communities. Generally, it has been observed that women have limited access and use rights to land and other resources than their male counterparts. The situation is further complicated by the fact that there are geographical variations to the access that women have to land. There are more restrictions on women's access to land in the northern regions of Ghana than in the south. This is in spite of the fact that women account for 70 percent of production of subsistence crops and form about 90 percent of the labour force in the marketing of farm produce.

The co-existence of many systems of law regulating land in Ghana presents special difficulties, particularly for the more vulnerable sections of society, including women and the rural and urban poor. It is estimated that 80% of the land in Ghana is owned and governed by traditional rulers.

Table 4 AGRICULTURAL LAND USE IN GHANA

Type of land use specific to Agriculture	Hectares	%	Explanation
1.0 Total Land Area (T.L.A.)	23,853,900	100	
2.0 Agric. Land Area (A.L.A.)	13,628,179	57.1	(2.0/1.0)
2.1 Area under cultivation (2010)	7,846,551	57.6	(2.1/2.0)
2.2 Total area under irrigation (2010)	30,269	0.2	(part of 2.1)
2.3 Area not under cultivation (2010)	5,781,628	42.4	(2.1/2.0)
3.0 Area under inland waters	1,100,000	8	(3.0/1.0)
4.0 Others (forest reserves, savannah woodland, etc)	9,125,721	38.3	(4.0/1.0)

Sources: The Ghana Survey Dep't and MOFA, Accra

Note: Percentages will not add up to 100, because percentages of areas under cultivation, irrigation and inland waters are of the Agricultural Land Area (ALA).

Ghana has enough agricultural land to produce to feed its population and export. Availability of land for agricultural purposes 13,628,176ha of which only 57 percent of it is under cultivation and only 0.2 percent of the 7,486,551 is under irrigation as at 2010. By this, the country has a great

deal of potential to expand its agricultural base by the introduction of technology and expansion of commercial irrigation to help in mitigating the effect of climate change on smallholder farmers in the most vulnerable Regions in Ghana where climate change is a threat to agricultural employment.

1.6 RAINFALL DISTRIBUTION IN GHANA

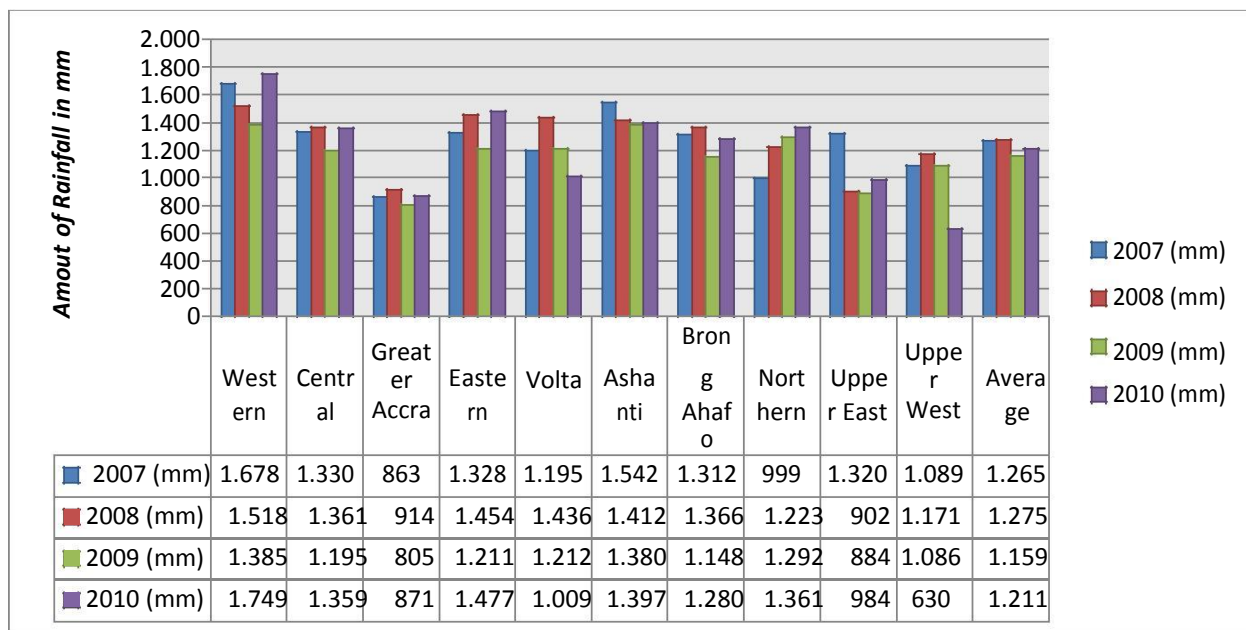
Annual rainfall in Ghana is highly variable on inter-annual and inter-decadal timescales and long-term trends are difficult to identify. Rainfall over Ghana was particularly high in the 1960s, and decreased to particularly low levels in the late 1970s and early 1980s, producing an overall decreasing trend in the period 1960 to 2006, with an average precipitation of 2.3 mm per month (2.4%) per decade. There is no evidence of a trend in the proportion of rainfall that has occurred in ‘heavy’ events since 1960 according to the Ghana Meteorological Agency.

Table 5 REGIONAL RAINFALL DISTRIBUTION IN GHANA

Region	2007 (mm)	2008 (mm)	2009 (mm)	2010 (mm)	30yrs Average (mm)	% change 2010/2009 (mm)	% change 2010/30- yr average (mm)
Western	1,678	1,518	1,385	1,749	1,558	26.3	12.3
Central	1,330	1,361	1,195	1,359	1,252	13.7	8.5
Greater Accra	863	914	805	871	788	8.2	10.5
Eastern	1,328	1,454	1,211	1,477	1,340	22	10.2
Volta	1,195	1,436	1,212	1,009	1,180	-16.7	-14.5
Ashanti	1,542	1,412	1,380	1,397	1,345	1.2	3.6
Brong Ahafo	1,312	1,366	1,148	1,280	1,244	11.5	2.9
Northern	999	1,223	1,292	1,361	1,155	5.3	17.8
Upper East	1,320	902	884	984	912	11.3	7.9
Upper West	1,089	1,171	1,086	630	1,022	-42	-36.4
Average	1,265.60	1,275.70	1,159.80	1,211.70	1,179.60	4.5	2.7
Total	12,656	12,757	11,598	12,117	11,796	4.5	2.7

Source: Ghana Meteorological Agency

Fig 6 REGIONAL RAINFALL DISTRIBUTION IN GHANA – 2007 – 2010 (mm)



The Regional distribution of rainfall in Ghana is according to the ecological zone of the Region. The Tropical Rain Forest is occupied by the Western Region with an average Annual Rainfall between 2007 and 2010 of 1,582.5 mm. The Ashanti, Eastern parts of Brong Ahafo and Volta Region occupied the deciduous Forest with an Average Annual precipitation between the same periods of 1,400 mm which is above the National Average of 1,227.5 mm. The Upper East Region represents the Sudan Savanna with the lowest average of 1,022.5 mm only next to Greater Accra. 863.3 mm.

Table 6 RAINFALL DISTRIBUTION BY AGRO-ECOLOGICAL ZONES

Agro-ecological zone	Mean Annual Rain (mm)	Growing Major Season	Period (Days) Minor Season
Rain Forest	2,200	150 – 160	100
Deciduous Forest	1,500	150 - 160	90
Transitional	1,300	200 - 220	60
Coastal	800	100 – 110	50
Northern Savanna:			
Guinea Savanna	1,100	180 - 200	*
Sudan Savanna	1,000	150 - 160	*

Source: Meteorological Services Department, Accra.

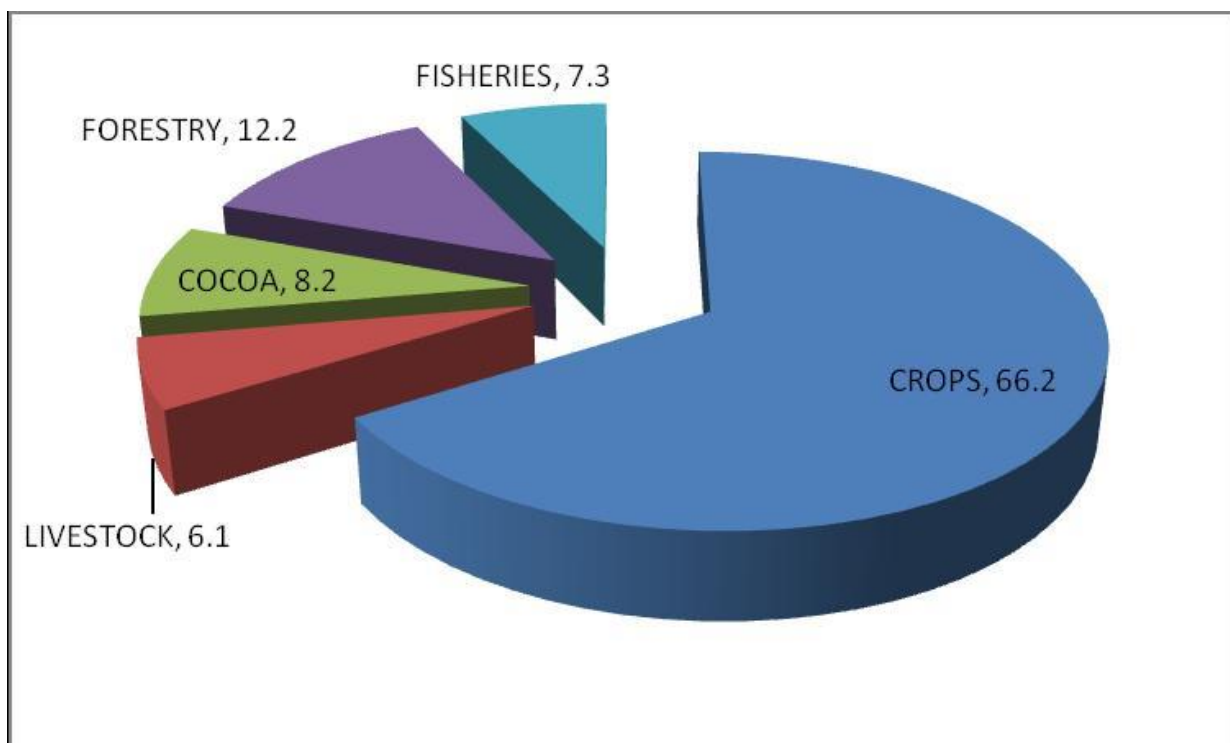
**Rainfall distribution is bimodal in the Forest, Transitional and Coastal Zones, giving a major and minor growing season; elsewhere (Guinea Savanna and Sudan Savanna), the unimodal distribution gives a single growing season.*

Farmers in the Rain Forest, Deciduous Forest, Transitional zone and the coastal belt have two cropping seasons in a year, the major season begins from mid-April to June and June to September in the minor season while the Northern Savanna experience only one cropping season in a year from mid-May to June.

The Sudan Savanna receives the least annual precipitation of a 1000 mm while the Tropical Rain Forest by representation, Axim receives the most 2,200 mm.

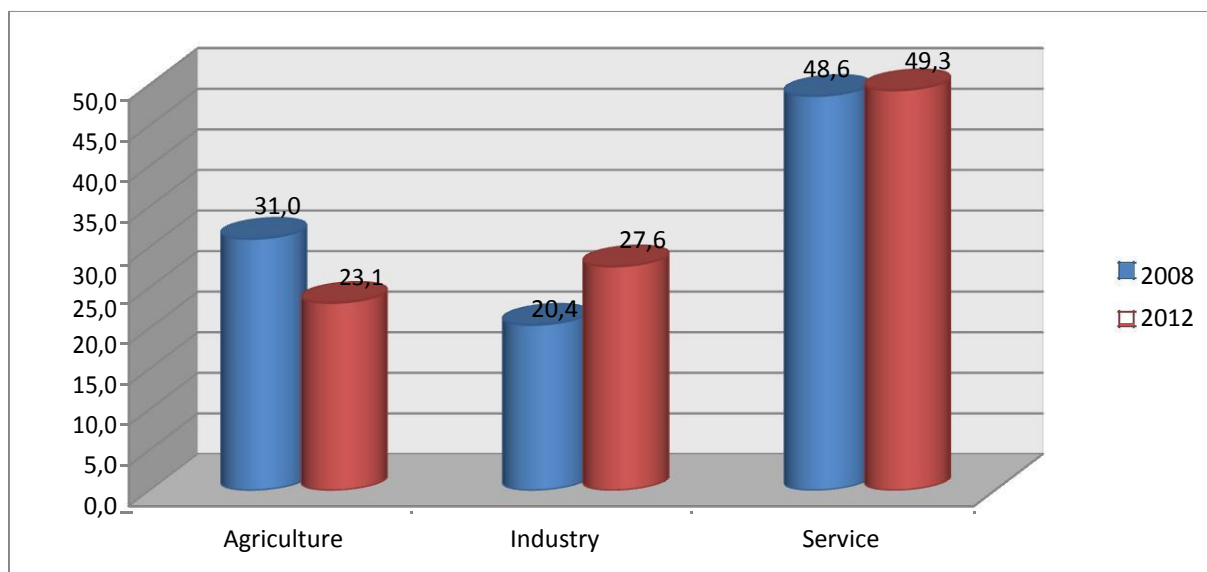
1.7 CONTRIBUTION OF THE AGRICULTURAL SECTOR TO THE ECONOMY OF GHANA

Fig 7 AGRICULTURAL SUBSECTORS BY GDP (%) – 2010



Source: Ghana Statistical Service, Accra

Fig 8 PERCENTAGE SECTOR CONTRIBUTION TO GDP -2008 AND 2012



Source: Ghana Statistical Service

While the service sector grew marginally 48.6% to 49.3% from 2008 to 2012, the sector leads in contributing to GDP. Within the same period industry made strong gains from 20.4% to 27.6%, with mining and quarry contributing substantially to this sector. Agriculture's contribution to GDP fell from 31.0% to 23.1% probably as a result of the poor performance of the timber and forestry subsector. The economy of Ghana is therefore said to be service-led.

In the 1980s, agriculture contributed about 55% to the GDP but this declined to 41% in 1995 and further declined to 36.5% in 1999. In 2006, it stood at 39.3% compared with 32.9% and 27.8% for service and industry respectively.

Table 7 PERCENTAGE GROWTH IN AGRICULTURE (2005-2010)

Activity	2005	2006	2007	2008	2009	2010
Agriculture	4.1	6.2	4.3	5	6.2	4.8
Crops and Livestock	3.3	3.5	6.1	5.5	7	5
Cocoa	13.2	12.2	6.5	5.3	5	4.6
Forestry & Logging	5.6	5.6	4	2.5	3.5	3.8
Fishing	-1.2	3.6	5	17.4	-5.7	5

Source: Ghana Statistical Service/MoFEP

Agriculture has generally been growing at a decreasing rate between 2005 and 2010. While cocoa production has been the most significant in this regard. It registered 13.2 percent in 2005 to 4.6 percent in 2010. Livestock production did not also show much in terms of positive growth rate, while fishing showed positive growth rate between 2005 and 2008, the reverse was the case between 2008 and 2010. This pattern of growth is the result of over dependence on rainfall coupled with the threat of global warming.

1.7.1 FARMING SYSTEMS

Agriculture is predominantly on a smallholder basis in Ghana. About 90% of farm holdings are less than 2 hectares in size, although there are some large farms and plantations, particularly for rubber, oil palm and coconut and to a lesser extent, rice, maize and pineapples. The main system of farming is traditional. The hoe and cutlass are the main farming tools. There is little mechanized farming, but bullock farming is practiced in some places, especially in the North. Agricultural production varies with the amount and distribution of rainfall. Soil factors are also important. Most food crop farms are intercropped. Mono cropping is mostly associated with larger-scale commercial farms.

AGRICULTURAL OUTPUT - CROP SUB-SECTOR

1.7.2 PRINCIPAL AGRICULTURAL PRODUCE IN GHANA Industrial

Crops: Cocoa, Oil Palm, Coconut, Coffee, Cotton, Kola, Rubber.

Starchy and Cereal Staples: Cassava, Cocoyam, Yam, Maize, Rice, Millet, Sorghum, Plantain.

Fruits and Vegetables: Pineapple, Citrus, Banana, Cashew, Pawpaw, Mangoes, Tomato, Pepper, Okra, Egg Plant, Onion, Asian Vegetables

Table 8 MEAN ANNUAL GROWTH RATES FOR AREAS PLANTED TO SELECTED FOOD CROPS

Crop	Average Area ('000ha)		Growth Rate	Average Area ('000ha)		Growth Rate
	1999-2001	2002-2004		2005-2007	2008-2010	
Rutes &Tubers						
Cassava	675.6	795.2	5.43	780.2	866.9	3.56
Cocoyam	294.1	276.1	-2.1	257.5	227.3	-4.16
Yam	213.7	282.5	9.34	310.8	350	3.96
Plantain	254	281.5	3.43	298.1	321.6	2.53
Cereals						
Maize	701.6	821.5	4.6	774.4	930.8	6.13
Millet	195.9	195.6	-0.05	182.6	181.8	-0.13
Sorghum	309.8	327.1	1.81	277.8	265.2	-1.55
Rice (Paddy)	95.6	120	7.56	118	158.8	9.91
Legumes						
Groundnuts	236.2	285.8	19.74	423.9	346.9	-6.68
Beans	101.5	184.8	19.96	167.9	163.7	-0.86

Source: Statistics, Research and Information Directorate (SRID), MoFA.

*The average of 2005 to 2007 compared with average of 2008 to 2010 and average of 1999 to 2001 compared with average of 2002 to 2004.

A serious look at the growth rates of areas planted to specific crops in Ghana shows a general decline. Apart from rice and maize, which have been given special attention in recent times by government, cassava, cocoyam, yam, plantain, millet, sorghum, groundnut and beans have all shown a decline in the area (ha) of cultivation. This situation has an implication for job losses, poverty and livelihood for small-scale farmers because farmers of these crops are smallholder farmers.

1.7.3 IRRIGATION

Irrigation in Ghana has to be taken seriously if the country is ready to diversify livelihood options and be able to move on the path of sustainable growth taking into account the threat of global warming and to have its food security agenda on track.

Table 9 TOTAL AREA UNDER IRRIGATION IN GHANA

Formal Irrigation (Project/Scheme)	Area (ha)-2009	Area (ha)-2010
Existing irrigation schemes	10,067	10,127
Additional Area after Rehabilitation	500	500
Small Scale Irrigation Development Project	1,279	1682
Small Farm Irrigation Project	322	324
Surface water Extraction	0	0
Ground Water Extraction	0	0
MCA	0	0
Sub-Total	12,168	12,633
Informal Irrigation	17,636	17,269
Grand Total	29,804	30,269

Source: Ghana Irrigation Development Authority, MOFA

Clearly, this is not the case according to the table where only 30,269ha of agricultural lands is under irrigation out of 7,846,551ha under cultivation (GSD, MoFA, 2010) of agricultural lands are under irrigation currently with a sum total of formal irrigation covering only 12,633 ha making agriculture heavily dependent on rain. Localized irrigation for smallholder farmers to be able to produce all year round is a more sustainable way of making their livelihood more meaningful and at the same time reducing poverty to a greater extent.

Fig 9 INFORMAL (SMALLHOLDER) IRRIGATION TYPE



Source: Ghana Irrigation Development Policy

Fig 10 FORMAL IRRIGATION TYPE



Source: Ghana Irrigation Development Policy

Fig 11 COMMERCIAL IRRIGATION WITH A CANAL FROM LARGE SCALE DAMS



Source: Ghana Irrigation Development Policy

1.8 OCCUPATION

About (41.3%) of the economically active population aged 15 years and older are skilled agricultural, forestry and fishery workers. About 21 percent is also engaged as service and sales workers while 15.2 percent are craft and related trade workers. Skilled agricultural, forestry and fishery work remains the dominant occupation for both males (45.0%) and females (37.8%). However, a much higher proportion of females (31.3%) than males (10.0%) are engaged as service and sales work. (GSS, 2012)

This pattern is generally the same for most of the regions, with the three northern regions (Northern, 73.6%; Upper East, 70.3%; Upper West, 72.6%) having relatively high proportions of the economically active population engaged as skilled agricultural, forestry and fishery workers followed by Brong Ahafo (61.0%). However, in Greater Accra, most economically active population is more likely to be engaged as service and sales workers (35.3%) and less likely to be engaged as skilled agricultural, forestry and fishery workers (5.8%). (Ghana Statistical Service

Table 10 ECONOMICALLY ACTIVE POPULATION (15 YEARS AND ABOVE) BY REGION AND SEX (2010)

Region	Total Labour force	Count.	Agriculture (Farming, Forestry, Fishing and Hunting)				Non-Agric (Mining, manufacturing, Service etc)	
			Share of Labour Force	% Male	% Female	Male	Female	Total
Western	971,703	454,488	46.8	54.4	45.6	247,204	207,284	517,215
Central	889,465	374,016	42.0	51.5	48.5	192,492	181,524	515,449
Greater Accra	1,849,114	83,153	4.5	64.1	35.9	53,284	29,868	1,765,961
Volta	881,313	439,411	49.9	53.6	46.4	235,335	204,076	441,902
Eastern	1,121,536	503,095	44.9	57.0	43.0	286,794	216,301	618,441
Ashanti	1,963,012	586,436	29.9	50.8	49.2	297,815	288,621	1,376,576
Brong Ahafo	991,189	604,424	61.0	52.6	47.4	318,119	286,305	386,765
Northern	988,658	727,650	73.6	53.3	46.7	387,708	339,942	261,008
Upper East	441,288	310,233	70.3	49.3	50.7	152,887	157,346	131,055
Upper West	276,400	200,793	72.6	50.5	49.5	101,473	99,320	75,607
All Regions	10,373,678	4,283,699	41.3	53.1	46.9	2,273,112	2,010,583	6,089,979

Source: GSS-Based on 2010 Population and Housing Census

Out of 10,373,678 economically active populations according to the 2010 population census, 41.3 per cent are engaged in agricultural activity. In other words their livelihood is dependent on agriculture with males dominating 53.1 per cent as against women 49.6 per cent. The Northern part of the country (Upper East, Upper West, Northern and Brong Ahafo Regions) has over 60 percent of the active populations 5 years and above in those regions engaged in agriculture, making agriculture the dominant sector in terms of employment and livelihood.

Western, Volta, Eastern and Central regions however have less than 50 percent of the economically active populations dependent on agriculture. In all, agricultural employment seems to hold the key to employment in the labour market especially in Regions that are more rural.

1.9 SOCIAL POLICY AND SOCIAL PROTECTION

To provide opportunity for the poor and vulnerable to take part in the growth process the interventions outlined under the National Social Protection Strategy continued to be implemented. These include the Livelihood Empowerment against Poverty Programme. (LEAP), the National Health Insurance Scheme (NHIS), the Capitation Grant, and the School Feeding Programme. These interventions by government though a good beginning is still too little to addressing the effects of climate change on smallholder farmers.

The LEAP which was introduced to provide both conditional and unconditional cash transfers to targeted populations to support extremely poor households continued in 2010. In 2010 the total cumulative enrolment under the regular LEAP was 39,423 households with an estimated population of 157,689 and covering 83 districts in all the regions. Besides the regular LEAP, there was also an Emergency LEAP enrolment during 2010, and the Department of Social Welfare (DSW), under this programme, supported 59,115 households in 59 districts across the country. In 2012, up to 60,000 households were covered (2013 Budget Statement). Following the re-constitution and inauguration of the National Council on Persons with Disability in 2009, the Council, in collaboration with key institutions, developed a Draft Legislative Instrument to operationalize the Persons with Disability Act, 2006, Act 175. It prepared a five-year (2011-2015) Strategic Plan to translate the various components of the Disability Act into measurable results and outcomes. Also, the National Ageing Policy and its Implementation Action Plan were approved by Cabinet.

The new NDC government (2012) is harmonizing all the social interventions under the new re-oriented Ministry of Children, Gender and Social Protection to be run more efficiently and effectively by way of monitoring and evaluation.

The Ghana School Feeding Programme (GSFP) covered 1,582,402 pupils in 4,545 beneficiary schools across the country in 2012

Local Enterprises and Skill Development Programme (LESDEP) provided 44,735 beneficiaries with skills and training in vocational, entrepreneurship and business development services and set-up equipment to start their own businesses in various trades.

Microfinance and Small Loan Centre (MASLOC) provided and distributed a total of 1,000 outboard motors to fishermen in all fishing communities in Ghana engaged in the fishing industry. Lending operation covered 168 districts out of 170 districts. The recovery rate for new loans stood at 70 percent. To help minimize the use of unapproved fishing nets, a total of 6,450 bundles to fishing nets were distributed to fishermen across the country.

Taxi drivers were not left out in the targeted group. A total of 390 Hyundai Verna cars and 200 Hyundai Accent cars on hire purchase were distributed across the entire country.

2 CLIMATE CHANGE, CLIMATE TRENDS AND ITS IMPACT ON AGRICULTURE IN GHANA

This chapter addresses issues on climate change and its effect on agriculture in Ghana, showing the most vulnerable ecological zones to climate change.

2.1 CLIMATE CHANGE AT THE GLOBAL LEVEL

At the global level what has been less discussed is the way that climate change will affect social conditions and particularly the labour market, jobs and workers. The social costs, both financial and human, will substantially add to the environmental and economic ones. In September 2008 the International Labour Organization (ILO), the United Nations Environment Programme (UNEP), the International Trade Union Confederation (ITUC) and the International Organization of Employers (IOE) launched the report *Green Jobs: Towards Decent work in a Sustainable, Low-Carbon World*. This document makes an important contribution to understanding the challenges associated with the transition to the so-called “green jobs” worldwide. It illustrates the tremendous potential for job creation and transformation of existing jobs, as well as some destruction of jobs across virtually all economic sectors in low- and high-income countries. It sets out a policy framework to harness this potential (ILO 2009).

The world had experienced structural changes in the labour market before. However, changes in the climate will have an enormous impact on employment and the labour market in general, especially in developing countries. Even though the largest share of Green House Gases (GHG) affecting the climate is coming from developed countries and countries in transition, it is the developing world which will be the hardest hit – areas already poor and financially weak with respect to what the measures they would be able to take to tackle climate change effects. In an interview in the *Financial Times* in December 2008 (Harvey 2008), Nicholas Stern suggested that “there are two big challenges for this century; and they are world poverty and climate change.” He argues that we will have to address both or we might fail in both areas. This is important as all economic sectors will be affected by climate change; although some sectors are more weather sensitive than others and will have more impact on people’s lives and income possibilities. This is particularly true for agriculture and tourism.

Over 1 billion people are employed in the agricultural sector which is the second greatest source of

employment worldwide after services. Asia accounts for more than 70 per cent of the world total and sub-Saharan Africa for almost 20 per cent. China and India together represented almost 60 per cent of the world's total agricultural labour force. Of the total workforce, about 40 per cent are women (ILO 2008c).

2.2 THE EFFECTS OF CLIMATE CHANGE TODAY

While the IPCC refers to climate change as any change in climate over time, whether due to natural variability or as a result of human activity, the UNFCCC refers to it as a change in climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere, and that is in addition to natural climate variability observed over comparable time period (IPCC, 2007).

Climate change will affect not only the way we talk about weather. For many people around the world, particularly in developing countries, climate change will have a deep impact on working life, income and lifestyle. Not only will workers have to adapt to new and cleaner production methods, but in many cases, workplaces may disappear due to unsustainable production or even because a particular geographical area no longer exists. In this scenario, whole communities might disappear (ILO, 2012).

Over 100 years ago, people worldwide began burning more coal and oil for homes, factories, and transportation. Burning these fossil fuels releases carbon dioxide and other greenhouse gases into the atmosphere. These added greenhouse gases have caused the Earth to warm more quickly than it has in the past. Scientists from around the world with the Inter-governmental Panel on Climate Change (IPCC) tell us that during the past 100 years, the world's surface air temperature increased an average of 0.6° Celsius (1.1°F), and as a result during the 20th century, sea level rose about 15 cm (6 inches) due to melting glacier ice and expansion of warmer seawater. Models predict that sea level may rise as much as 59 cm (23 inches) during the 21st century, threatening coastal communities, wetlands and coral reefs. The summer thickness of the arctic sea ice is about half of what it was in 1950. Melting ice may lead to changes in ocean circulation. Over the past 100 years, mountain glaciers in all areas of the world have decreased in size and so has the amount of permafrost in the Arctic. Greenland's ice sheet is melting faster too.

The sea-surface temperatures are warming, causing warmer waters in the shallow oceans and have contributed to the death of about a quarter of the world's coral reefs in the last few decades.

Many of the coral animals died after weakened by bleaching, a process tied to warmer waters. The temperatures of large lakes world-wide have risen dramatically. Temperature rises have increased algal blooms in lakes; favor invasive species, increase stratification in lakes and lower lake levels. Warmer temperatures have led to more intense rainfall events in some areas causing flooding in some areas. Higher temperatures cause a higher rate of evaporation and more droughts in some areas of the world. Increased temperatures and extreme drought are causing a decline in crop productivity around the world (IPCC, 2011). Decreased crop productivity can mean food shortages which have many social implications on food security. As temperatures warm, species may either move to a cooler habitat or die. Species that are particularly vulnerable include endangered species, coral reefs, and polar animals. Warming has also caused changes in the timing of spring events and the length of the growing season thereby changing the ecosystems in the world. Carbon dioxide dissolving into the oceans is making seawater more acidic that could impact on coral reefs and other marine life.

There is evidence that hurricanes have changed in frequency and strength in the Atlantic since 1970. Scientists continue to study whether climate change is the cause. More frequent heat waves have become more common in more areas of the world as a likely result of climate change. The results of these changes are more deaths and more allergy attacks as the pollen season grow longer. There have also been some changes in the ranges of animals that carry pathogens like mosquitoes.

As global temperatures increase, those who live in the tropics will see their death rate increase due to malaria, dengue fever, diarrhea and malnutrition. Underdeveloped countries will see most of their crops destroyed by extreme weather conditions such as droughts, hurricanes and heat waves which accompany a warming climate. They will suffer from floods due to rising sea levels, which will also cause salt water to seep into their surface and groundwater, making many coastal areas unfertile. These under-developed countries will suffer decline in crop yield with even a slight amount of warming.

2.3 HUMAN AND NATURAL DRIVERS OF CLIMATE CHANGE

Changes in the atmospheric abundance of greenhouse gases and aerosols, in the solar radiation and in land surface properties alter the energy balance of this climate system. These changes are expressed in terms of “radiative forcing”, which are used to compare how a range of human and natural factors drive warming or cooling influences on the global climate (IPCC, 2007).

The New Scientist magazine, in its publication of the 25th January, 2013, had it on its headline “What leaked IPCC report really says on climate change” It was a preliminary draft of a report by UN International Panel on Climate Change which was leaked to the public in January, 2013 and climate skeptics say it contained fresh evidence of 20 years of over-estimated global warming (IPCC, 2013). The report is not scheduled for publication until 2014.

The key sentence examines evidence of the link between the sun’s activity and climate. It concludes that the link is slightly stronger than previously thought. This suggests that positive feedbacks within the climate must make the sun’s influence a little larger to fully explain how it affects Earth’s climate. The author (Rawls) interprets this as an admission that the sun is actually a significant driver of climate change. Climate scientists are however lining up to debunk this claim (New Scientist, 25th January 2013).

In another article published by David Rose on Tuesday, April 2, 2013 in the Mail Online and headed “The Great Green Con no.1: The hard proof that finally shows Global Warming forecasts that are costing you billions were wrong”. The article presented scientific evidence in a form of a graph as irrefutable evidence that official predictions of Global Climate Warming have been catastrophically flawed. The graph shows there has been no statistically significant increase in the world’s average temperature since 1997 and academics are revising their views after acknowledging the miscalculations. These are what some expects now say:

“Global surface temperatures have not risen in 15 years. They make the high estimates unlikely”
– Climate Change Professor, Leeds University

“This changes everything. Global Warming should no longer be the main determinant of economic or energy policy” Dr. David Whitehouse – Global Warming Policy Foundation

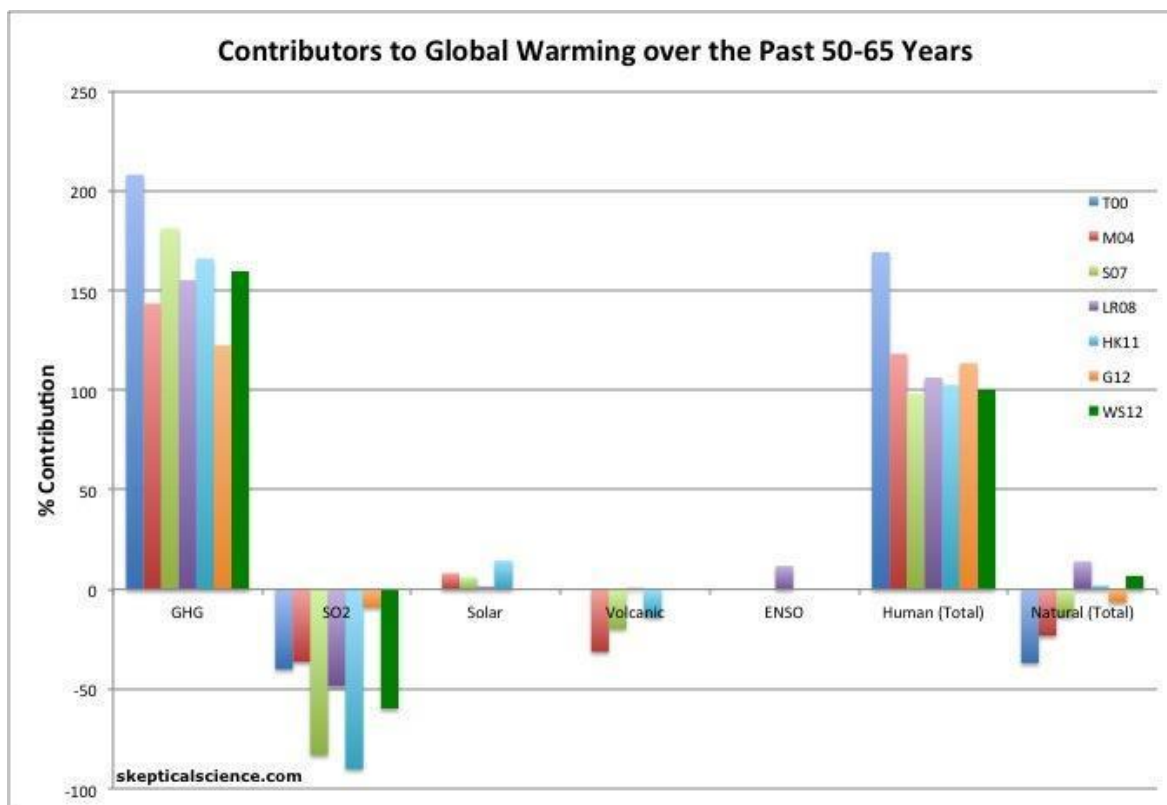
“Climate Models are running too hot..... Current flat trends may continue for two or more decades”

– Prof. Judith Curry – Georgia Institute of Technology.

In a sharp rebuttal in an article published in the Guardian Environment Network and titled “Global Warming is not due to the sun, confirmed leaked IPCC report” on Friday, December 14, 2012 by Dana Nuccitelli. The article clearly shows that the sun has made little if any contribution to the observed global warming over the past 50+ years by the graph.

Rawls completely misrepresented the IPCC in his supposedly “game-changing admission” from the IPCC report

Fig 12 CONTRIBUTORS TO GLOBAL WARMING OVER THE PAST 50-65 YEARS



Source: Guardian Environment Network

Percent contributions of greenhouse gases (GHGs), sulfur dioxide (SO₂), the sun, volcanoes, and El Niño Southern Oscillation (ENSO) to the observed global surface warming over the past 50-65 years according to Tett et al. 2000 (T00, dark blue), Meehl et al. 2004 (M04, red), Stone et al. 2007 (S07, green), Lean and Rind 2008 (LR08, purple), Huber and Knutti 2011 (HK11, light blue), Gillett

et al. 2012 (GI2, orange), and Wigley and Santer 2012 (WS12, dark green).

2.4 CLIMATIC TRENDS AND CLIMATE CHANGE IN GHANA

The major rainfall and temperature patterns form the basis of the agro-climatic zones namely, the Sudan Savanna zone, the Guinea Savanna zone, the Transition Zone, the semi-Deciduous

Rainforest zone, and the High Rainforest Zone. Each zone is represented geo-climatically by Navrongo, Tamale, Wenchi, Kumasi, and Axim, respectively.

The climate baseline trends for Ghana (since 1960) can be summarized as follows:

Mean annual temperature has increased by 1.0°C, at an average rate of 0.21°C per decade. The rate of increase has been higher in the northern regions of the country than in the south. The average number of ‘hot’ days per year increased by 48 between 1960 and 2003, while the average number of ‘hot’ nights per year increased by 73 in the same period. The average number of ‘cold’ days per year decreased by 12 (3.3% of days) between 1960 and 2003, (Ghana’s climate Risk and Adaptation Profile, World Bank, 2011).

The average number of ‘cold’ nights per year decreased by 18.5 (5.1% of days) in the same period. Annual rainfall in Ghana is highly variable on inter-annual and inter-decadal timescales and long-term trends are difficult to identify. Rainfall over Ghana was particularly high in the 1960s, and decreased to particularly low levels in the late 1970s and early 1980s, producing an overall decreasing trend in the period 1960 to 2006, with an average precipitation of 2.3 mm per month (2.4%) per decade. There is no evidence of a trend in the proportion of rainfall that has occurred in ‘heavy’ events since 1960 according the World Bank Climate Risk and Adaptation Report.

Several studies have been undertaken to reveal overall climate trends for Ghana in the future. These include the World Bank study of the Economics of Adaptation to Climate Change Study (looking at the 2010-2050 period) and the 2000 UNDP Climate Profile of Ghana (looking at the 2060-2090 period). Among their findings are the following:

The mean annual temperature is projected to increase by 1.0 to 3.0°C by the 2060s, and 1.5 to 5.2°C by the 2090s. The projected rate of warming is most rapid in the northern inland regions of Ghana.

Under the Ghana Dry climate scenario, temperatures in the three regions of the North are projected to increase by 2.1–2.4°C, in the western, Western-Central, and Volta Regions by 1.7– 2.0°C, and in the Brong Ahafo region by 1.3–1.6°C.

All projections indicate substantial increases in the frequency of days and nights that are considered ‘hot’ in current climate, but the range of projections between different models is large. Total annual rainfall is projected to decline by 1.1%, and 20.5% in 2020 and 2080, respectively. Seasonality is projected to change, with early termination of rainfall in the transitional zone, and is likely to convert the current bi-modal regime to a uni-modal one.

2.5 IMPACT OF CLIMATE CHANGE ON GHANAIAAN AGRICULTURE

The agriculture sector employs over 60% of the workforce and is largely based on smallholdings (over 85% are 2 ha or less in size) and the greater part of Ghana’s agricultural activity is rain fed. Cocoa is the principal cash crop, being grown on 40% of cultivated land. Cassava, yams and cocoyam are the most important root and tuber crops, which in total account for 40% of agricultural GDP (Dazé, 2007; CIA World Fact book, 2007; GINC, 2000). Millet is the staple crop in the savannah, and maize and rice are widely consumed throughout the country. Cereals are relatively vulnerable to climate change and are important in terms of food security. Ghana’s high temperatures result in low cereal yields due to a limited growing period and high evapo-transpiration (thus, higher water requirements).

In the north of Ghana there is a high level of dependence on agriculture for livelihood and the area is climatically sensitive to low and decreasing rainfall and frequent, recurring droughts, together make this area the most vulnerable region to climate change. The dependence on rain-fed agriculture across the country makes farmers in Ghana particularly vulnerable to climate change. Irrigation has recently been introduced but is not widespread. In 2000, only 0.5% of the cultivated area in Ghana was irrigated (AQUASTAT, cited in Dazé, 2007) but climate change will increase demand for irrigation water. Coupled with the reductions in rainfall and runoff as projected by climate models (Boko *et al.*, 2007), impacts on water availability for agriculture will be significant for this country.

Cereals will be negatively affected by climate change. Increasingly, variable rainfall will result in droughts, soil degradation and unpredictable growing seasons; all of which will reduce yields. Additionally, roots and tubers will be negatively impacted; cassava production is projected to decrease by 53% and cocoyam by 68% by 2080 (Anon, 2007; Dazé, 2007).

Cocoa accounts for 60–70% of foreign export earnings from agriculture or 20–25% of total foreign export earnings. Over 800,000 smallholder families (350,000 farm owners), mainly in the western region, depend on cocoa production for their livelihoods, as cocoa represents 70–100% of their household annual income.

In its publication, Ghana Myjoyonline.com in March 19, 2013 and titled “Northern disasters: It is time to involve International donors – Ex-NADMO Coordinator” reported that in recent weeks scores of people have died and over 10,000 people displaced in severe rain storm that has hit parts of the Northern Region. According to the report, the Ghana Meteorological Agency says the Region is yet to experience the rainy season which means the situation is likely to deteriorate.

Fig 13 The tree that killed four traders and injured several others



Source: Myjoyonline

These occurrences in recent times are some of the climatic variations in Ghana especially the northern part of the country where the majority of the informal agricultural workers cannot come to

terms with the changes and therefore need answers.

2.5.1 WATER RESOURCES

Water is vital to Ghana's socio-economic growth and improvement. Impacts of climate change on water resources are likely to affect such sectors as energy, agriculture, and the budding industry. Based on domestic, industrial, and irrigation water demands relative to socio-economic indicators for the year 2020-2050 and using GCM projections and CROPWAT model for precipitation and evapo-transpiration, the following impacts are expected as a result of increasing climate variability:

Reductions in rainfall and runoff of about 20 and 30 per cent, respectively, with an observed increase in temperatures of about 1°C over a 30-year period, sensitive changes to runoffs or discharges in all the representative basins relative to precipitation and temperature. A 10 per cent change in precipitation or a 1°C rise in temperature can cause a reduction in runoff of about 10 per cent, although this varies according to the terrain and soil types. Likely reduction in river flows between 15-20 per cent and 30-40 per cent for the years 2020 and 2050, respectively, in all the basins. Climate change can cause reduction in groundwater recharge between 5 and 22 per cent by the year 2020. Reductions for the year 2050 are projected to be between 30 and 40 per cent. Irrigation water demand and hydropower generation could be affected considerably by climate change.

2.5.2 GREENHOUSE GAS INVENTORIES AND CLIMATE CHANGE IN GHANA

There is strong evidence that since the early twentieth century the change in the earth's climate is linked to the release of Greenhouse Gases (GHGs) from human activities. The greenhouse gases that are released contribute to a process which controls the temperature of the earth. However, the releases of extra greenhouse gases from human activities contribute to this process and traps extra heat within the earth's atmosphere causing a warming effect (Greenhouse Gas Inventory Report, 2011).

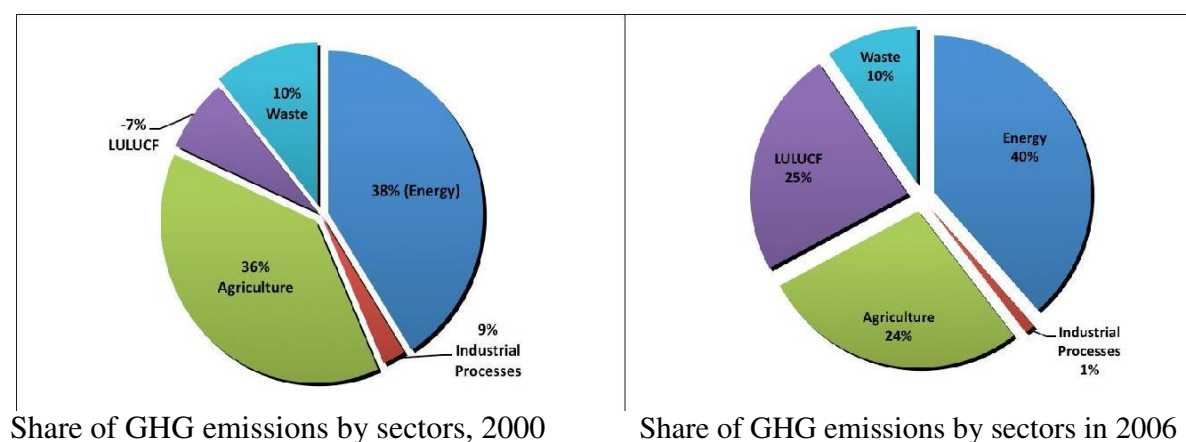
Ghana ratified the United Nations Framework Convention on Climate Change (UNFCCC) in September 1995 and the convention came into force in December 1995. Parties to the convention are obligated to develop, publish and regularly update national emission inventories of GHGs. Five direct greenhouse gases were covered namely, CO₂, CH₄, N₂O, CF₄ and C₂F₆, each with different

global warming potential by the inventory.

In 2000, the total net greenhouse gas emission (including LULUCF emissions) in Ghana was 173% above the 1990 levels and 97% lower than 2006 levels. The total net greenhouse gas emissions increased by 242% from 1990 to 2006. If emissions from LULUCF are excluded, in 2000, the total GHG emission in Ghana is about 43% above 1990 levels and 39% lower than 2006 levels.

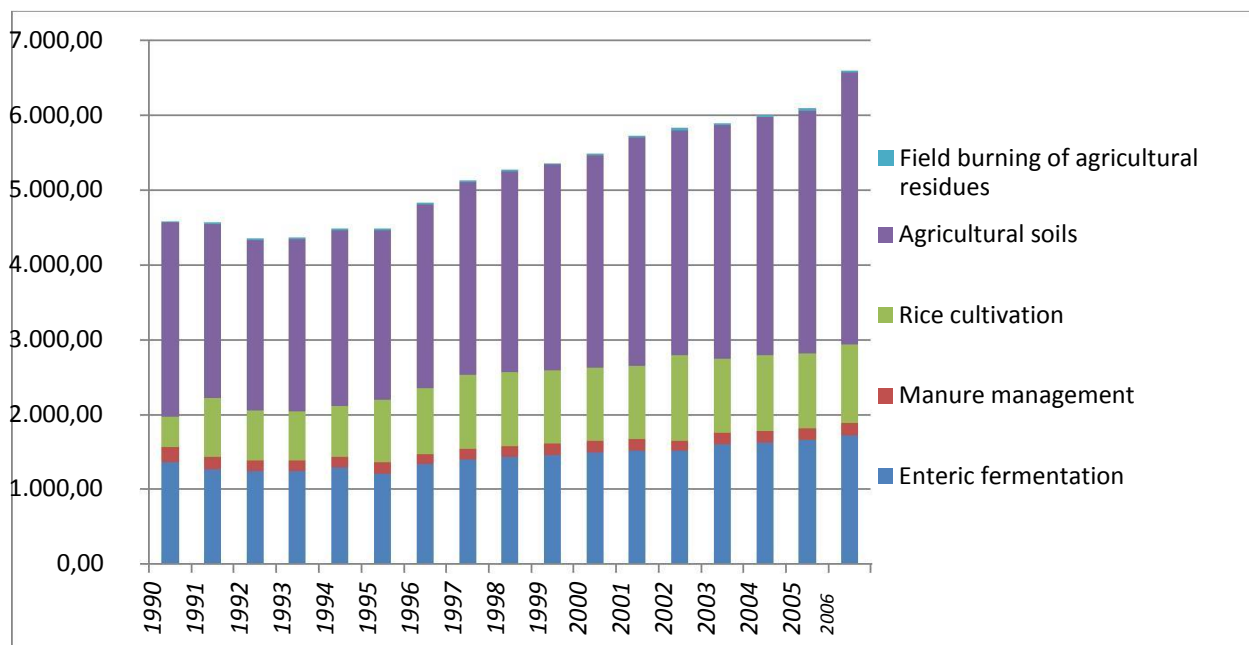
Without LULUCF emission, the total emission increased by 107% from 1990 to 2006, (Greenhouse Gas Inventory Report, 2011).

Fig 14 TOTAL EMISSIONS BY SECTORS, 2006 AND 2000 (GgCO₂e)



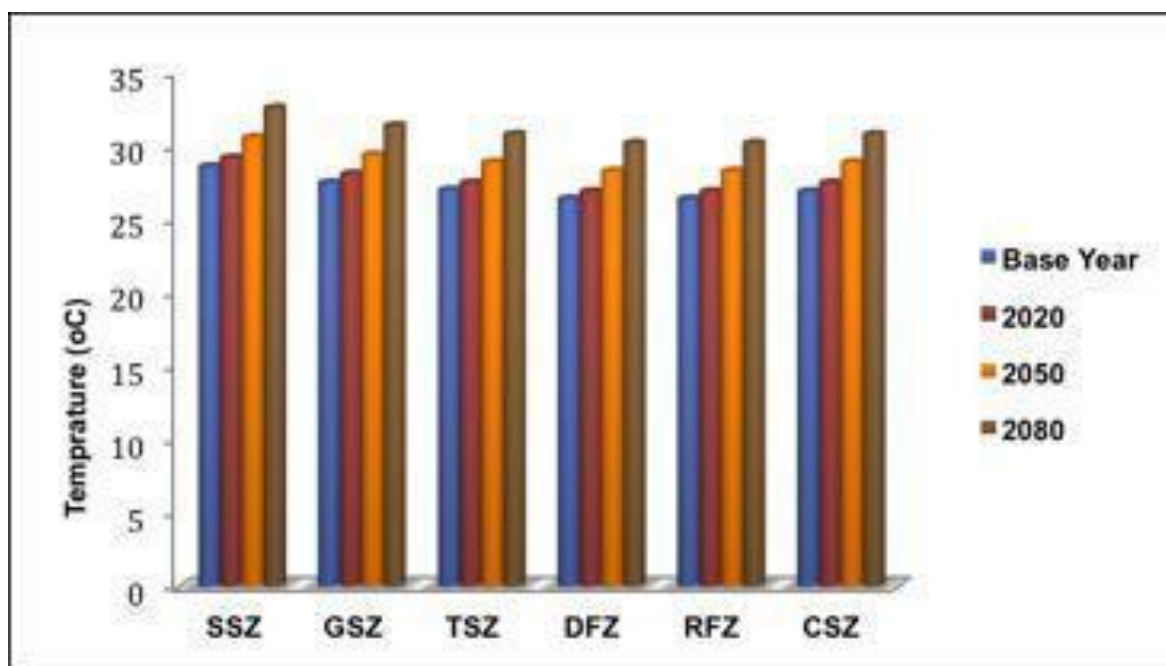
Source: National Greenhouse Gas Inventory Report for 1990-2006 – Ghana

Fig 15 AGRICULTURAL EMISSIONS AS ESTIMATED FROM 1990 – 2006 – GHANA



Source: National Greenhouse Gas Inventory Report for 1990-2006 – Ghana

Fig 16 ANNUAL MEAN TEMPERATURE VARIATIONS FOR ALL CLIMATIC ZONES IN THE SCENARIO (2020, 2015, and 2080)



Source: Ghana's second National Communication to the UNFCCC, 2011

GSZ – Guinea Savanna Zone, SSZ – Sudan Savanna Zone, TSZ – Forest-Savanna Transition Zone, DFZ – Deciduous Forest Zone, RFZ – Rain (Green) Forest Zone, CSZ – Coastal Savanna Zone

Over 2020; 2050 and 2080 time zones temperatures (minimum maximum and mean) were predicted based on the 1961 – 2000 observed temperatures. In Ghana, temperatures are generally expected to change by 0.6°C, 2.0°C and 3.9°C in 2020, 2050 and 2080 respectively. The hottest months in the year are still likely to be between February and May whereas between June and September temperature will be relatively low

2.6 THE INFORMAL SECTOR

In 1993, the fifteenth International Conference of Labour Statisticians (ICLS) adopted an international statistical definition of the informal sector; it defined the informal sector in terms of the characteristics of enterprises (production units) in which the activities take place, rather than in terms of the characteristics of the persons involved or of their jobs.

Production units of the informal sector were defined by the fifteenth ICLS as a subset of unincorporated enterprises owned by households, that is, production units which are not constituted as separate legal entities independently of the households or household members who own them. For such units no complete set of accounts (including balance sheets of assets and liabilities) are available which would permit a clear distinction of the production activities of the enterprise from the other activities of their owners.

In order to distinguish informal sector enterprises from other unincorporated enterprises owned by households, the fifteenth ICLS recommended using one or more of the following three criteria: (i) non-registration of the enterprise; (ii) small size in terms of employment; and (iii) non-registration of the employees of the enterprise. The first criterion refers to non-registration under specific forms of national legislation, such as factories or commercial acts, tax or social security laws, professional groups' regulatory or similar acts, laws or regulations established by national legislative bodies. The second criterion may be formulated in terms of the number of employees employed by the enterprise on a continuous basis, the number of all employees (including those employed on an occasional basis), or the total number of persons engaged during a specific reference period (including the entrepreneur, business partners and contributing family workers in addition to the employees). The third criterion refers to the conditions of employment in the informal sector regarding the employees' legal and social protection; it was defined in terms of the absence of employment or apprenticeship contracts which commit the employer to pay relevant taxes and social security contributions on behalf of the employees or which make the employment relationships subject to standard labour legislation. According to this criterion, an enterprise would be considered informal if none of its employees is registered (ILO, World Labour Report, 2000, p.194, box 10.1).

Fig 17 A TYPICAL PEANUT FARMS INTERCROPPED WITH MILLET IN NORTHERN GHANA



Source: Sod Based Cropping Systems in Ghana

The origin of the informal sector in Ghana's economy dates back to the very beginning of colonial capitalism in the then Gold Coast. Even at such an early stage an essential feature of labour in the informal sector was its heterogeneous character that provided for varieties of peasant proprietors and agricultural labourers, distribution agents, buyers, transport owners and employees, porters, repairers, etc. (Ninsin, 1991; Adu-Amankwah, 1999).

Throughout the decades, instead of disappearing as the modern economy expanded, the informal sector has actually grown in the rural and urban areas of Ghana. The size of Ghana's informal sector is placed at 80 per cent of the total labour force (Hormeku, 1998). The large scale retrenchment of labour as overriding consequences of structural adjustment in Ghana in the mid-1980s, coupled with the inability to provide employment for the emerging labour force has created a large pool of unemployed persons who have naturally gravitated towards the informal sector. According to

Nyameky (2009), the size of the informal sector employment in the 1980s was twice that of the formal sector. However, by the 1990s, informal sector employment had increased by five and half times that of the formal sector. Growing informality is partly explained by low educational attainment. About 31 percent of Ghanaians aged 15 years and above have never attended school. A total of 55.7 percent of Ghanaians have attained only basic education and 13.6 percent have attained secondary education or higher. Generally, Ghanaian men have higher educational attainment than women (GSS 2008). The inability of the formal private sector to generate jobs in their required quantities has also pushed many into the informal sector. As government continue to maintain a policy of net hiring freeze into the public sector, and private sector firms fold up or switch to importation due to unfair competition from foreign companies, the formal sector continues to lose grounds in terms of its share of total employment. In the absence of appropriate social protection mechanisms (e.g. unemployment benefit), informal activities have become survival strategies for many Ghanaians - old and young.

The informal sector in Ghana is made up of the proprietary of micro and small-scale enterprises. It consists of producers, wholesalers, retailers and consumers. There are also intermediary service providers along the value chain such as suppliers of raw materials to manufacturers on contractual basis. Informal sector workers are largely self-employed persons such as farmers, traders, food processors, artisans and craft-workers to mention but a few. The sector consists of varied activities. In rural Ghana, informal sector work mainly involves agriculture (75%) (GSS, 2008), fishing and fish processing, agro-based processing. In contrast, more urban workers (43%) are engaged in non-agricultural activities. Labour for rural agricultural activities is in the forms of family, casual/permanent, apprenticeship, communal and child labour. Permanent labour relations are common on plantations such as cocoa, oil palm, coconut and rubber produce (APADEP, 1998). Casual workers earn daily wages in performing activities such as land clearing, weeding, preparing moulds, planting, fertilizer and chemical application and harvesting. Again and in contrast to urban centers, labour is largely wage-based, either on piece rate or fixed daily/monthly wage. Child labour is also prevalent in both urban and rural areas.

A significant number of informal sector workers in Ghana are trapped in poverty as they do not earn enough to lift themselves and their families out of poverty. Linked to the high prevalence of

poverty among informal economy operators is the lack of access to productive resources, especially capital. It is estimated that between 80-90 percent of the population in developing countries have limited or no access to credit facilities beyond what is provided by family members, friends or informal money lenders.

Lack of skills and technology has affected the level of production among informal sector workers. They employ traditional and manual technologies of production and thus work longer hours but produce little. Informal sector workers are either ignorant about safety issues in their field of work or they simply cannot afford protective gadgets. Most workers in the sector are exposed to bad environmental and other hazardous conditions that constitute a threat to health and safety. Other decent work deficits in the informal sector in Ghana are lack of job security and social protection to include pension, maternity leave and paid sick leave, to mention but a few.

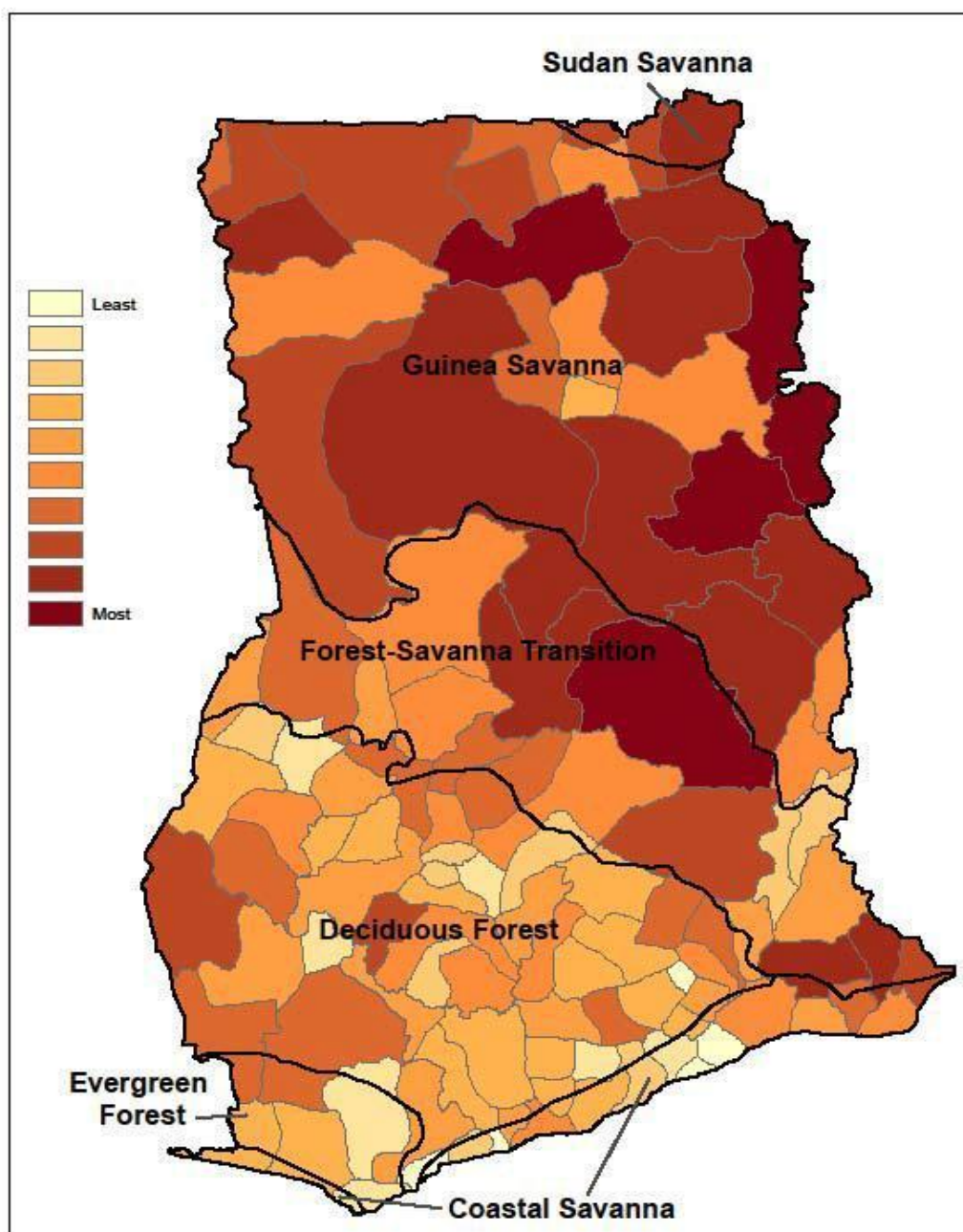
Informal sector workers escape the regulation of government and, as a consequence, suffer neglect of policy makers. Often times, informal sector workers are victims of policy interventions (e.g. city decongestion) initiated by local governments: District, Municipal and Metropolitan assemblies- as mostly seen in Accra and Kumasi metropolis. Their escape has also culminated in evasion of their civil responsibilities such as tax payment and other responsibilities associated with their work. For instance, many employers in the informal sector do not honour labour obligations set out in the Labour Act.

As a result of all the above challenges, the sector has received increasing attention in the labour and development discourse of Ghana. It has, in effect, been the target of some policy initiatives and activities by certain governmental and nongovernmental institutions and organizations, including the trade unions. Unfortunately however, not much progress has been made in transforming the sector by the government but also trade unions.

It is still widely accepted assumption that the informal sector is a transitory phenomenon and that it will be absorbed by the formal sector in time without the need for action by Trade Unions or the state. The experience of the last two decades however shows that this assumption of gradual formalization is unrealistic and only fosters dangerous complacency. Traditionally, trade unions have organized from formal sectors. Although some trade unions have in the last three decades been

organizing informal workers, very little has been attained especially in the agricultural sector.

Fig 18 SOCIAL VULNERABILITY TO CLIMATE CHANGE IN GHANA BY ECOLOGICAL ZONES



Source: Ghana climate change vulnerability and adaptation Assessment 2011

The Northern Region, Upper West and Upper East Regions are the most socially vulnerable. Road access, distance from drinking water and distance from a food market stand out as influential. Extremely high rate of illiteracy are also found in these Regions and they exhibit the highest dependency on agricultural employment making them the most vulnerable to climate change. (USAID, 2011)

Poverty makes households more vulnerable to climate change because poor households generally have fewer options and less capacity for adaptation. Over the past two decades, rural areas in Guinea and Sudan Savanna Ecological zones in Northern Ghana have constantly exhibited the highest incidence of poverty in Ghana. (USAID, 2011)

3 GENERAL PROPOSITIONS OF THE MEANS TO DEAL WITH CLIMATE CHANGE THAT COULD BE USED IN GHANA WITH SMALLHOLDER FARMERS IN MIND

This chapter looks at some experiences of other countries and civil society in dealing with the effects of climate change and general propositions of dealing with global warming in Ghana in a sustainable manner.

3.1 IMPORTANCE OF AGRICULTURE IN SUSTAINABLE DEVELOPMENT

Sustainable Development is development that meets the needs of the present without compromising the ability of the future generations to meet their own needs. (Brundland Report: 2007).

Sustainable Inclusive Development is one of the most pressing realities of the 21st century, especially in the developing world, where countries must struggle to meet the needs of increasing growth within the context of sustainable agricultural practices. Agriculture do not only contribute to the overall economic growth, but it also a key source of livelihood and often the entry point for how countries can and do manage their natural resources and the environment. Those engaged in agriculture are the custodians of economic growth, food security and sustainable development.

While much of the growth in agricultural production in other heavily agriculture-dependent economies in developing and middle-income countries in particular Brazil, China and South Africa, is a result of big commercial farming operations, African agricultural development has largely been accelerated by smallholder farmers. Small-scale farmers are responsible for more than 90 per cent of Africa's agricultural production (Ibid), and women make up 70 per cent of small-holder farmers in sub-Saharan Africa (IFAD, 2011).

3.2 THE AFRICAN CHALLENGE

The 21st century has seen renewed efforts to tackle Africa's development problems. Since 2008, there has been greater interest in investing in African agriculture, a sector that is the backbone of the majority of African economies (World Development Report 2008; AlertNet, 2011).

However, Africa's sustained development is often hampered by an unpredictable and unforgiving climate with 12 of the 15 most-at-risk countries being in Africa (Maplecroft, 2010). The close link between the changing climate and human security has increasingly become part of

the global discourse and Africa's climate story is largely defined by its dependence on rain-fed agriculture.

Risks to Africa's well-being is not purely economic, though, but also include the potential for the spread of diseases and escalating conflicts over increasingly limited and scarce resources, particularly water. Indeed, the volatile mix of food and water insecurity has already been linked to conflicts in Somalia, Ivory Coast and Burkina Faso.

Yet, Africa's adaptive capacity to climate change is itself constrained by widespread poverty, low human capacity, lack of appropriate technologies, poor infrastructure and susceptibility to high food prices. These factors put millions of Africans at great risk of poverty and hunger; limits the region's chances of achieving the Millennium Development Goals (MDGs), and indeed, increase the likelihood of mass emigration. Climate therefore, is one of the most pressing challenges on the social, political and economic agenda.

Sustaining food security will require intense efforts to increase productivity while shifting to low-carbon and zero waste mode of production. Climate-smart agricultural techniques offer the potential to substantially reduce emissions and increase carbon storage in the soil. For FAO, climate-smart agriculture delivers a critical 'win-win' situation, one that includes higher sustainable productivity, greater resilience, reduce greenhouse emissions (GHGs) and progress toward national food security and development goals (FAO, 2010). Through sustainable intensification, use of alternative crops and changes in farm management practices, African farmers could remain on the same land, enjoy increased yields, and contribute to mitigating climate change by reducing deforestation and the encroachment of agriculture into natural ecosystems (Bellassen, 2010).

Accordingly, Africa's political leadership at the highest level has stated its commitment to address the challenges of climate change. This is reflected in various decisions and resolutions of African Union (AU) Summits and Conferences of relevant Africa Ministerial bodies, most notably the African Ministerial Conference on the Environment (AMCEN), the Joint annual Meetings of the AU Conference of Ministers of Economic and Finance, and the Economic Commission for Africa (ECA), Conference of Ministers of Finance, Planning and Economic Development (ECA, 2010). Furthermore Pillar 1 of the Comprehensive Africa Agricultural

Development Programme (CAADP) advances the development of a framework on agricultural climate change Adaptation and Mitigation as part of the sustainable land and water use portfolio.

3.3 AGRICULTURE AND GREEN ECONOMY

A Green Economy is one that results in increased human well-being and social equity, while significantly reducing environmental risk and ecological scarcities (UNEP, 2011). Knowledge sharing is critical to supporting the three dimensions of sustainable development (social, economic and environment) and extension and advisory services are vital knowledge-sharing institutions.

Farmers are a key to Green Economy, they grow the crops to feed and clothe, and they manage the land, safeguard natural resources and help protect biodiversity. Growth in agriculture is at least twice more effective as reducing poverty than any other sector and it has one of the highest of mitigating carbon emissions.

Helping farmers share knowledge and access training and input they need to sustainably improve the quantity and quality and diversity of crops they grow must be our watchword. We must help them adapt to changing weather patterns, soil fertility and pest control. Farmers need better access to market, get supply and information in order to sell their surplus crops more reliably and affordably to further reduce waste. These facilities include local storage, communication and transport systems. These methods increase the money they earn and create more jobs. Farmers can use their income so derived from the sales of their produce to reinvest in their farms and pay for better education and healthcare for their families. When existing farms are more productive, natural habitat and the biodiversity they support can remain intact and forest can continue to capture carbon and decrease overall emission related to climate change.

Sustainable farming practices like conservation tillage also help prevent soil degradation and keep carbon in the soil; and technology like drip irrigation can also reduce the amount of water farmers use. Agro-forestry will preserve trees which give cover to the soil and thereby prevent soil erosion. Agriculture is essential to green economy; and the wise thing to do is to invest in agricultural research and create science-based policies that give farmers a wide range of options to choose from. Agriculture is capable and has the ability to create jobs to safeguard the environment.

The Rio Earth Summit in 1992 gave a vision of sustainability. The world has changed and the changes have become more complex with dramatic changes in the weather patterns - threatening food production to feed the ever increasing population of the world. To be able to succeed, therefore, the commission on sustainable agriculture and climate change made the following proposals which are worth examining:

- Integrating sustainable agriculture into National and Global Food Policies
- Harmonized forest and agriculture policies can boost food production, biodiversity and carbon stocks.
- Increase investment in sustainable agriculture by supporting scientific research which can help sustainable solution to reach more people.
- By sustainably intensify food production; we can minimize the environmental footprint of farming while increasing food production.
- Assisting the most vulnerable population and sectors involving women farmers in policymaking can improve the resilience of food production.
- Reshaping food access and consumption patterns to ensure nutritious diets.
- Reducing wastage in food systems by better storage and transportation can ensure that more food gets to the markets (CCAFS, 2012).

3.3.1 SYSTEM OF RICE INTENSIFICATION (SRI)

The System of Rice Intensification, known as SRI is a climate-smart agro-ecological methodology for increasing the productivity of irrigated rice by changing the management of plants, soil, water and nutrients. SRI originated in Madagascar in the 1980s and is based on the cropping principles of significantly reducing plant population, improving soil conditions and irrigation methods for root and plant development and improving crop establishment methods.

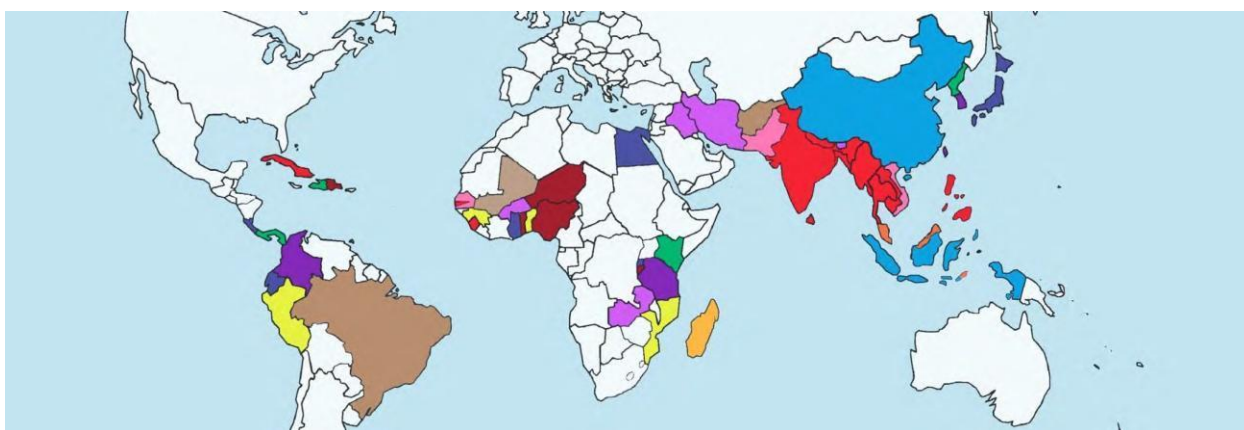
Farmers can adapt recommended SRI practices to respond to their agro-ecological and socio-economic conditions. Adaptations are often undertaken to accommodate changing weather patterns, soil conditions, labour availability, water control, access to organic inputs and the decision whether to practice fully organic agriculture or not.

In addition to irrigation rice, SRI principles have been applied to rain-fed rice and other crops such

as wheat, sugarcane and millet, showing increased productivity over current conventional planting practices. When SRI principles are adapted to other crops, we refer to it as the System of Crop Intensification or SCI.

SRI methods, as enumerated above, have been demonstrated in over 45 countries, 50% - 100% and showed more increased yield, up to 90 percent reduction in required seed and up to 50 percent water savings (SRI-Rice, 2010).

Fig 19 2012: SRI BENEFITS HAVE NOW BEEN SEEN IN OVER 50 COUNTRIES OF ASIA, AFRICA, AND LATIN AMERICA



Source: SRI International Network and Resources Center (SRI-Rice)

Before 1999: Madagascar

1999: China, Indonesia

2000-01: Bangladesh, Cuba, Laos, Cambodia, Gambia, India, Nepal, Myanmar, Philippines, Sierra Leone, Sri Lanka, Thailand

2002-03: Benin, Guinea, Moz., Peru

2004-05: Senegal, Pakistan, Vietnam

2006: Burkina Faso, Bhutan, Iran, Iraq,

Zambia

2007: Afghanistan, Brazil, Mali

2008: Rwanda, Costa Rica, Ecuador, Egypt, Ghana, Japan

2009: Malaysia, Timor Leste

2010: Kenya, DPRK, Panama, Haiti

2011: Colombia, Korea, Taiwan, Tanzania

2012: Burundi, Dominican Republic, Niger,

Nigeria, Togo

3.4 POLICIES ON CLIMATE CHANGE IN OTHER COUNTRIES/EXPERIENCE OF OTHER COUNTRIES

3.4.1 HOW CAN CIVIL SOCIETY NETWORKS MAKE A DIFFERENCE?

Climate change is happening now and is leading to a variety of impacts, including changing rainfall patterns, increases in the numbers of floods, droughts and storms, and slower onset changes such as rises in sea levels. This climate change pattern is affecting food security and water resources and leading to more disasters, especially amongst the world's poorest and most vulnerable communities. Governments at every level are responsible for helping communities respond to these changes; and yet governments often only take action when under pressure from civil society. Civil society has a key role to play, both with raising awareness about climate change at local and national levels and helping governments, donors and international organisations plan for a climate change constrained future, with specific emphasis on those who are most vulnerable to its impacts.

3.4.2 THE ETHIOPIAN CIVIL SOCIETY NETWORK ON CLIMATE CHANGE

The Ethiopian Civil Society Network on Climate Change is a loose network of Ethiopian Civil Society Organizations working on climate change. It was first conceived during a 2007 Green Forum meeting which held the first national conference on climate change. On behalf of eight European agencies, DanChurchAid, a Danish NGO, hosted a one-day-experience and information-sharing meeting with Ethiopian partner civil society organizations in the secretariat of the Network. The Network has six founding members (Forum for Environment, Action for Development, DanChurchAid, Poverty Action Network Ethiopia, SOS Sahel Ethiopia and Sustainable Land Use Forum). Currently, the Network has more than 60 civil society organization members. Its vision is to see an environment where the people of Ethiopia are enabled to cope with immediate and future impacts of climate change. To do this, it engages in the following four core areas of activity: (i) awareness raising and familiarization, (ii) networking, advocacy, lobbying, negotiation, (iii) research, publications and documentation, and (iv) capacity building beginning of November 2008. One outcome was the establishment of an advocacy working group which founded the National Climate Change Network of Civil Society Organizations.

3.4.3 LESSONS LEARNT ON CLIMATE CHANGE POLICY LOBBYING AND ADVOCACY WORK BY THE ZIMBABWE YOUTH NETWORK

Formed in 2009, the Zimbabwe climate change youth network is a coalition of voluntary youth organizations, institutions, development agents and individuals interested in working on climate change issues. The network acts as a platform for sharing climate change information (views, ideas and experiences) with a view to raising youth awareness on climate change and enhancing their participation in national, regional and international climate change agendas. Since its inception, the network has learnt many valuable lessons on policy lobbying and advocacy. The need for an information strategy has been a key lesson learned. This is required in order to:

Avoid duplication of efforts and information;

- Filter information so only what is relevant is passed on and shared;
- Develop a website displaying initiatives and actions;
- Develop a directory of Zimbabwean climate change organizations and networks;
- Develop an electronic newsletter to share highlights of network work and promote exchanges between networks; and,
- Develop a list-serve to act as a forum for regular news, debates, announcements about training and other activities.

The main risks and challenges identified by the network are as follows:

- The disconnect between capital-city-based policy NGOs and project implementing NGOs at the community level.
- Disenchantment with the climate agenda due to the slow progress of international negotiations and low prioritization of the issue by government.
- Poor co-operation between environmental and development NGOs and with social and grassroots movements.

3.4.4 SUSTAINABLE LIVELIHOODS-The Kam'mwamba Community Integrated Natural resource management and Use Project in Malawi

Background

This initiative focuses on a community of five villages in the Mwanza East District of Malawi. They are involved in a Community Based Natural Resource Management (CBNRM) project that generates income from Non-Timber Forestry Products (NTFPs). The project began in 1996, originally as an off-shoot of the 'Sustainable Management of Indigenous Forest project', implemented by The Wildlife Society of Malawi (WSM), and funded by The German Agency for Technical Corporation (GTZ).

The community had been experiencing heavy deforestation from both commercial exploitation and locals striving to earn a living to enhance their livelihoods. The area has about 3000 hectares of indigenous forest. The CBNRM project was therefore principally designed to respond to the problem of deforestation. The idea was to identify economic value in the indigenous forests, and devise mechanisms through which the community can benefit from such value. This would empower the community, enhance their livelihoods and at the same time create an incentive to conserve the forests. The economic value was identified to be in the harvesting and marketing of non-timber forest products.

The process leading to the identification of the project's activities and focus areas was participatory and involved members of the community who were mainly women. Although the community was clear on what it wanted to do, the project was preceded by extensive sensitization activities in the form of meetings, drama, and theatre on the significance of focusing on the harvesting and marketing of NTFPs. Institutionally, the community organized itself into Village Natural Resource Management Committees (VNRC) with the responsibility of coordinating natural resources activities.

Each of these villages is currently involved in activities such as bee-keeping, tree nurseries, bamboo furniture making, and production of briquettes (made from waste paper and crop refuse) as an alternative energy source, indigenous fruit-juice processing, and guinea-fowl rearing. These

activities provide the community with food, cash income, and renewable domestic energy. For each of these activities, WSM project staff helped the communities with startup funds and technical advice, using village-based workers, who also came from the same communities.

A livelihood is defined as comprising the capabilities, assets and activities required for a means of living. In order for it to be 'sustainable', it should be able to cope with and recover from external stresses and shocks, and maintain or enhance its capabilities and assets now and in the future (Chambers and Conway, 1992). The livelihood strategies adopted by the Kam'mwamba community within their CBNRM project fulfill the sustainable livelihood criteria.

4 TRADE UNIONS, ORGANIZED LABOUR AND THEIR PROPOSED ROLE IN MINIMISING THE EFFECTS OF GLOBAL WARMING ON SMALLHOLDER FARMERS IN GHANA

This chapter examines organized labour and the history of Trade Unions in Ghana, what they have done about the issue of climate change, what they are doing and some proposals of how they can influence policy to be relevant in an era of sustainable development and climate change.

4.1 THE HISTORY OF THE TRADE UNION CONGRESS (TUC) IN GHANA

Trade union origins in Ghana were borne out of two main factors, the reaction of workers to situations they consider to infringe on their rights and colonial labour policy. Popular grassroots organizations in reaction to perceived threats to workers' interests first gave impetus for workers to organize. Later efforts of the colonial government offered the environment for organizing union activities which were described then as haphazard and lacking structure (Arthiabah and Mbiah 1995; Obeng-Fosu 1999). The initiative that brought the TUC into existence has been credited to the Railway Union. When it was first formed, the Gold Coast Trade Union Congress as it was then called had a membership of 6,030, within fourteen (14) unions with its headquarters at Sekondi. Later events in the 1952 caused the creation of the Ghana Trades Union Congress by a group of unemployed. In 1953, however the two were merged to form the TUC as it is known today.

Political developments of Trade Unions in Ghana

The political developments at the time drew the TUC into the struggle for independence, creating a bond between the TUC and the post-independence government of Ghana (particularly the Convention People's Party—CPP). This bond laid the foundation for certain structures that still affect internal democracy of unions in Ghana. The early leadership of the TUC developed a strong link with the ruling party to the extent that the TUC was seen as the labour wing of the party. Some people in the leadership of the then union moved into high government positions such as Ministers of State and Ambassadors. Ready union support for government policy was assured.

The years 1957 to 1965 have been described as years of prosperity in terms of membership growth, guaranteed union dues and above all, peaceful industrial atmosphere. This was the result of gestures of appreciation on the part of the CPP government to the TUC for the contribution of workers to the

struggle that brought political independence to Ghana. The appreciation came in the form of legislation that gave legal backing to the right of labour to organize, payment of dues by the check-off system and gifts of infrastructure like the hall of trade unions in Accra. Union mergers under Industrial Relations Act 1958, the Union Shop Act (compulsory Union Membership) in 1960, and the check-off system provided a sound financial and structural base for the National Unions and the TUC. Trade union structure in Ghana has therefore been dictated by the state's conception of workers' role in national development and labour rights for organization, the beliefs of activists as a determining factor in shaping the course of trade unionism has been on the low side.

The check-off system introduced by legislation through the CPP government has contributed immensely to enhance union activities and reduce the need for unions to recruit in those areas that they are already organized. It has given the national unions and the TUC access to considerable funds to support their activities. Unions are spared the trouble of having to go after workers to collect dues and levies and organize workers in workplaces that are already registered. The check-off system promotes complacency on the part of leadership, since there is no need to organize fresh recruitment in workplaces where workers are already unionized

Analysts say that TUC/state alliance was unavoidable under the CPP because the party was considered a workers' party as a result of the socialist ideology it pursued and the earlier co-operation fostered between the CPP and TUC during the struggle for independence. The flip side of this association was the fate the TUC suffered when the CPP government was overthrown. The loss, in terms of assets, arrests, and detention as well as the breakdown of its entire structure of the union have been well documented by Adu-Amankwah (1990); Arthiabah and Mbiah (1995); as well as Obeng-Fosu (1999). Membership allegiance to leadership was put to the test and failed. There was no organised attempt to resist the military government's interference in trade union affairs. Membership of TUC had already been disillusioned by the increasing interference of the ruling party in TUC affairs.

Later events led to a divorce between TUC and the ruling governments but did not reduce state interest in TUC affairs. The factors that have dictated TUC/state relations over the years have been the industrial environment, which depended to a large extent on government's economic policies

and their effect on labour interests. TUC/state relations have taken three forms over the years; there were the early years of close association that brought prosperity to the unions later, years of hostility on the part of government to trade union influence on labour which have seen attempts to reduce that union power. The longest and closest association has already been discussed that with the CPP government, which produced positive gains, but at the same time set the tone for subsequent TUC/state relations that have been unsteady over the years. The last form is what operates at present, a neutral stand where TUC maintains its independence from government. The neutral stand was expected to keep it out state manipulation and remove the attraction to make it a target for control.

The initial period of crisis and hostile state relations with government is the first military coup that Ghana experienced in 1966. The most important point here is how vulnerable the TUC became and how it's close association with state created a cleavage between leadership and membership. The result was the loss of leadership contact with membership and in that a loss of membership solidarity and allegiance. The military regime of 1981 also saw the TUC as a possible source of opposition to its broadly populists policies and therefore became a target again. The TUC as since then has known no peace until 1983 when renewed TUC was in place with fresh leadership and slightly revised constitutions.

The years 1988-1990 has been described as the period when the TUC and the state both viewed each other with suspicion and unease. The tense relation between the state and the TUC was a result of the ultra-liberal economic policies adopted by government, which infringed substantially on workers' rights. It has become a TUC policy to stay out of politics, maintain neutral relations between it, and the state. Its neutrality is affirmed in its constitution that maintains that it remains independent of party politics, however the perception that it may also be aligned at certain times to political forces to influence policy cannot be ruled out.

4.2 AUTHORITY STRUCTURE OF TUC IN GHANA

The TUC co-ordinates the activities of its affiliated unions, gives guidance on labour matters and speaks on behalf of all labour in Ghana (Obeng-Fosu 1999). The TUC also provides delegates to the ILO and other international conferences and is responsible for providing representatives on a number of state Boards and Committees that deal with matters of concern to workers. In theory, it is

a powerful organization in practice it is a loose confederation of national unions, which derives its survival and existence to what the national unions make of it. It has no direct membership and few owe it direct allegiance.

Two main organs operate the TUC; it's political wing comprising elected officers and the administrative structure, the technocrats and others whose work gives support to the political section. The elected officers are drawn from the TUC membership; officers who head the specialized departments that make up the administrative wing are appointed from the larger world of job seekers. The political wing includes the governing bodies of the TUC from which authority to take decisions rests.

The authority structure of the TUC is multi-layered, spanning eight levels with each layer having distinct areas of authority. Membership in each layer is clearly defined; some of the layers though repeat membership. The eight-layered structure is composed of the District Councils of Labour (DCL), Regional Councils of Labour (RCL), the Executive Committee (EC), the Finance Board, the Steering Committee (SC), the Executive Board (EB), the Secretariat and the Quadrennial Delegates Congress (Congress) the highest decision making body of the TUC.

The allocation of duties and responsibilities within the TUC is determined by its constitution. Congress is the supreme authority of the TUC in the sense that no other body can reverse its decisions. The specialized departments of the TUC are an important part of the TUC structure. Even though they are only supposed to have administrative responsibilities, the practice of their duties gives them some amount of power. They produce the research reports that guide TUC decisions; the officers are members of the EB and the SC, significant bodies in the governing structures of the TUC. Thus whereas the membership on the SC excludes Regional Secretaries, and the EB, District Secretaries, the Heads of the specialized departments are members of these two bodies. Within the Constitution of the TUC, the Secretariat is placed higher than the RCLs and the DCLs.

Clearly the decision making within the TUC is top-down and highly bureaucratized and leaves little room for membership participation. The trend has been to increase the efficiency with which the TUC affairs are executed by expanding membership of top decision-making bodies, bringing and creating more decision-making structures. Efforts made to activate inactive layers and strengthen administrative structures that support the political wing of the TUC has since not yielded any

positive dividend. What remains is the creation of a link between districts and top layers of the TUC governing bodies.

4.2.1 GOVERNMENT-TRADE UNION RELATIONS AT THE NATIONAL LEVEL

Since the country returned to constitutional rule in 1992, Government-Labour relations have improved considerably. Even though the relations cannot be described as very genial, it is not adversarial. The trade union movement is invited to serve on several major policy making bodies including;

The National Tripartite Committee on Salaries and Wages Guidelines

The National Advisory Committee on Labour

The National Media Commission

The Public Utilities Regulatory Commission

Divestiture Implementation Committee

The Board of Social Security and National Insurance Trust

National Population Council

Narcotics Board

National Institutional Renewal Programme

The above represent formal relations that enable the trade union movement to bring its influence to bear on national/developmental issues. There exist also informal structures like a National Parliamentary Caucuses and other informal avenues for union leaders to interact with Government Officials.

The main bone of contention between the unions and government is in regard to the latter's handling of economic affairs, especially in the face of harsh economic measures the unions perceive to be the cause of the impoverishment of the vulnerable and poor in the society.

The National Climate Change Committee (NCCC) under whose guidance the Draft National Climate Change Policy was produced include the following organizations: Ministry of Environment, Science and Technology; Ministry of Finance and Economic Planning; National Development Planning Commission; Ministry of Food and Agriculture; Ministry of Foreign Affairs; Ministry of Energy; Energy Commission; Ministry of Health; Environmental Protection Agency; Forestry Commission; Centre for Scientific and Industrial Research - Forestry Research Institute of Ghana; Ghana Health Service; National Disaster Management Organization; Ghana Meteorological Services; Abantu for Development; ENAPT Centre, Conservation International Ghana; Friends of the Earth Ghana; the Dutch Embassy; the UK Department for International Development. The contribution and influence of TUC here is limited if not missing even though there is a pseudo-representation of TUC on the National Climate Change Committee tasked to come out with a policy document, National unions are yet to have climate change issues as part of their agenda. There is a disconnection between the representation at the National Climate Change Committee level, national Unions and workers in general.

4.2.2 ORGANISED LABOUR IN GHANA

Organized Labour had been working closely with its social partners – Government and Employers through the national tripartite structures to determine the national minimum wage. The social partners since 2006, worked assiduously to develop a new salary structure for public sector wages called Single Spine Salary Structure (SSSS), though with its associated problems of managing the expectations of the different public sector unions and their members.

Ghana joined the International Labour Organization in 1957 and immediately the Convention Peoples Party (CPP) Government ratified many of the ILO Conventions including the ‘core’ Conventions that guarantee workers the right and freedom to form or join unions (Convention No. 87), the right to collective bargaining (Convention No. 98), abolition of forced labour (Conventions Nos. 29 and 105), and equal treatment (Conventions Nos. 100 and 111). Many other ILO Conventions that sought to promote industrial harmony and welfare of workers were also ratified. These included Conventions on hours of work in industry, weekly rest, minimum wage fixing, labour inspection, underground work by women, employment service, night work by women, social policy, working environment, child labour, labour administration, and many others. Ghana has so

far ratified 46 ILO Conventions. (National Labour Law Profile, GH, ILO: 2011)

4.3 ECONOMIC TRANSFORMATION AND TRADE UNIONS

Between 1945 and 1970 referred to as “The Golden Age”, capitalism was regulated; state intervention was the order of the day while Keynesian policies were driving the economies of the world. The period was characterized by full employment, full-time employment, reasonable wages, increasing productivity and increasing wages, high level of unionization and centralized wage-bargaining systems

In recent years referred to as the neo-liberal era or free market economy as some may term it (1970-2008) with less state intervention, the world economic order has witnessed, among other things, high rate of unemployment, short-time work, underpaid workers, low level of unionization, more individualized process of wage-bargaining and wages do not keep up with increasing productivity

Trade unions are bound to respond to the changing times to be able to alleviate the plight of workers under increasingly disadvantaged position. As a result, labour finds itself amidst capital accumulation, competition; downsizing among others as well as global warming that has become a serious developmental issue in recent times that affects all workers directly or indirectly.

Studies on trade unions, especially those of the political economy approach, reiterate the importance of trade unions in arresting the excesses of globalization, such as the threat to the environment and increasing global poverty. They also underscore trade unions’ pivotal role in the search for alternative development strategies.

4.4 AVAILABILITY OF TRADE UNIONS BY INDUSTRY

To what extent are Trade Unions available to help mitigate the effect of Global Warming on the most vulnerable agricultural sector? In the promotion and organizing non-wage workers, GAWU has extended its activities to five rural communities in each of the ten Regions in the country based on a) easy access to the communities and between the communities and b) the interest in the issues the union advances. The limitations are obvious - a Union which has no vehicles at the regions to facilitate the movement of officers in charge, lack of human capacity and financial constraints – cannot benefit the communities envisaged.

Table11 AVAILABILITY OF TRADE UNIONS BY INDUSTRY IN GHANA

Industry	Signed written contract			
	Yes		No	
	Frequency	Percent	Frequency	Percent
Agriculture	59	31.1	131	68.9
Mining and Quarrying	35	64.8	19	35.2
Manufacturing	84	28.7	209	71.3
Utilities	15	75	5	25
Construction	8	66	113	93.4
Trade and Commerce	34	11.1	272	88.9
Transport, Communication & Storage	102	41.6	143	58.4
Finance and real Estate	17	54.8	14	45.2
Community, Social & Pension Serv.	438	51.2	417	48.8

Source: Computed from GLSS 5 (2005/2006). Data

The agricultural sector is one of the industrial sectors with the lowest coverage by Trade Unions.

Almost 70% of employment in the agricultural sector is not catered for by unions probably because most of them are found in the informal sector whose activities are not regulated, and lack incentives for Trade Unions to organize.

4.5 GENERAL AGRICULTURAL WORKERS' UNION (GAWU)

The General Agricultural Workers Union of Ghana TUC remains the main national trade union organization covering farmers and employees in agricultural establishments in Ghana. It is making great advances in the organization of both formal and informal economy workers and has three programme areas of work, namely,

- Rights in Work Programme (RIW) - Industrial Relation
- Rural Workers Organisation Programme (WROP)
- Policy Advocacy and Campaign Programme (PAC)

4.5.1 RIGHTS IN WORK PROGRAMME

The RIW programme area has the responsibility of monitoring the industrial relations trends in the labour front for the purpose of effectively addressing the needs of membership in the country. It also has the duty to monitor and enforce compliance of the Collective Bargaining Agreements (CBAs) that has been contracted with managements, among others.

4.5.2 RURAL WORKERS' ORGANISATION PROGRAMME

GAWU has been organizing workers informal economy since 1957. Activities in the programme area are mainly centered on the organization of rural people either at the community based level or according to socio-economic sector groups. It seeks to enhance the livelihood of millions of people engaged in the sector by employing necessary conditions that are socially, economically and environmentally sustainable. Thus RWOP is also keen on ensuring that workers in the informal economy are engaged in decent work and their fundamental rights are respected. RWOP also aims at promoting and facilitating the organization of non-wage agricultural and rural workers for purposes of advancing sustainable agriculture and rural development policies bearing in mind the current challenges of climate change and its effects on the rural population. This department has four main objectives that drive its operations;

- a) To promote/facilitate the organization of non-wage workers
- b) To promote non-farm economic activities
- c) To improve and facilitate more profitable market access for rural produce
- d) To identify policies that impede/militate against the pursuit of the above.

The importance GAWU places on the informal sector or small scale rural producers is geared towards deepening and developing the organisation of rural informal workers to appreciate, understand and accept Trade Unionism. In addition, GAWU's work with the informal economy workers will equip them with the appropriate skills to engage policy makers in order to improve on their living conditions. Currently the Union is continuing interactions with the market from the local through to the global level so as to ensure that rural people, especially those in deprived areas get access to markets to help break the cycle of poverty.

The national socio-economic climate however holds a number of challenges for the informal working people. ILO Convention 141 on the informal economy and precarious work has still not been ratified by Ghana hence neither the constitution nor the labour law covers the rural informal sector. Consequently the government policies on this sector have most often been based on the vision of ruling governments. In pursuance of the above Programmes the Union maintains a number of external relations (FNV, LO Norway, Action Aid among others).

4.5.3 GAWU'S EXPERIENCE IN THE INFORMAL ECONOMY

GAWU's membership profile changed from predominantly formal to informal from 1980, and by 2005 over 50% of its members were the rural self-employed. It was one of the national unions worst hit by adjustment-induced rationalization, restructuring, divestiture, and privatization. Its membership reduced by more than two-thirds from 130,000 in 1982 to 40,000 in 1997. Extension of union coverage to the rural self-employed was in response to informalization in rural plantation agriculture. The necessary constitutional amendments have now been effected to facilitate institutional representation for informal economy workers within union structures. GAWU's strategy has altered from performing purely collective bargaining for formal sector-based members to include representation, campaigning, and advocacy to pursue national policies and programs that will enhance the livelihoods of agricultural workers. GAWU, together with the GTUC, engaged in a legal battle to have government repeal a law that facilitated the dumping of cheap poultry and rice imports on the Ghanaian market to the detriment of local rice and poultry farmers, the majority of whom are informal economy workers. GAWU, however, remains caught in service provisioning like training and skills development, as well as savings and credit schemes. It is also involved in the promotion of group and pre-co-operative activities, provision of access to appropriate rural and agricultural technology, and community re-afforestation programs. These services are putting a strain on union finances and dampening group moral as GAWU's capacity to deliver becomes strained.

4.5.4 PROMOTION OF NON-FARM ECONOMIC ACTIVITIES

To serve as a means of keeping the Self Employed Rural Worker (SERW) unions together and to serve as a means of helping them to generate additional income to supplement the seasonal income from their farming activities, GAWU introduced a programme to support members to support skills

to help them establish non-farm economic activities. GAWU has organized between 2008 and 2011 five communities each of the ten administrative Regions in Ghana under the programme. Establishment of non-farm economic activities has taken off successfully in all communities. In two communities in the Brong-Ahafo region, they have started beekeeping for honey production. They are beginning to scale up the bee keeping activity – sometimes using savings from the group. The difficulty though is that, the union has limited resource to make real impact.

Fig 20 NON-FARM ACTIVITIES OF GAWU WITH RURAL FARMERS

Introducing farmers to grasscutter rearing with the supply of cages and seed animals in Ghana



Introducing rural farmers to beekeeping and snail farming in Ghana



Source: Rural non-farm activities of GAWU

The Union initiated a Revolving Loan Scheme (RLS) to support the development of identified economic activities and to mobilize local resources as a basis for accessing funds through the RLS, paying particular attention to the needs of women. Some communities are making considerable progress with the RLS.

4.5 POTENTIAL ROLE OF TRADE UNIONS

Trade Union movements have been significantly involved in lobbying for the rights at the UN level in relation to Environmentally Sustainable Development. Thirty two Trade Unions from Twelve countries participated in this process for the implementation of the Kyoto protocol at the conference of the UNFCCC held in November 2006.

The following climate change priorities were promoted by trade unions at cop12:

- I. Undertake research to establish climate change linkages to employment
- II. Establish climate change linkages to sustainable development
- III. Promote worker participation as a key determining sustainability of climate change policies
- IV. Recognize the workplace as a key field of action for climate change
- V. Consider technology options that strengthen social engagement by favouring sustainable and labour-intensive energy options.
- VI. Fashion a long term agreement for equitable sharing of the burden of emission reduction between developing and developed countries to extend beyond 2012

4.5.1 PROPOSITIONS

Ghana Trade Union Congress must as a matter of policy following from COP 12, direct all its members (National Unions) to make an effort to create a desk responsible for climate change; this will bring some level of responsibilities on the national unions to begin to put the issue in their scheme of things. In effect TUC should begin to develop its own climate change policy document following from the national draft policy document on climate change to guide the national unions.

Human resource capacity building within the union fraternity should be given a serious attention on environmental issues especially climate change, since this has become an important

developmental issue that Impact on all workers in all sectors directly or indirectly and if trade 84 unions will remain relevant and committed to their constituents in defending, protecting, promoting and the creation of jobs, they must be seen tall at the center of the debate on issues on climate change.

Trade unions must begin to create bigger social movements to press home sustainable policies that will positively affect the most vulnerable and most sensitive to climate change, the informal agricultural sector (smallholder farmers), that has very little representation or none at all and yet the most affected.

Trade unions must begin to look at sensitization/awareness drive as part of the responsibilities in disseminating relevant information to their target groups especially the informal agricultural sector where livelihoods, job losses, poverty and inclusive development are most critical and relevant. Advocacy and awareness building will also need to be matched with defined strategies to ensure that individual well-being, not just the macro-economy, remains the center of the debate and action. This will potentially place trade unions at the center of debates on environmental rights, justice and equity.

A livelihood is defined as comprising the capabilities, assets and activities required for a means of living and in order to be 'sustainable' it should be able to cope with and recover from external stresses and shocks and maintain or enhance its capabilities and assets now and in the future (Chambers and Conway, 1992). Trade Unions at the local level must identify projects within communities based on the circumstances of the community. The process must involve members of the community in the form of meetings, drama and theater on the significance of the project. Some projects that could be considered include bee-keeping, tree nurseries, grasscutter rearing, guinea-fowl rearing. These activities will provide food, cash income and renewable domestic energy for the communities.

Trade Unions should research or liaise with research institutions for appropriate adaptation and mitigation for the various ecological zones of Ghana. These research findings should be filtered and the relevant information passes on to the target groups. There should be corporation and collaboration with other relevant institutions that work in the same environment for example

Ministry of Food and Agriculture (extension) collaborating with General Agricultural Workers' Union to avoid duplication.

Trade Unions could push for the creation to a new agricultural ministry to purposely take charge of smallholder farmers while the other caters for the commercial aspect of agriculture including agribusiness. In an attempt to introduce technology and industrialize agriculture, the process could have a negative impact on smallholder farmers?

Trade unions could make a case for sustainable development models that are compatible with smallholder farmers in the face of climate variability to guarantee their livelihood and job security. System of Rice Intensification (SRI) and or System of Crop Intensification (SCI) could be expanded if already introduced to cover many more smallholder farmers with the collaboration of other stakeholders, donors and NGOs.

Trade Unions could put together workplace knowledge and put forward alternatives in the phase of climate variability, organize workers out of the phenomenon but at the same time defend wages because we are still in an era of capitalism.

CONCLUSION

Climate change poses direct challenge to small-scaled agricultural production and food security. With weather conditions becoming more extreme, some regions are seeing more intense rainfall and flooding while others experience more frequent drought. The agricultural sector, which employs 65% of Africa's labour force, is particularly vulnerable.

Climate variability have led to periods of severe drought, decline in crop production and livestock herds and severe food shortages experienced in the country especially in the early 1980s, and points to the potential future threats. The severe impact of climate change on the natural resources base and the sustainable livelihoods of rural communities can translate in increased poverty, job losses and limited economic development

In a climate change vulnerability and adaptation assessment on Ghana report in June 2011, Upper East, Upper West and Northern Regions have the overall highest social vulnerability to climate change. The Eastern portion of Brong Ahafo Region and the far Northern and Southern parts of the Volta Region also exhibit high social vulnerability to climate change. The Sudan Savanna, Guinea Savanna and the Forest Transition zone are the most vulnerable.

The greenhouse gases that are released through human activities contribute to the greenhouse effect that can result in a warming effect (as well as a cooling effect) on the global weather system. This increase in the earth's temperature has adverse impacts and these impacts will need to be managed and adapted to, both now and in the future, as the overall climate patterns shift and then change over the long-term. Though, developing countries like Ghana have not been necessarily responsible for the historical releases of GHGs, their experiences with various fluctuations as well as seemingly new patterns, suggest they are on the frontline of longer-term change. Inventories carried out in Ghana (1990 – 2006) covering Energy, Industrial Process, and Agriculture, Land use Change and Forestry and Waste, including these gases: CO₂, CH₄, N₂O, CF₄ and C₂F₆, show that; though Ghana's emissions are low compare to other countries, there is potential for the emissions to grow and peak across sectors. This could potentially change

Ghana's GHG profile and shift the argument regarding GHG contributions particularly if oil exploration becomes a significant sector of the Ghanaian economy. Although, for the time being,

Ghana will remain a historically minor contributor, the present and future context of a more carbon-intensive economy changing the nature of its climate equity discussions with emerging and developed economies. The energy sector continues to be the largest source of greenhouse emissions as at 2006 and it is predicted to dominate over time. However, emissions from land use change and forestry have significant impact on the national emissions especially through forest and grassland conversions. It also, to some extent, forces consideration of “balance” between the immediate returns of oil, the distribution of the returns in a fair and just way, particularly for those who are likely to bear the greater immediate and localized impacts on environmental quality.

For example, though currently carbon dioxide is the major greenhouse emissions in Ghana, methane is predicted to contribute significantly to the national greenhouse emissions in the coming years as a result of above-mentioned increased activities in the oil and gas industry.

Ghana is well positioned to start now to transform towards a broader mitigation and adaptation approach including the effective use of “brown investments” for broader green and inclusive sustainable development returns. Starting with the energy, forestry and agriculture sector would be a key along with others like waste management. A co-benefit based strategy, in defining key activities and strategies would be a clear priority, with employment being a pivotal economic, social and environmental focal point.

Urban districts appear to be less vulnerable than rural districts, probably because of relatively well developed infrastructure and opportunities for economic diversification. Investment that supports climate change adaptation in the most vulnerable ecological zones deserves attention.

The Northern sector of the country which stretches from part of Brong Ahafo, Northern Volta to Upper East and Upper West Regions could well be over 60 percent of the land surface of the country and experience one raining season in a year which last not more than 5 months. Increased warming in this part of the country will have overwhelming effect on agriculture employment, poverty, livelihood, and migration particularly for a larger part of the country. This part of the country has over 70 per cent of its active population engaged in agricultural employment and therefore changes in climate could also change water and energy needs as well as the types of seeds and crops which will be economically viable. All of these, in turn, will affect the number of jobs, the

seasonality of jobs, the skills required as well as wages on offer.

Employment opportunities could disappear or become significantly less reliable, and climate change will present a fundamental challenge to business as usual in the labour market as more workers are pushed into the informal economy.

Over 90% of the countries food production is derived from smallholder farmers with agricultural landholdings less than 3ha. An average of 72% of farmers in the three Northern Region and Brong Ahafo has landholdings less than 3ha and most vulnerable to any significant changes in water and soil quality.

Taking all of the above into consideration, designing projects or putting together list of measures to reduce the impact of climate change does not constitute adaptation by itself. A national policy response should be anticipatory, not reactive, and should be anchored in the country's framework of economic growth and sustainable development, and integrated with its poverty reduction strategies.

Trade unions, as an important policy actor, will increasingly need to engage in climate change issues by building the capacity of their members in the face of increasing climate variability. Adaptation to varying rainfall patterns as aquaponics (in which fish and plants grow together in one integrated, soil-less system), hydroponics (the cultivation of plants in nutrient solution rather than soil) and System of Rice Intensification could help position agricultural workers to adapt to new farming conditions and needs.

GAWU at the rural and local level could develop programmes and make a case for smallholder farmers in the phase of climate change with the support of the mother union (TUC), donor agencies in order to protect the livelihoods of this target group thereby reducing poverty and giving true meaning to inclusive development at the local level.

Key Policy pointers

In planning for adaptation for food and farming, institutions and policies must be directed in a circular manner to support systems for food, energy, waste and water in a holistic and integrated way to tackle poverty, ensure food security and enhance resilience to climate change and other environmental changes.

Policy makers must take into account traditional knowledge about seed varieties, crops, breeds of animals and land management to enhance adaptive management capabilities

Economic assessment should be more rounded in analysis including a wider array of cost implications for governments for implementation

To strengthen local organizations and federations, build on local knowledge and empower local people, a more joined-up policy making and institutional support across sectors is required.

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APPENDIX

OPERATIONAL DEFINITIONS

ADAPTATION

Adaptation refers to the adjustments in ecological, social or economic systems in response to actual or expected climate stimuli and their effects or impacts. It refers to changes in processes, practices and structures to moderate potential changes or to benefits from opportunities associated with climate change. (UNFCCC: 2012).

GENDER

Gender refers to the culturally based expectations of the roles and behaviours of males and females (Integrating gender into the World Bank's World: A strategy for action, World Bank, 2002)

GREEN GROWTH

Green Growth is a part of sustainable development that includes environment and environmental policy as sources of economic growth and welfare gains through innovation, efficiency, and resilience to shocks, job creation and poverty alleviation (World Bank concept note on Green Growth, 2011).

LIVELIHOOD

A livelihood is the capabilities, assets (material & social resources) and activities required for a means of living, and livelihood is sustainable when 'it can cope with and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base' (Department of International Development, 2004)

MITIGATION

Mitigation of climate change is defined as a human intervention to reduce the sources or enhance the sinks of Greenhouse Gases (UNFCCC).

POVERTY

“Poverty is the result of economic, political and social processes that interact with each other and exacerbate the deprivation in which poor people live” (World Development Report 2000/2001:

Attacking poverty, World Bank 2001).

SUSTAINABLE DEVELOPMENT

Sustainable development “meets the needs of the present without compromising the ability of the future generations to meet their own needs” (World Commission on the Environment and

Development, 1987).

VULNERABILITY

Vulnerability is defined as the degree to which a system is susceptible to or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate variation to which a system is exposed, its sensitivity and its adaptive capacity (UNFCCC).

SMALLHOLDER FARMERS

They are farmers with limited land availability, capital, fragmented holdings and limited access to inputs (PSIA: Asumeng-Brempong et al, 2004).