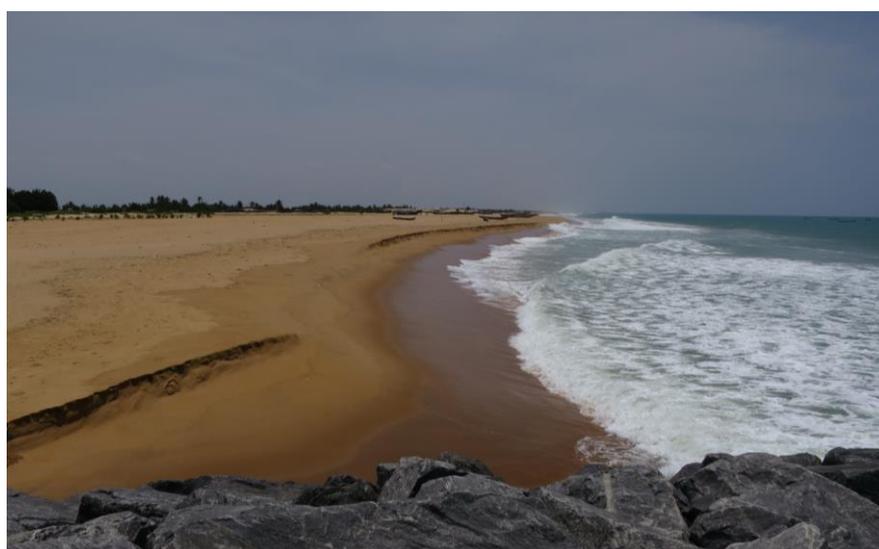




Review of Adaptation Related Policies in Ghana WT6.1.2



Authors: Adelina Mensah¹, Kirk Anderson¹, Winfred Nelson²

Affiliations:

¹ University of Ghana, Ghana

² National Development Planning Commission, Ghana



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About DECCMA Working Papers

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Titles in this series are intended to share initial findings and lessons from research studies commissioned by the program. Papers are intended to foster exchange and dialogue within science and policy circles concerned with climate change adaptation in vulnerability hotspots. As an interim output of the DECCMA project, they have not undergone an external review process. Opinions stated are those of the author(s) and do not necessarily reflect the policies or opinions of IDRC, DFID, or partners. Feedback is welcomed as a means to strengthen these works: some may later be revised for peer-reviewed publication.

Contact

Somnath Hazra

Email: somu.durg@gmail.com

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Acronyms

Name	Definition
CDKN	Climate and Development Knowledge Network
DECCMA	Deltas, Vulnerability and Climate Change: Migration and Adaptation
EPA	Environmental Protection Agency (previously named the Environmental Protection Council)
EPC	Environmental Protection Council
GDOs	Gender Desk Officers
GoG	Government of Ghana
GPRS	Ghana Poverty Reduction Strategy
G-RAP	Ghana Research and Advocacy Programme
GSGDA	Ghana Shared Growth and Development Agenda
GSS	Ghana Statistical Service
IPCC	Intergovernmental Panel on Climate Change
MDAs	Ministries, Departments, and Agencies
MEST	Ministry of Environment, Science and Technology (currently the Ministry of Environment, Science, Technology and Innovation - MESTI)
MLFM	Ministry of Lands, Forestry and Mines
MLGRD	Ministry of Local Government and Rural Development
MLNR	Ministry of Lands and Natural Resources
MMDA	Metropolitan, Municipal And District Assemblies
MoE	Ministry of Energy
MoFA	Ministry of Food and Agriculture
MoH	Ministry of Health
MoT	Ministry of Transport
MOWAC	Ministry of Women and Children's Affairs
MoWAC	Ministry of Women and Children's Affairs (currently Ministry of Gender, Children and Social Protection)
MGCSP	Ministry of Gender, Children and Social Protection
MWRWH	Ministry of Water Resources, Works and Housing
NaDMO	National Disaster Management Organisation
NCCAS	National Climate Change Adaptation Strategy
NCCP	National Climate Change Policy
ND-GAIN	Notre Dame Global Adaptation Index
NDPC	National Development Planning Commission
NGCP	National Gender and Children Policy
NPC	National Population Council
WRC	Water Resources Commission
WRM	Water Resource Management

Executive Summary

Ghana, as a signatory to international requirements of the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, has recognized the risks of global warming to its economy and has committed to take appropriate responsive actions through national policies and plans. In addition to its two key adaptation policy documents, National Climate Change Adaptation Strategy (NCCAS), 2012, and the National Climate Change Policy, 2014, there are a number of other national documents that provide complementary adaptive actions for prioritized sectors. This study provides a critical review of identified national policies and plans that are relevant for responding to climate change.

The review process first created a database of all key national actions that focus on development, resource development and cross-cutting issues, specifically policies/plans on climate change, disaster risk reduction, agriculture, fisheries, forestry, flood/flood risk management, water resources management, urban planning, rural development, poverty reduction and gender. This resulted in a total of 40 national adaptation policies and plans formulated by the Government of Ghana (GoG) through its Ministries, Departments, and Agencies (MDAs) in the past two decades.

The contents of each document in the database was then checked for the presence of specific key terms (i.e., adapt, cope, thrive, transform, adjust, risk, vulnerability or vulnerable, resilience or resilient, robust, bounce back, capacity) to determine the extent of adaptation in the policy. Only documents that contained any of the words (or variations of it) were qualified for further thematic analysis. The number of times the key terms appeared in the document, in reference to climatic stressors were also counted. Out of the 40 documents identified, 30 were relevant to climate change adaptation, with about 75 percent being adopted and implemented within the five-year period between 2010 and 2014. The most commonly occurring adaptation terms were *vulnerable/vulnerability* (associated with impacts on natural and social systems), *adapt* (with respect to developing resilience and capacity of natural and built infrastructure), and *resilient/resilience* (in the context of social groups, natural and built systems), each forming 39, 35 and 12 percent of total word counts, respectively. Policy themes that received the most attention were (i) rural development and poverty reduction, (ii) water resources, and (iii) agriculture.

Further thematic analysis of the evidence of adaptation in the policy documents, resulted in a total of 18 types of adaptation categories, which were grouped under the following five main categories:

1. *Improve quality and access to information*: Includes actions to improve access to and quality of information to support decision making at all levels of society; enhance the capacity of national and local institutions through training; and strengthen technological research in academic and research institutions, especially for agriculture, wildlife and forestry, water resources, and energy sectors.
2. *Increase resilience of both built and natural infrastructure*: To minimize impacts of climate change on key public infrastructures in coastal, urban and rural areas and protect the ecological integrity of natural systems, actions integrate climate resilience approaches through improved management and enforcement regulations.
3. *Improve water supply and quality*: With high dependence on groundwater and surface water resources, strategies focus on water conservation as well as improved management of resources to meet domestic, industrial, agricultural, and energy needs.

4. *Resilience of agricultural systems*: To ensure food security, approaches for resilient cropping and new crop varieties are the main focus, as well as improving the agriculture value chain through improved access to markets and management of post harvest loss.
5. *Social support for vulnerable groups*: To reduce the vulnerabilities of various social groups, proposed actions empower gender, improve social delivery service especially in health, provide livelihood diversification and transfer risks, and encourage financial support and incentive schemes.

Of specific concern to the DECCMA project are gender and migration components in national policies and plans. The survey indicated that gender equity continues to gain momentum at the national level, with 12 of the documents incorporating gender as key considerations. The National Climate Change Policy (2014) and the Ghana Shared Growth and Development II (2014) especially provided more inclusive discourses for the implementation of gender appropriate interventions, gender equity and monitoring actions, and evaluation methods from a gender perspective. Migration, however, with the exception of the NCCP which recognizes its importance as a livelihood and development strategy, had no other mentions in the remaining policies with regards to adaptation.

The review reveals that the most comprehensive of national actions for adaptation are detailed in the National Climate Change Policy (2014) and its draft Policy Action Programme for Implementation (2015-2020) which details plans of action, responsibilities and timelines for mainstreaming and implementation of prioritized programmes for adaptation, mitigation and social development. Developed through an extensive participatory process, the documents aim to properly coordinate prioritized options in order to minimize fragmentation and conflicting actions. Being relatively recent, there are still inherent challenges such as inadequate institutional capacity and climate financing, which will influence the effectiveness of implementation at the community level. However, there are a number of opportunities such as the decentralised system and mainstreaming of adaptation into annual budget cycles of collaborating institutions, in addition to increasing support from development partners operating at the sub national levels and the private sector.

The policy review has clearly highlighted the importance of improved quality and access to information, which has critical implications for stakeholders who need to make evidence based decisions. The reviewed adaptation options were mainly generic in nature, some of which may be more appropriate in one ecological area but not another. DECCMA can, therefore, contribute to national and local decision making processes for deltaic and coastal ecological by providing relevant research findings to appropriate stakeholders in a timely manner, while incorporating the role of traditional knowledge in supporting the uptake process.

1. Introduction

Aim of the report

The economy of Ghana is highly reliant on climate sensitive sectors such as agriculture, energy and forestry. In the past decades, there has been increasing awareness of the impacts of a changing and variable climate and the need for adaptation measures by policy and decision makers at all governance levels. Climate change adaptation has, become an integral component of the Government of Ghana's climate policy agenda and being integrated into a number of development policies, plans and programmes. These policies not only meet international commitments to provide a targeted approach for decreasing vulnerability and increasing resilience of communities and position the country for accessing funds in meeting national adaptation needs, but also provide opportunities for awareness creation for all stakeholders.

This adaptation policy report is based on a systematic review of the spectrum of climate change related national adaptation policies and plans in Ghana that are especially relevant for the Volta delta , the focus of the five-year *Deltas, Vulnerability and Climate Change: Migration and Adaptation* (DECCMA) project. The project is being implemented by a consortium of five countries with research in three deltas of Africa and Asia - the Volta basin in Ghana, the Ganges-Brahmaputra delta in Bangladesh/India and the Mahanadi in India. The overall objective of the project is to examine the vulnerability and adaptation options of communities in deltas under a changing and variable climate and assess the dynamics of migration as a potential response, in order to deliver policy support for effective adaptation.

This policy report will support the results from an earlier report on adaptation options in the Volta delta, a desk-based survey of documented records on current or observed adaptation options by communities or individuals, specifically in the Lower Volta, to the impacts of climate change. The policy results will allow for comparison of policy choices and adaption options across the three DECCMA deltas.

Relevance of Climate Change Adaptation Policy in the Delta

In Ghana, the impacts of climate change and variability, including increasing temperature, more variable rainfall and sea level rise, are already evident. Data from 1960 to 1990 show that the mean annual temperature for the country increased by 1°C, with 20% reduction in rainfall that was variable and not consistent enough to project long-term trends (McSweeney et al, 2010). Temperatures are projected to increase by 2.5°C in most regions (up to 3°C in the northern Savannah) with uncertain rainfall patterns in some zones and decreases in others (USAID, 2011). Along the coastal zone, a 2.1 mm per year rise in sea level has also been observed, with projections of up to 34.5 cm by 2080. Vulnerability assessments show that communities that live in drought and flood prone areas, especially informal settlements and eroding coastal areas, face the greatest threats from climate change (MEST, 2012).

Based on its performance on the University of Notre Dame Global Adaptation Index (ND-GAIN), Ghana is considered to have a moderate level of vulnerability to and preparedness for climate change (ND-GAIN, 2015). However, the impacts of climate change will vary across diverse geographical and ecological regions, with differing vulnerabilities and adaptive capacities of physical elements (e.g., infrastructure) and socio-economic elements (e.g., communities). The low-lying

deltaic ecosystem Volta Basin especially, has a wide diversity of terrestrial, freshwater, brackish water and marine habitats, including mangroves ecosystems that support a rich biodiversity and provide food, water and livelihood security to many local communities. With high dependence on natural resources, communities are increasingly vulnerable to the combination of climate change and variability, and existing challenges such as eco-hydrological changes following the creation of the Akosombo and Kpong dams that were constructed for hydro-electricity on the Volta River in the early 1960s, increasing ecological degradation, and high levels of poverty (Heller and Zavaleta, 2009).

The country has two key national adaptation policy documents that recognize the need for action at all levels of the government, from national to local. These are the National Climate Change Adaptation Strategy (NCCAS), presented in 2012 for the period 2010 to 2020, and the National Climate Change Policy, launched in 2014 for the period 2015-2020. With lead implementation by the Ministry of Environment, Science, Technology and Innovation (MESTI) and support from the National Climate Change Committee, the NCCAS is being jointly implemented by the United Nations Environment Program (UNEP) and the United Nations Development Program (UNDP). The five main objectives of the NCCAS are to: (i) improve society's awareness of and preparedness for future climate change; (ii) mainstream climate change into national development to reduce climate risks; (iii) increase the robustness of infrastructure development and long-term investments; (iv) increase the flexibility and resilience of vulnerable ecological and social systems to enhance their adaptive capacity; and (v) foster competitiveness and promoting technological innovation. These objectives are to be achieved through interventions in areas of livelihoods, energy, agriculture, health, early warning, fisheries management, land use and water (Box 1).

The NCCP is the result of a participatory and validation process that began with the National Climate Change Policy Framework (a discussion document). A series of interactions with a wide range of stakeholder groups including academia and researchers, members of parliament, private sector and donors, civil society and non-governmental organisations, traditional leaders, local government, etc., restructured the framework document and resulted in a comprehensive document that complements all other all national efforts for addressing climate change. The process ensured that the ten identified priority focus areas (Box 2) encompassed the critical sectors of the country in a comprehensive way. The NCCP is a three-part document: the NCCP (2014), which presents the analyses of the current national situation and provides the broad policy vision and its objectives; NCCP II (Ghana National Climate Change Policy Action Programme for Implementation: 2015-2020), an implementation plan scheduled to be launched in 2016, which sets out the specific objectives, actions and strategies as well as estimated timelines and budget for implementation of the identified programmes for achieving policy objectives; and the NCCP III, which will detail how climate programmes and actions can be mainstreamed and embedded into annual work plans of implementing units.

Both national documents describe prioritized interventions for adaptation, where individuals and communities can reduce their vulnerabilities, increase resilience and strengthen coping mechanisms. However, there are a number of other national policies and plans that also provide complementary actions in specific sectors or focus areas of concern. This study provides a critical review of existing national policies in order to identify the information gaps and the important adaptation components that are relevant for the communities and ecological systems of the Volta basin.

Box 1: The National Climate Change Adaptation Strategy (NCCAS)

The goal of the NCCAS is “to enhance Ghana’s current and future development to climate change impacts by strengthening its adaptive capacity and building resilience of the society and ecosystems”. Its main objectives are to improve societal awareness and preparedness for climate change, enhance the mainstreaming of climate change into national development planning. The NCCAS has 10 priority programmes for climate change adaptation and integration into national development:

1. Increasing resilience to climate change impacts: identifying and enhancing early warning systems
2. Alternative livelihoods: minimizing impacts of climate change for the poor and vulnerable
3. Enhance national capacity to adapt to climate change through improved land use management
4. Adapting to climate change through enhanced research and awareness creation
5. Development and implementation of environmental sanitation strategies to adapt to climate change
6. Managing water resources as climate change adaptation to enhance productivity and livelihoods
7. Minimizing climate change impacts on socio-economic development through agricultural diversification
8. Minimizing climate change impacts human health through improved access to healthcare
9. Demand- and supply-side measures for adapting the national energy system to impacts of climate change
10. Adaptation to climate change: sustaining livelihoods through enhanced fisheries resource management

Box 2: The National Climate Change Policy (NCCP)

The National Climate Change Policy is Ghana’s integrated response to climate change with the vision to ensure a climate-resilient and climate-compatible economy while achieving sustainable development through equitable low-carbon economic growth for Ghana. It establishes the fundamental principles and actions required to address climate change in the immediate and long term based on seven systemic pillars: (i) governance and coordination (ii) capacity-building (iii) science, technology and innovation (iv) finance (v) international cooperation (vi) information, communication and education, and (vii) monitoring and reporting. The NCCP has five (5) main Policy priority Areas, which have been subdivided to form a total of ten (10) Programme Areas:

1. Agriculture and Food Security
 - i. Develop climate-resilient agriculture and food security systems
2. Disaster Preparedness and Response
 - ii. Build climate-resilient infrastructure
 - iii. Increase resilience of vulnerable communities to climate-related risks
3. Natural Resource Management
 - iv. Increase carbon sinks
 - v. Improve management and resilience of terrestrial, aquatic and marine ecosystems
4. Equitable Social Development
 - vi. Address the impact of climate change on human health
 - vii. Minimize the impact of climate change on access to water and sanitation
 - viii. Address gender issues in climate change
 - ix. Address climate change and migration
5. Energy, Industrial and Infrastructural Development
 - x. Minimize greenhouse gas emissions

Importance of Gender in Policy

Due to their unique roles and responsibilities in society, women and men contribute to, are affected by and react to climate change and variability in different ways. Women are particularly affected as a result of cultural social inequalities that result in unequal access to natural resources, inability to own land, limited roles in the decision making process, and inadequate access to education and information (AAP, 2011). In the rural communities, low income women, female-headed households, the elderly and young children tend to be relatively more vulnerable with limited capacities in coping with and adapting to the impacts of climate change (Mensah-Kutin, 2010). Women also tend to be more reliant on natural resources, the availability of which will fluctuate in a changing climate. This can add to women's workloads where gender roles ascribe them the responsibility to fetch water, collect fuel wood, and agricultural production processes. With the increasing rate of seasonal or permanent labour migration of men to other areas during poor environmental conditions (which occurs in many parts of Ghana), as well as changing societal norms, women are gaining more responsibilities in agricultural production. Together, this is adding to women's workloads and changing the nature of gender relations. The mainstreaming of gender into adaptation policies and plans, which also encourages effective participation at all levels, will therefore contribute to the success and sustainability of the proposed actions.

A key national action that aims to increase the decision making-capacity and control of assets and benefits by women and children in Ghana is the National Gender and Children Policy (NGCP), launched in 2004. The NGCP has the overall objective of mainstreaming gender concerns in the national development process for improving the social, legal/civic, economic and cultural conditions of the people of Ghana. It emphasizes Government's commitment to gender responsive development intended to ensure women and children in particular become the critical beneficiaries of all development plans and programmes (Box 3). More recently, the National Gender Policy was validated in early 2015 with plans to be launched by the end of the year. It articulates issues from gender perspectives, ensuring that women and men, girls and boys as well as the vulnerable, the marginalized and persons living with disabilities participate and have a voice and decision-making power in governance processes. The policy is the result of several assessments and consultations including an institutional assessment sponsored by the United Nations Population Fund (UNFPA) and a national review of the country's performance in the sector of gender equality and women's empowerment.

There are a number of sectoral policies that incorporate gender issues, for example, the Gender and Water Resources Management Strategy (2011) mainstreams gender issues in water resource management (WRM), specifically to (i) build and strengthen capacities (ii) integrate gender issues in WRM regulations and operations (iii) strengthen gender equity administration and management (iv) support and sustain gender responsive praxis, and (v) develop and implement a gender monitoring and evaluation system. The National Irrigation Development Policy (2011) also emphasises gender mainstreaming through all project cycles. Specifically, the policy reiterates the need to a) address land tenure problems with respect to women b) ensure equitable access to irrigation services by women, and c) ensure full participation in cooperatives and leadership activities by women and disadvantaged groups. Other plans, such as the Food and Agriculture Sector Development Policy II (2007) and the Tree Crops Policy (2013), also integrate gender in its extension programming to ensure relevance of information and equitable access to services by both men and women.

Box 3: Strategies in the National Gender and Children Policy (2004)

1. Gender Concerns

- i. Ensuring women responsive development planning at all levels- National, Regional, Districts, Area Council, and Unit Committees.
- ii. Sensitization on gender issues at all levels.
- iii. Promoting a Gender and Development (GAD) approach that is based on the understanding of gender roles and social relations of women and men as well as the Women in Development (WID) approach which focuses on women specifically.
- iv. Ensuring the dissemination, translation, and implementation of the gender policy in all sections of the Ghanaian society.
- v. Promoting appropriate education, sensitization and creation of awareness on the responsibility of all concerned parties in each sector to address the specific gender concerns within the sector. This should entail consultation with both women and men in specific areas of relevance to identification of gender concerns.
- vi. Promoting and carrying out research into gender related concerns.
- vii. Advocating for gender equality at all levels.
- viii. Promoting a gender sensitive approach to technical co-operation among the various actors in the development arena.
- ix. Establishing effective mechanisms to monitor and evaluate gender issues.

2. Child-Related Issues

- i. Ensuring child development planning at all levels.
- ii. Provision of appropriate policy guidelines to improve the quality of life of children.
- iii. Sensitization on children's issues at all levels to ensure survival, protection and development of children.
- iv. Promoting and carrying out research into child-related concerns.
- v. Establishing gender and children responsive monitoring and evaluation mechanisms for development.
- vi. Establishing effective mechanisms to monitor and evaluate child issues.
- vii. Advocate for the consideration of the best interest of the child in all issues affecting the child.
- viii. Strengthening the capacities of personnel who work in child related areas in an integrated manner to handle child-related issues efficiently.

Outline of the report

Following the introduction and the context of the policy report, there are three major sections outlined as follows:

- Section 2 describes the methodology used in gathering the data
- Section 3 discusses the main findings from the inventory based on key emerging themes as identified in the sectors considered
- Section 4 provides the synthesis and summary of important components of adaptation between sectors in the delta, key knowledge gaps and needs, as well as opportunities for policy development.

2. Methodology

The assessment was carried out according to the guidelines¹ developed by DECCMA Work Package 6 team to ensure consistency of approach across the deltas. In the context of the DECCMA project, a *policy* is defined as a general guidance for addressing public concerns and a *plan* as an outline of how

¹ Suckall, N, and Tompkins, E. L. (2014) Protocol on how to create comparable evaluations of adaptation policy in the four country deltas (WT 6.1.2), DECCMA Working Paper

to achieve policy goals in practice. The analysis of climate change adaptation policies and plans was mainly based on documents obtained from the internet and personal databases of the authors. The methodology consisted of the following four steps:

1. **Identification of climate adaptation relevant policies:** Policies in areas of sectoral development (e.g., agriculture), resources development (water resources management) and cross cutting issues (e.g., gender) were reviewed for the following elements: climate change, disaster risk reduction, agriculture, fisheries, forestry, flood/flood risk management, water resources management, urban planning, rural development, poverty reduction and gender.
2. **Creation of a database of climate change adaptation relevant policies:** For each of the identified policies, a database was developed to allow for comparison between the deltas. This included information on the name of the document, the implementing agency, the date the policy was created, the period it would cover and the available format of the policy.
3. **Content analysis to determine the extent of adaptation in the policies:** Specific terms were used to search for mentions of climate change adaptation in the policy documents (adapt, cope, thrive, transform, adjust, risk, vulnerability or vulnerable, resilience or resilient, robust, bounce back, capacity) in relation to one or more stressors². For each of these terms, the number of times it appeared in the document was recorded. Documents that did not include any of the key words were not considered for the next step.
4. **Thematic analysis to assess the evidence of adaptation in the policy document:** Based only on documents identified in the previous activities, the types of adaptation were defined with detailed descriptions provided.

3. Data and Analysis

Discussion of policy documents

The survey shows that the Government of Ghana (GoG) through its Ministry, Departments, and Agencies (MDAs) has implemented 40 climate adaptation relevant policies and plans towards national development and environmental sustainability (Table 1). Overall, the thematic areas that received relatively more attention, based on the number of national policies/plans under each thematic category, are (i) rural development and poverty reduction (with 10 mentions), (ii) water resources (with 7 mentions), and (iii) agriculture (with 5 mentions). The remaining thematic areas had four mentions each for climate change, forestry, and urban planning, three mentions for gender, and one mention each for disaster risk reduction, fisheries and energy.

Based on the prescribed key adaptation search terms in relation to various stressors, 30 out of the 40 policies/plans were considered to be relevant for climate change adaptation (Table 2). More than 75 percent of the policies/plans were adopted and implemented within the five year period from 2010 to 2014, with earlier policies mainly based on environmentally related issues (National Environmental Action Plan, 1988; National Soil Fertility Action Plan, 1998; Wildlife Division Policy on Collaborative Community, 2000; Water Policy, 2007), development (Land Policy, 1999; Ghana Poverty Reduction Strategies I and II, 2003, 2005) and agriculture (Food and Agriculture Sector Development Policy II, 2002).

² Stressors such as Climate, Weather, Variability, Hazard, Floods, Drought, Sea-level rise, Salinization, Cyclones

Table 1: Key policies and plans under DECCMA suggested thematic areas for Ghana

#	Policies under thematic areas	Climate relevant*	Implementing Institution
	<i>Climate Change</i>		
1	National Climate Change Policy, 2014	Yes	Ministry of Environment, Science and Technology (MESTI)
2	National Climate Change Adaptation Strategy, 2012	Yes	MESTI
3	National Environmental Policy, 2012	Yes	MESTI
4	National Environmental Action Plan, 1988	Yes	Environmental Protection Council
	<i>Disaster Risk Reduction</i>		
5	National Action Programme to Combat Drought and Desertification, 2002	Yes	Environmental Protection Agency
	<i>Agriculture</i>		
6	National Irrigation Development Policy , 2011	Yes	Ministry of Food and Agriculture (MoFA)
7	Food and Agriculture Sector Development Policy II, 2007	Yes	MoFA
8	Tree crops policy, 2013	Yes	MoFA
9	Medium Term Agriculture Sector Investment Plan, 2011	No	MoFA
10	National Soil Fertility Action Plan, 1998	No	MoFA
	<i>Fisheries</i>		
11	Fisheries and Aquaculture Sector Development Plan, 2011	Yes	Ministry of Fisheries and Aquaculture Development
	<i>Forestry</i>		
12	National Wildfire Management Policy, 2011	Yes	Ministry of Lands and Natural Resources (MLNR)
13	Forestry and Wildlife Policy, 2012	Yes	MLNR
14	Ghana Forest Plantation Strategy, 2014	Yes	Forestry Commission
15	Wildlife Division Policy on Collaborative Community Based Wildlife Management, 2000	Yes	Wildlife Division
	<i>Water Resources Management</i>		
16	National Environmental Sanitation Strategy and Action Plan, 2010	Yes	Ministry of Local Government and Rural Development (MLGRD)
17	National Environmental Sanitation Policy , 2010	Yes	MLGRD
18	Water Policy, 2007	Yes	Ministry of Water Resources, Works and Housing (MWRWH)

#	Policies under thematic areas	Climate relevant*	Implementing Institution
19	Riparian Buffer Zone policy, 2014	Yes	MWRWH
20	Gender and Water Resources Management Strategy, 2011	Yes	Water Resources Commission (WRC)
21	Groundwater Management Strategy, 2011	Yes	WRC
22	National Integrated Water Resources Management (IWRM) Plan, 2012	Yes	WRC
	<i>Urban Planning</i>		
23	Land Policy, 1999	Yes	MLNR
24	National Transport Policy, 2008	No	Ministry of Transport
25	National Urban Policy, 2012	Yes	MLGRD
26	National Urban Policy Action Plan, 2012	Yes	MLGRD
	<i>Rural Development and Poverty Reduction</i>		
27	National Decentralisation Policy, 2010	No	MLGRD
28	National Decentralisation Policy Action Plan, 2010	No	MLGRD
29	Energy Sector Strategy and Development Plan, 2010	Yes	Ministry of Energy (MoE)
30	National Population Policy , 1994	No	National Population Council
31	Traditional Medicine Development Policy, 2005	No	Ministry of Health (MoH)
32	Ghana Poverty Reduction Strategy (GPRS I), 2003	Yes	National Development Planning Commission (NDPC)
33	Growth and Poverty Reduction Strategy (GPRS II), 2005	Yes	NDPC
34	Ghana Shared Growth and Development Agenda I, 2010	Yes	NDPC
35	Ghana Shared Growth and Development Agenda II, 2014	Yes	NDPC
36	The Coordinated Programme of Economic and Social Development Policies, 2014	Yes	NDPC
	<i>Gender</i>		
37	National Gender and Children Policy, 2004	No	Ministry of Women and Children's Affairs
38	Health Sector Gender Policy, 2009	No	MoH
39	National Health Policy, 2007	No	MoH
	<i>Energy</i>		
40	National Energy Policy, 2010	Yes	MoE

*based on the key search terms provided in the methodology

Table 2 Timeline of relevant policies/plans for climate change adaptation

#	Policy/Plan	Year
1	National Environmental Action Plan	1988
2	Land Policy	1999
3	Wildlife Division Policy on Collaborative Community Based Wildlife Management	2000
4	National Action Programme to Combat Drought and Desertification	2002
5	Ghana Poverty Reduction Strategy (GPRS I)	2003
6	Growth and Poverty Reduction Strategy (GPRS II)	2005
7	Food and Agriculture Sector Development Policy II	2007
8	Water Policy	2007
9	National Environmental Sanitation Strategy and Action Plan	2010
10	National Environmental Sanitation Policy	2010
11	Energy Sector Strategy and Development Plan	2010
12	Ghana Shared Growth and Development Agenda I	2010
13	National Energy Policy	2010
14	National Irrigation Development Policy	2011
15	Medium Term Agriculture Sector Investment Plan	2011
16	Fisheries and Aquaculture Sector Development Plan	2011
17	National Wildfire Management Policy	2011
18	Gender and Water Resources Management Strategy	2011
19	Groundwater Management Strategy	2011
20	Forestry and Wildlife Policy	2012
21	National Integrated Water Resources Management (IWRM) Plan	2012
22	National Urban Policy	2012
23	National Urban Policy Action Plan	2012
24	National Climate Change Policy	2012
25	National Climate Change Adaptation Strategy	2012
26	Tree Crops Policy	2013
27	Ghana Forest Plantation Strategy	2014
28	Riparian Buffer Zone policy	2014
29	Ghana Shared Growth and Development Agenda II	2014
30	The Coordinated Programme of Economic and Social Development Policies	2014

Content analysis

For the 30 national policies/plans that were climate relevant, the most common term used to describe adaptation responses to climate change is *vulnerability/vulnerable* with total counts of over 513 (39%), followed by *adapt* (35%) and *resilience/resilient* (12%) (Table 3). The remaining terms were relatively infrequent and the key words *capacity* and *bounce back*, were not encountered at all.

The highest counts of the term *vulnerability/vulnerable* were found in the national actions for climate change (i.e., National Climate Change Policy, 2014, and National Climate Change Adaptation Strategy, 2012) and poverty reduction (Ghana Poverty Reduction Strategies I and II, and the Ghana Shared Growth and Development Agenda I). The term is generally associated with climate change impacts on the natural and social systems (e.g. flooding, coastal erosion, and infrastructure) and agriculture and food systems (e.g. increasing temperatures, drought, and bush fires). It was often

associated with response strategies aimed at reducing the risks of climate change and extreme events, for example, by providing alternative livelihoods, increasing adaptive capacity or building the resilience of social and natural systems. It was used in association with the need to mainstream gender into climate change adaptation (e.g. the Tree Crops Policy, 2013), in addition to smallholder farmers and rainfall variability.

Adapt was generally used with respect to developing resilience and building capacity of both natural ecosystems and infrastructure to withstand the impacts of climate change in agriculture (e.g. rain harvesting, storage of grains), energy and infrastructure sectors. It was associated with social groups' mitigation of climate change, adaptation strategies to minimize present and future impacts from climate variability and change, as well as building adaptive capacity through measures such as improved land use management and sustainable livelihood use of water.

Resilience/Resilient occurs in the context of vulnerable groups, natural ecosystems, human health, infrastructure, biodiversity, and urban planning. The term was also associated with the need to improve the resilience of adaptation programming (e.g. techniques in the development of water resources) to reduce vulnerability and increase resilience of affected people to climate change.

For the remaining terms, *transform* is associated with the need to improve extension services and agricultural education in order to improve rural agriculture; *adjust* is associated with impacts of climate variability and change and reducing vulnerability; *cope* occurs with adaptation to impacts in production and food insecurity risk (e.g. droughts and floods), exploring sustainable livelihoods, reducing poverty, health risks as well as dependence on rain fed agriculture; and *robust* occurs with infrastructure development and long-term investments as well as in the cocoa sector objectives for maintaining the produce as the lead commercial crop.

Table 3 Count of DECCMA prescribed climate change adaptation terms in identified national policies/plans

Policies	Adapt	Cope	Thrive	Transform	Adjust	Vulnerab*	Resilien*	Robust	Risk	Total
National Climate Change Policy, 2014	231	5	0	1	0	136	124	2	0	499
Ghana Shared Growth and Development Agenda II, 2014	13	1	2	113	8	50	13	4	42	204
Ghana Shared Growth and Development Agenda I, 2010	35	4	0	40	3	74	5	2	0	163
Coordinated Programme of Economic/Social Development Policies 2014	4	0	3	128	1	10	8	2	4	156
National Climate Change Adaptation Strategy, 2012	78	4	1	0	3	45	15	1	0	147
Ghana Poverty Reduction Strategy (GPRS I), 2003	2	4	0	21	6	72	0	1	0	106
Growth and Poverty Reduction Strategy (GPRS II), 2005	0	2	0	14	7	80	0	3	0	106
National Integrated Water Resources Management Plan, 2012	64	3	0	0	0	7	12	0	0	86
National Action Programme to Combat Drought and Desertification, 2002	2	2	0	2	1	24	6	0	0	37
National Environmental Sanitation Strategy/Action Plan, 2010	11	0	1	2	3	18	0	2	0	37
Food and Agriculture Sector Development Policy II, 2007	2	2	0	6	1	12	2	2	0	27
Fisheries and Aquaculture Sector Development Plan, 2011	0	3	0	0	7	2	5	4	7	21
Tree crops policy, 2013	13	0	0	4	0	3	0	0	0	20
Water Policy, 2007	0	1	0	2	0	15	0	0	0	18
Riparian Buffer Zone policy, 2014	4	0	0	0	4	3	0	0	0	11
Forestry and Wildlife Policy, 2012	6	0	1	1	0	2	0	0	0	10
National Urban Policy, 2012	4	1	0	1	1	3	0	0	0	10
National Urban Policy Action Plan, 2012	6	0	0	0	0	3	0	0	0	9
National Environmental Action Plan, 1988	0	1	1	1	5	0	0	0	0	8
National Irrigation Development Policy 2011	1	1	0	2	0	2	0	2	0	8
National Environmental Sanitation Policy, 2010	2	0	0	0	0	6	0	0	0	8
National Energy Policy, 2010	2	0	0	4	0	1	0	0	1	7
National Wildfire Management Policy, 2011	1	0	0	1	0	3	0	0	0	5
Gender and Water Resources Management, 2011	0	0	0	1	0	3	0	0	0	4
Energy Sector Strategy and Development Plan, 2012	2	0	0	0	0	1	0	1	0	4
National Environmental Policy, 2012	1	0	0	1	0	0	0	0	0	2
Ghana Forest Plantation Strategy, 2014	0	0	0	0	0	0	1	1	3	2
Wildlife Division Policy (CCBWM), 2000	1	0	0	0	0	0	0	1	0	2
Land Policy, 1999	0	0	0	0	2	0	0	0	1	2
Groundwater Management Strategy, 2011	0	0	0	0	0	1	0	0	0	1

Key emerging themes

The types of adaptation options provided in each of the policy documents were defined under 18 thematic areas that were further grouped into the following five major categories (Table 4):

1. *Improve quality and access to information*: Includes actions to improve access to and quality of information to support decision making at all levels of society; enhance the capacity of national and local institutions through training; and strengthen technological research in academic and research institutions, especially for agriculture, wildlife and forestry, water resources, and energy sectors.
2. *Increase resilience of both built and natural infrastructure*: To minimize impacts of climate change on key public infrastructures in coastal, urban and rural areas and protect the ecological integrity of natural systems, actions integrate climate resilience approaches through improved management and enforcement regulations.
3. *Improve water supply and quality*: With high dependence on groundwater and surface water resources, strategies focus on water conservation as well as improved management of resources to meet domestic, industrial, agricultural, and energy needs.
4. *Resilience of agricultural systems*: To ensure food security, approaches for resilient cropping and new crop varieties are the main focus, as well as improving the agriculture value chain through improved access to markets and management of post harvest loss.
5. *Social support for vulnerable groups*: To reduce the vulnerabilities of various social groups, proposed actions empower gender, improve social delivery service especially in health, provide livelihood diversification and transfer risks, and encourage financial support and incentive schemes.

Table 4: Major climate change adaptation themes in national policy/plans

Adaptation category		Adaptation Theme		# Policies*
1	Improve quality and access to information	1	Knowledge, information management, surveillance and early warning	16
		2	Institutional capacity, governance and training	15
		3	Research and development	13
2	Increase resilience of built and natural infrastructure	4	Resilient and hard Infrastructure	14
		5	Disaster response and management	9
		6	Marine and coastal management	6
		7	Resilient land use, rural and urban planning	13
		8	Plantation, landscape and green space management	13
3	Improve water supply and quality	9	Alternative energy	9
		10	Improved Water, Sanitation and Hygiene (WASH)	14
4	Promote resilient agricultural systems	11	Water conservation and Irrigation systems	13
		12	Resilient cropping and new crop variety	9
		13	Improved access to market	6
5	Social support for	14	Post-harvest loss management	5
		15	Women empowerment	12

Adaptation category	Adaptation Theme		# Policies*
vulnerable groups	16	Improved social service delivery	9
	17	Financial support, insurance and incentive schemes	9
	18	Livelihood diversification and risk transfer	7

*Multiple themes may occur in each policy

The following sections further describe the category of strategies with reference to the policies/plans that proposed them.

Improve the quality and access to information

Knowledge, information management, surveillance and early warning is the most commonly occurring adaptation category. For many sectors and cross-cutting programmes linked to climate change in Ghana, improving the quality of data, access to data, gathering sharing and translation of the data addressing the challenges of information and data, form one of the key approaches to increasing the resilience and coping capacity of communities. Policy actions for information include strategies that target improvement in knowledge, information management, surveillance, and early warning systems. A total of 16 policies recommended various strategies for developing the overall public awareness about climate change and its impacts. Some of the strategies include:

- Enhancement of institutional coordination and existing information systems/databases for easier public access to climate information (National Climate Change Policy, 2014) for example, for more effective environmental management (National Environment Policy, 2012; National Environmental Action Plan, 1988).
- Effective dissemination of information for early warning. Under the National Urban Policy Action Plan, 2012, are strategies to increase citizen awareness of natural hazards and familiarization of local urban population with citizen emergency response for rescue, safety and refuge. The National Climate Change Adaptation Strategy (NCCAS, 2012) also outlines specific strategies for adaptation in the area of early warning that include: (i) promoting the development of modern information management system including E-Governance process, (ii) developing systems for data collection, processing and dissemination of information, (iii) promoting evidence-based decision making, (iv) intensifying government's commitment to enhance access to public information and enabling environment for media, and (v) promoting timely dispatch of strategic information to targeted areas.
- Improvement of the linkages between scientific information and traditional knowledge systems. For example, the Wildlife Division Policy on Collaborative Community Based Wildlife Management, 2000, promotes the need to retain the cultural value of wildlife and create an awareness of past values and traditional knowledge. The National Climate Change Adaptation Strategy, 2012, also advocates the strengthening of the relationship between scientific knowledge and traditional or indigenous knowledge by developing systems for data collection, processing and dissemination of information. The central role of traditional rulers, landlords and earth priests (*Tindanas*) in mobilizing communities for Integrated Water Management (IWM) activities have also been outlined as one of the effective ways of improving the link between scientific and traditional knowledge (National Action Programme to Combat Drought and Desertification, 2002).

- Improved access of farmers to market information and intelligence relevant to crop, weather, and animal production with strengthened early warning systems (e.g., FASDEP II, 2007; Ghana Shared Growth and Development Agenda I, 2010).

The impacts of climate change and variability present new challenges to the existing capacities of institutions and individuals to respond adequately. To address these needs and support the uptake and effective use of climate-related information for increased resilience, the second most commonly occurring adaptation option in this category is improving *institutional capacity and governance, and training*. At the institutional level, this will promote coordination and establish clear roles of the various organisations and stakeholders to enhance institutional synergies and minimize conflict. More effective governance mechanisms will result in increased compliance to laws, rules and regulations by the general public for building climate resilience. Increased access to training programmes by individuals, especially those that belong to vulnerable groups, will ensure full participation in climate change initiatives. According to the policy documents, strengthening the institutional capacity of key stakeholders can be achieved through:

- Policy, legislation, networking, and capacity development training and funding (e.g., Wildlife Division Policy on Collaborative Community Based Wildlife Management 2000; National Climate Change Policy, 2014)
- Support for developing institutional strategies and plans (e.g., Land Policy, 1999; National Climate Change Adaptation Strategy, 2012)
- Development of national standards (e.g., National Environmental Action Plan, 1988)
- Establishment of new institutions to address gray area issues (e.g., National Environmental Policy, 2012), the establishment of allied institutions such as farmer based organisations to improve information and technology dissemination capacity (e.g., Tree crops policy, 2013) and strengthen the capacity of institutions for disaster risk reduction and management (e.g., Ghana Poverty Reduction Strategy I, 2003)
- Development of institutional capacity to support commercial scale agro-processing and buffer stock management (Ghana Shared Growth and Development Agenda I, 2010) or policy actions to address sector regulation, investment mobilisation, strengthening of human capacity, research and development (National Energy Policy, 2010)

Depending on the focus of the specific policy document, these actions can enhance the adaptive capacity of institutions in different sectors such as agriculture, environmental sanitation, forestry and wildlife management, or cross cutting areas such as disaster risk reduction and management. At the stakeholders level, training provided to communities on new farming technologies (e.g., National Climate Adaptation Strategy, 2010), improving the participation of local stakeholders in environmental management for forests, wildlife, and aquatic resources (e.g., National Environment Policy, 2012; National Urban Policy Act, 2012; Fisheries and Aquaculture Sector Development Plan, 2011), and strengthening farmers ability to participate throughout project cycles (e.g., National Irrigation Development Policy, 2011) can also lead to effective adaptation.

To support information management and capacity building is the *research and development* thematic action, which focuses on strengthening technological research in academic and research institutions. In Ghana, there is limited research in climatic and meteorological sciences, especially in the downscaling of models and scenarios. These actions will enable researchers undertake rigorous climate change studies, in combination with participatory engagement processes with local

stakeholders, to develop improved projections on possible impacts for various sectors of the environment and inform suitable climate resilient strategies, planning and practices. These actions can also support meaningful interaction and feedback opportunities between scientists and users of the generated information, such as policy and decision makers who need evidence for developing valid policies and guiding implementation strategies. The policy documents propose research in important sectors such as:

- **Agriculture:** The development of drought tolerant crop varieties (National Action Programme to Combat Drought and Desertification, 2002), promotion of research in the development and industrial use of local and indigenous staples (Food and Agriculture Sector Development Policy II, 2007) have been emphasised to improve production and supply. Under the FASDEP II, 2007, for example, the goals of the livestock sector development policy include increasing the supply of meat, animal and dairy products from domestic production at the current aggregate level of 30% to 80% by the year 2015, and contributing to poverty reduction among farmers (specifically livestock keepers) from 59% to 30% by the year 2015, based on improved research based activities. The strategies in FASDEP II performance targets for the agriculture sector, based on achievements between 2001 and 2006, were: agricultural growth rate of 6-8% per annum over a 4-year period, crops and livestock leading agricultural growth at an average annual growth rate of 6%, and forestry and logging, and fisheries, each growing at 5% per annum
- **Wildlife and Forestry:** The development of research infrastructure for the savannah ecosystem (Forestry and Wildlife Policy, 2012) and increased research investments in extension, training and capacity building for forest plantation development (Ghana Forest Plantation Strategy, 2014)
- **Water resources:** Research to strengthen science and information based policymaking (National Environmental Action Plan, 1988), and research on climate change adaptation strategies (National Integrated Water Resources Management Plan, 2012)
- **Energy:** The Energy Sector Strategy and Development Plan (2010) recommend the allocation of at least 20% of the Energy Fund annually for R&D activities relating to policy, renewable energy, energy conservation and institutional development.

Increase the resilience of both built and natural infrastructure

The strategies described for *resilience of infrastructure, disaster response and management, and marine and coastal management* are national strategies to ensure that key public infrastructures are able to withstand the impacts of future climate change and variability. With varying vulnerabilities of communities depending on spatial and social differentiations, there are potential impacts on homes and settlements as well as on key economic infrastructure such as power lines, dams and roads. Coastal areas also require additional interventions to increase their resilience to sea level rise. Infrastructure can be impacted on directly by floods, droughts, windstorms and other extreme events, indirectly where infrastructure is not climate-proof and consequently unable to withstand additional climatic stresses, or may become ineffective due to increased demands, such as for energy or water flows for hydropower. National policies/plans, therefore, focus on actions to:

- Build more efficient structures, provide new and affordable technologies or improve the design standard (e.g., Fisheries and Aquaculture Sector Development Plan, 2011; Energy Sector Strategy and Development Plan, 2010)
- Develop relevant codes and spatial planning of existing structures, such as those for waste management (including landfills), agricultural storage products, irrigation and water management, energy; as well building hard control structures such as the Keta Sea Defence to protect coastal areas (e.g., Growth and Poverty Reduction Strategy II, 2005; Ghana Shared Growth and Development Agenda I, 2010; Energy Sector Strategy and Development Plan, 2010)
- Support relocation of settlements and economic activities to non-flood areas (National Climate Change Policy, 2014)
- Develop early warning systems and emergency preparedness (Ghana Poverty Reduction Strategy I, 2003; The Coordinated Programme of Economic and Social Development Policies, 2014; Ghana Shared Growth and Development II, 2014)
- Promote integrated prevention and control practices for wildfires and floods (National Wildfire Management Policy, 2007)

The resilience of natural ecosystems to climate change is also critical for sustaining the livelihood of communities, especially in rural areas. Maintaining the integrity of ecosystems and services that generate food, income, medicine and foreign exchange for local communities can be achieved through strategies for *resilient land use, rural and urban planning plantation; landscape and green space management; and alternative energy*. This is reiterated as priority strategies in both the National Climate Change and Adaptation Strategy (2012) with its objectives for enhancing the adaptability of vulnerable ecological and social systems by increasing the flexibility and resilience of these systems (Box 1), and the National Climate Change Policy (2014) Focus Area 5, i.e., improve the management and resilience of terrestrial, aquatic and marine ecosystems; increasing carbon sinks (Box 2). These strategies will also minimize the threats from weather related hazards by reinforcing natural buffer systems such as forests and coastal mangroves.

Strategies to protect natural resources include the implementation and enforcement of land use regulations to ensure environmental considerations for sustainable use and conservation of natural resources, for example, promoting selective clearing of land for the development of new plantations (Tree Crops Policy, 2013) and more effective land use plans to control land degradation, reduce soil loss and minimize siltation of water bodies (Water Policy, 2007). The review and update of national, regional and district level spatial development frameworks will serve as a guide for conservation, resource use and governance (National Environmental Action Plan, 1988); the use of information systems will strengthen inter-sectoral linkages and collaboration for adaptation planning (Land Policy, 1999; National Environmental Policy, 2012), as well as streamline and reinforce land use spatial development plans (National Urban Policy, 2012). To conserve and maintain biological diversity, other strategies include:

- Creation of biological corridors, development and protections of green spaces (including culturally sensitive sites such as sacred groves) and riparian buffer zones along river banks (e.g., Water Policy, 2007; National Urban Policy Action Plan, 2012; Riparian Buffer Zone Policy, 2014)
- Reforestation (Ghana Poverty Reduction Strategy I, 2003)
- Forest management and enrichment plantings (Ghana Forest Plantation Strategy, 2014)

- Promotion of equitable access to and sustainable use through community based natural resource management (e.g., The Coordinated Programme of Economic and Social Development Policies, 2014)
- Development of efficient energy technologies that will also reduce the pressure on forests for fuel woods and encourage the use of renewable energy resources (e.g., National Environmental Policy, 2012)

Improve water supply and quality

In Ghana, the proportion of the population with access to safe drinking water in the urban areas increased from 59.0% in 2009 to 63.4% in 2012, whilst those in rural areas increased from 58% to 62.9% over the same period (The Coordinated Programme of Economic and Social Development Policies, 2014). Water availability, mainly dependent on groundwater resources (for the rural population) and surface water sources (for urban communities), is being challenged by inadequate water systems that are unable to meet the demands of a rapidly growing population and pollution from poor sanitation practices. With rainfall variability, reductions in groundwater recharge and runoff, increased contamination from landfills and other sources during flooding, and increased incidence of water related and waterborne diseases, will compromise the quantity and quality of available water and impact on the health of vulnerable communities. Specific strategies for adaptation in the water sector have been captured by the National Climate Change Adaptation Strategy, 2012, such as: (i) conserving water resources, (ii) making water accessible for domestic, agricultural, industrial, and commercial use and energy production, (iii) increasing water availability for domestic, industrial, agricultural, and energy production and (iv) improving and sustaining the quality of water resources and to build capacity in water resources management. These strategies are geared toward the management of water resources as a means of climate change adaptation to enhance productivity and livelihoods. Other national strategies to achieve *improved water, sanitation and hygiene*, include:

- Raising public awareness and building capacity to manage health impacts of climate change (National Climate Change Policy, 2014)
- Training to improve life skills of communities including hygiene, fire safety, environment, sanitation, climate change (Ghana Shared Growth and Development II, 2014; The Coordinated Programme of Economic and Social Development Policies, 2014)
- Promoting access to improved sanitation and potable water through rural investment (Growth and Poverty Reduction Strategy II, 2005; protecting water bodies through land use planning guidelines (Land Policy, 1999)
- Provision of efficient waste management systems including improved regulation, monitoring, and enforcement of measures to reduce risks due to poor sanitation and hygiene, and water and airborne diseases (such as bilharzia, guinea worm, and malaria) (National Irrigation Development Policy, 2011; National Climate Change Adaptation Strategy, 2012)
- Promoting the benefits of alternative uses of wastes through reduction, re-use, recycling and recovery (National Environmental Sanitation Strategy and Action Plan, 2010)
- Introduction of a national health insurance system and subsidising water supply to guinea worm endemic areas (Ghana Poverty Reduction Strategy I, 2003)

Increasing temperatures, variable rainfall and recurrent drought, especially in the northern parts of the country, also have implications for the quality and quantity of water required for food production, livestock watering and hydropower. Proposed strategies for *water conservation and irrigation systems* facilitate the control of water of water storage facilities at various scales (from small local dams to large scale dams) to improve water security and increase climate resilience. These actions include the:

- Development of a master management plan for more effective use of water and reduce loss (National Environmental Action Plan, 1988)
- Development of multi-purpose water harvesting and storage facilities that will promote in-field harvesting and conservation (National Climate Change Policy, 2014)
- Increase in water availability and access for all users of water (domestic, industrial and commercial) while sustaining the quality of the water resources (National Climate Change Adaptation Strategy, 2012)
- Development of appropriate water harvesting and conservation schemes including rainwater harvesting systems, dams and boreholes (e.g., Food and Agriculture Sector Development Policy II, 2007; Water Policy, 2007; National Integrated Water Resources Management Plan, 2012)
- Preparation of an integrated watershed management plan that will include downstream control for shared distribution systems (National Action Programme to Combat Drought and Desertification, 2002; National Irrigation Development Policy, 2011)
- Enforcement of the buffer zone policy along streams and water bodies to prevent degradation of the catchment area and water resources (Riparian Buffer Zone policy, 2014)

Resilient agricultural systems

Agricultural and food production systems are mainly extensive and reliant on natural resources, including hunting, and fishing from natural aquatic systems. Over the years, plans for agricultural development have focused on increasing productivity and production. However, with climate change, existing challenges such as land degradation, crop failures due to unpredictable weather, increasing incidence of diseases and pests, and decreasing arable land for coastal communities due to sea erosion will further affect the livelihoods of rural communities. National policies and plans are therefore proposing more resilient cropping systems through *resilient cropping and new crop variety*, as well as addressing a number of factors along the agriculture value chain such as *improved access to markets* and *post harvest loss management*.

The National Climate Change Policy (2014) specifically addresses resilience of agricultural systems by stating the need to develop climate-resilient agriculture and food security systems by mainstreaming climate change considerations along the agricultural value chain in order to make Ghana's agriculture climate-smart. These are to be achieved through eight programs: (i) Institutional capacity development for research and dissemination, (ii) Development and promotion of climate resilient cropping systems, (iii) Adaptation of livestock production systems, (iv) Support to climate change adaptation activities in fisheries and aquaculture, (v) Support to water conservation and irrigation systems, (vi) Risk transfer and alternative livelihood systems, (vii) Improved post-harvest management, and (viii) Improved marketing systems. Strategies elaborated in other national policies include:

- Provision of improved breeds, new seed varieties and improved support services (National Action Programme to Combat Drought and Desertification, 2002)
- Introduction of high-yielding and short duration crop varieties including the development of disease and pest resistant varieties (e.g., Food and Agriculture Sector Development Policy II, 2007; Ghana Shared Growth and Development Agenda I, 2010; Ghana Shared Growth and Development II, 2014)
- Development and distribution of certified planting material (Tree crops policy, 2013)
- Promotion of environmentally sustainable cropping practices and natural resource management in farming communities (Growth and Poverty Reduction Strategy (GPRS II), 2005)
- Improvement of market facilities and roads (especially feeder roads) that support distribution of food across various communities, including vulnerable areas. These include climate proof transportation, cold chain facilities, financing, and specialized markets for trading of forest plantations stands (e.g., National Action Programme to Combat Drought and Desertification, 2002; Food and Agriculture Sector Development Policy II, 2007; Ghana Shared Growth and Development I & II, 2010; 2014)
- Minimize high postharvest losses, a major constraint that results in reduced production volumes and incomes, due to inadequate access to post harvest technologies and infrastructure. Strategies include training in postharvest technologies (e.g., National Climate Change Adaptation Strategy, 2010) and provision of processing, value addition and storage infrastructure at individual and community levels (Food and Agriculture Sector Development Policy II, 2007). This also has the potential to open up public and private sector investments in post harvest management operation along the value chain.

According to the draft NCCP Action Programme for Implementation (2015-2020), mainstreaming these actions into the food and agriculture sector policies, programmes and plans will require:

- Creating awareness at all levels of relevant stakeholders on measures to address climate change and climate variability
- Building the capacity of extension service providers and farmers to enable them engage in discussions and analysis
- Reviewing the training curricula of agricultural training colleges to include climate change and variability
- Ensuring that climate change is integrated into strategic environmental assessment processes for the sector

Social support for vulnerable groups

The impacts of climate change on poor and marginalised groups, e.g., poor women, the elderly, children and disabled, are often exacerbated due to their limited access to resources, including basic services. The capacity of different social groups to adapt to climate change depends on a range of physical, socio-economic and technological conditions which results in disparities in climate change adaptation outcomes. To disaggregate these, policy actions to address human and social dimensions of climate change issues have highlighted the inclusion of gender in all sectoral planning, improved access to social services, the provision of alternative sustainable livelihoods, and the provision of

social protection and social safety nets, as essential elements for building the resilience of vulnerable communities. Specific strategies are discussed below.

Gender empowerment

To empower women and vulnerable individuals, policy actions generally call for the participation of women in decision making processes (including the use of indigenous knowledge) in various sectors including wildlife management, water resource management and sanitation, and energy; training women to complement extension service delivery; and improving land tenure rights on long term basis to benefit women. The following specific strategies are being targeted by policies to improve women's role in climate change adaptation:

- Identify and map gender specific vulnerable groups and individuals likely to experience the worse forms of climate change impacts and implement interventions, including continuous monitoring and evaluation as well as impact assessment of climate change from a gender perspective (National Climate Change Policy, 2014)
- Facilitate the participation of women across all sections of society in training, public awareness campaigns, formal and non-formal education and decision-making processes in environmental management (National Environmental Policy, 2012)
- Empower and grant full and active participation of women in the management of drylands by utilizing their indigenous knowledge (National Action Programme to Combat Drought and Desertification, 2002)
- Advocate the training of women leaders in the communities to complement extension service delivery (Food and Agriculture Sector Development Policy II 2007)
- Secure access to land for small scale farmers, especially women, on a long term basis (Tree crops Policy, 2013)
- Promote women involvement in wildlife management at community level (Wildlife Division Policy on Collaborative Community Based Wildlife Management, 2000)
- Empower women through training at all levels to perform their roles in water resource management and sanitation (Water Policy, 2007)
- Encourage capacity building for women in the energy sector (Energy Sector Strategy and Development Plan, 2010)
- Promote land reforms that ensures equal access to irrigated land for women and Persons with Disability. It also promotes alternative extension approaches that will increase the proportion of women farmers that are reached particularly in the transition and savannah zones (Growth and Poverty Reduction Strategy II, 2005)
- Provide selective subsidies for the procurement of improved agriculture inputs for poor peasant farmers and women (Ghana Shared Growth and Development Agenda I, 2010)
- Support capacity building of MDAs and Metropolitan, Municipal And District Assemblies (MMDAs) in the public policy and planning processes including consideration for gender and women empowerment (Ghana Shared Growth and Development II, 2014)
- Encourage government to double its efforts to empower women to participate more effectively in the political, social and economic development of the nation (The Coordinated Programme of Economic and Social Development Policies, 2014)
- Ensure participation of women in the formulation and implementation of energy interventions (National Energy Policy, 2010)

Social service delivery - health

In recognition of the direct and indirect impacts on human health and the additional challenges that climate change will place on the health care systems, policy strategies mainly focus on increasing and strengthening health facilities and equipment to ensure equitable access and affordable social services for all. According to the Coordinated Programme of Economic and Social Development Policies, 2014; government's allocation of expenditure to healthcare increased from 5.7% in 2000 to 15.4% in 2012. National actions for improved social service delivery include:

- Review and increase investments in existing social services to ensure that the key Public Social Services are able to recover after climate related disasters (National Climate Change Policy, 2014)
- Increase and upgrade existing health facilities and equipment (ambulance, health centers (CHPS), mobile health vans, helicopters (National Climate Change Adaptation Strategy, 2012)
- Equip existing health centers, improve staffing situation, build new health centers in rural areas (National Action Programme to Combat Drought and Desertification, 2002)
- Supply rural areas with improved infrastructure for service delivery such as health, agriculture extension service, education and early warning communication (Food and Agriculture Sector Development Policy II, 2007)
- Expand the provision and delivery of social services including health and education; Promote use of insecticide treated bed nets by procuring and distributing nets (Growth and Poverty Reduction Strategy II, 2005)
- Minimize climate change impacts on human health through improved access to healthcare (Ghana Shared Growth and Development Agenda I, 2010)
- Expand equitable access to good quality and affordable social services (Ghana Shared Growth and Development II, 2014)

Livelihood diversification and risk transfer

The provision of alternative sustainable activities to support livelihood needs of those who depend mainly on natural resources increases resilience to potential climate risks and impacts. Livelihoods adaptation strategies of the National Climate Change Adaptation Strategy (2012) include (i) improving output and income of vulnerable groups (ii) creating awareness on climate change and its adaptation strategies, (iii) sensitizing beneficiaries on the need to adopt new and appropriate technologies on economic and non-economic livelihoods, (iv) improving access to credit facilities, (v) building technical and financial capacities on alternative livelihoods mechanisms, and (vi) strengthening the relationship between scientific knowledge and traditional or indigenous knowledge. Numerous strategies to promote local enterprises and support the acquisition of skills in alternative livelihoods that can improve incomes and reduce pressure on natural resources are provided in the National Climate Change Policy, 2014, and include diversification into tree crops, vegetables, small ruminants and poultry; urban farming in green spaces. Other specific strategies for livelihood diversification and risk transfer include:

- Construct dams and dug-outs on community grazing lands for livestock and irrigation; Support off-farm livelihood activities through training and credit schemes (National Action Programme to Combat Drought and Desertification, 2002)
- Adopt a special programme that will enhance diversification opportunities, reduce risk and enhance access to productive resources; Support diversification by farmers by providing

assistance into tree crops, vegetables, small ruminants and poultry, based on their comparative and needs (Food and Agriculture Sector Development Policy II, 2007)

- Determine the pace of change - how effort reductions and value added activities in target sectors will be staged to ensure alternative livelihood and/or compensatory support can be provided to complement such change (Fisheries and Aquaculture Sector Development Plan, 2011)
- Create employment opportunities and sustainable livelihoods in rural communities through forest plantation development (Ghana Forest Plantation Strategy 2014)
- Develop and use open spaces, green belts and other ecologically sensitive areas for alternative livelihood such as urban farming (National Urban Policy Action Plan, 2012)
- Establish and manage a national buffer stock (Ghana Poverty Reduction Strategy I, 2003)
- Improve and diversify livelihoods for men and women in the post harvest seasons (Growth and Poverty Reduction Strategy II, 2005)
- Promote the adoption of Good Agricultural Practices (GAP) by farmers and diversification (Ghana Shared Growth and Development Agenda I, 2010)
- Develop and implement livelihood diversification measures for affected communities (Ghana Shared Growth and Development II, 2014)
- Maintain and enhance ecological integrity of protected areas by accelerating the implementation of national buffer zone policies for rivers and protected areas; facilitate alternative livelihoods, including eco-tourism support schemes for fringe communities along protected areas (The Coordinated Programme of Economic and Social Development Policies, 2014)

Financial Support, Insurance and Incentive Schemes

Strategies that encourage the financing of climate change activities will also help minimize the risks associated with climate impacts. Examples of actions include:

- Promote private sector investments in eco-tourism (through economic incentives and agriculture and fisheries based insurance schemes), waste management, organic fertilizer industry (with credit lines available to small scale farmers), and seasonal financial products for irrigators (e.g., National Climate Change Policy, 2014)
- Provide incentives to adopt affordable and appropriate technologies in waste management (National Environmental Policy, 2012)
- Encourage private sector to invest in the organic fertilizer industry. Credit should be made available to small scale farmers to enable them purchase and use mineral fertilizers (National Action Programme to Combat Drought and Desertification, 2002)
- Develop innovative term and seasonal financial products for irrigators (National Irrigation Development Policy, 2011)
- Give incentive and compulsion measures to encourage users of the environment to adopt less exploitative and non-degrading practices in agriculture (Food and Agriculture Sector Development Policy II, 2007)
- Create incentives for investors in tree crops and plantation (tax relief for private sector investment in research and development (Tree Crops Policy, 2013)
- Align the economic incentives confronting fishers with imperatives to promote the generation of wealth and sustainability rather than economic incentives to maximise individual catch volumes (Fisheries and Aquaculture Sector Development Plan, 2011)

- Set up a Trust Fund Board to manage Community Resource Management Areas (CREMAs) (Forestry and Wildlife Policy, 2012)
- Institute publicity and incentives for community initiatives for improving the environment (National Urban Policy Action Plan, 2012)
- Establish and implement an Environmental Credit Facility for development of energy project; use fiscal and financial incentives to promote the production and use of environmentally friendly energy forms (Energy Sector Strategy and Development Plan, 2010)
- Provide selective subsidies for the procurement of improved agriculture inputs for poor peasant farmers and women; improve incentives to encourage users of the environment to adopt less exploitative and non-degrading practices in agriculture (Ghana Shared Growth and Development Agenda I, 2010)
- Improve access to financial services and develop a more comprehensive insurance market (Ghana Shared Growth and Development II, 2014)
- Scale up the commercial agriculture insurance system piloted in 2011 to cover more crops and regions (The Coordinated Programme of Economic & Social Development Policies, 2014)
- Support sustained regeneration of woody biomass resources through legislation, fiscal incentives, and attractive pricing (National Energy Policy, 2010)

Gender dimensions

A review of the policies and plans shows that gender perspectives of climate change adaptation is present in 12 of the documents. Policies such as the National Climate Change Policy (2014) and the Ghana Shared Growth and Development II (2014) provide a much more comprehensive discourse on gender, including vulnerable groups and individuals likely to experience the worse forms of climate change impacts, implementation of gender appropriate interventions, actions to include gender equity and monitoring, and evaluation methods from a gender perspective.

The National Climate Change Policy, 2014 and its Action Programme for Implementation 2015-2020 also clearly identify gender as one of the ten priority areas under Social Development. It acknowledges that women are one of the most vulnerable groups impacted by climate change and that there is little supporting information on the causes and solutions to climate related gender disparities. The policy's key objectives are therefore to generate more information on gender relations, establish gender sensitive livelihoods, ensure mainstreaming and access to funds for gender based programmes and to ensure equity in the management of natural resources. In most of the earlier policies, however, gender was focused mainly on empowering and addressing the concerns of only women without emphasis on other vulnerable groups such as the youth or disabled.

Generally, the adaptive strategies that incorporate gender issues include:

- Awareness creation (National Environmental Policy, 2012) and training of women (Water Policy, 2007; Energy Sector Strategy and Development Plan, 2010)
- Provision of selective subsidies for women and poor farmers (Ghana Shared Growth and Development Agenda I, 2010)
- Removal of institutional barriers that restrict women's participation in decision making processes for environmental management, for example, in drylands (National Action Programme to Combat Drought and Desertification, 2002), wildlife management (Wildlife

Division Policy on Collaborative Community based Wildlife Management, 2000), or water resources management (Water Policy, 2007)

- Regulating land access for women as small scale farmers on long term basis (Tree crops policy, 2013)
- Training women to complement extension services (Food and Agriculture Sector Development Policy II, 2007)

4. Discussion

Comparison of findings with wider literature on Climate Change Adaptation

Climate change has been addressed in a number of national development processes, as reviewed in the survey, with the most comprehensive documents being the National Climate Change Policy (2014) and its draft Policy Action Programme for Implementation (2015-2020) that details plans of action, responsibilities and timelines for mainstreaming and implementation of prioritized programmes for adaptation, mitigation and social development. As one of the few national documents developed through an extensive national level stakeholder driven process, the contextual framing of its proposed actions and strategies encompass strategies and priorities outlined in other climate related national policies. This public engagement process, which many authors have recognized the benefits of (e.g., [Cloutier et al., 2014](#); [Sherman and Ford, 2014](#)), ensures overall efficacy and representativeness of planning processes and outcomes, as well as incorporates the needs of vulnerable groups. However, since the policy is relatively recent, dissemination to the local government where implementation is to occur is still ongoing. [Essegbey \(2014\)](#), for example, noted that policy literacy at the regional, district and community levels of governance is still very limited, although the effective implementation of national policies requires that critical actors in the policy cycle are knowledgeable about the contents of the policy. [Asante et al. \(2015\)](#) also indicated that responsibilities allocated by the NCCP to Metropolitan, Municipal and District Assemblies (MMDAs) had not yet been recognized by the local level offices, who were also limited in their experience of the actual implementation of the proposed strategies. The Ministry of Local Government and Rural Development, in collaboration with the Local Government Service, who have a significant share of resources as the lead institutions for implementing the NCCP, were also not recognized at the MMDA level. With the multiple scales, diversity and complexity in governance, finance and range of actors for developing adaptation options, it is critical to assess downward accountability and adaptive capacity of institutions to effectively coordinate and implement the policy ([Kissinger et al., 2013](#)). This alignment also enables funding for implementation through government budgetary allocations. The Medium-Term Development Plan by the National Development Planning Commission is the most significant guide for mainstreaming and integrating climate adaptation into development planning processes. It is envisaged, therefore, that the third part of the NCCP would address this challenges and institutionalize adaptation through coordinated efforts and integration of the strategies into annual work plans of the implementing units.

Literature on adaptation, although conceptually defining the types and forms of adaptation, acknowledge that adaptation is place- and context-specific with no single approach for reducing risks. Governmental interventions have implications at the local level for individuals, private businesses or communities, who make personal decisions based on their unique circumstances.

Large-scale infrastructural changes, for example, such as the building of sea defence walls to minimize the impacts of sea level rise, have various implications for different categories of people. As a result, the context of proposed adaptation actions also need to be local and not generic, with the need for planned adaptation to be evidence-based instead of anecdotal. The inclusion of local level stakeholders in the design implementation and monitoring of adaptation interventions will ensure that actions to reduce climatic impacts are relevant for the specific local socio-economic context. A feedback mechanism from bottom up is, therefore, required to contribute back into policy processes, although there are challenges, for example, in incorporating traditional leaders who have different levels of informal power at the local level into local government. The significance of local traditional authority ranges, for example, from the powerful chieftaincy hierarchy among the Asante and Akim, to frequent succession disputes in the northern region, to the relatively weaker authority of chiefs in the coastal areas (Hoffman and Metzroth, 2010), which poses difficulties in standardizing a model for incorporation into local government processes.

Gender equity continues to gain momentum in the international adaptation discussions and is gradually being reflected in national level policies and programmes since Ghana adopted the Convention on Elimination of All Forms of Discrimination Against Women (CEDAW) in 1981. The establishment of the Ministry of Women and Children's Affairs (MOWAC) in 2001, created an institution that takes responsibility for gender issues, with allocated Gender Desk Officers (GDOs) to mainstream gender issues in line ministries. Although there have been indications that this has been generally unsuccessful due to lack of clarity about mandates in addition to the core responsibilities, multi-stakeholder approaches and a growing collaboration between the ministry and other groups including women's rights organisations, civil society and others, are promoting the delivery of actions to achieve the principle of equality of women and men.

The survey indicated that with the exception of the NCCP, 2014, migration has not been specifically addressed in any of the reviewed policies. A growing body of literature argues that limited adaptive capacity compels people to migrate during extreme events when other options are unsuccessful (Lilleør and Van den Broeck, 2011; Arnall and Kothari, 2015). For successful migration to take place, the prospectus migrant must have the basic required economic resources to move. The NCCP, 2014, recognizes the importance of migration as a livelihood and development strategy that needs to be effectively managed and supported. It highlights two key objectives that are (i) to ensure that the migrant has equal opportunities to enjoy the economic and social amenities at destination location that they need to adapt to climate change, and (ii) promote development and resilience in the sites of both origin and destination. However, besides this recognition, migration support systems are rather limited in the other climate-related policies. This aspect is generally addressed by NGOs at the rural and local levels to improve adaptive capacity of individuals, although these strategies may not be appropriate or context specific for the local area. The adaptation responses in the policies are not oriented towards building individual adaptive capacities but at institutional level with the assumption that benefits accrued will trickle down through the decentralization system.

What is missing from Country Context in terms of Policy and Content

The policy review shows that adaptation governance in Ghana is composed of a mosaic of policies, actors, and strategic action priorities, which will need to be properly coordinated to avoid potential implications of fragmentation in climate adaptation and on adaptive capacity at institutional and

individual levels. A number of studies in climate governance have indicated that fragmentation in policies have negative effects in performance outcomes (Zelli and van Asselt, 2013; Zelli, 2011; Boyd, 2010; Biermann et al., 2009), while others argue that a significant degree of fragmentation is needed to reflect the diversity of problems and real world situations as long as there are interactions among systems (Van Asselt et al., 2005; Van Asselt, 2007; Van Asselt and Zelli 2012). In Ghana, there have been limited platforms to dialogue, negotiate and diagnose climate adaptation issues (Adu-Boateng, 2015) which could increase adaptation costs due to the duplication of efforts and lack of harmonization. For example, there are no specific sectoral policies on the coastal zone although a number of environmental related policies that address the coastal zone exists. The main orientation of these policies is on integrated coastal zone management, marine environmental protection and sustainable use and conservation of marine resource, however, there are different mandates by different institutions to address various thematic issues. Major shoreline developments such as the construction of the Keta Sea Defense Project to protect the shoreline from sea level rise and coastal erosion, is implemented by the Ministry of Water, Works and Housing, while issues of pollution and conservation are addressed by the Environmental Protection Agency under the Ministry of Environment, Science, Technology and Innovation, and management of mangroves and wetlands are the responsibility of the Wildlife Division of the Forestry Commission. In addition, inland, coastal and marine resources are under the mandate of the Ministry of Fisheries and Aquaculture Development, although the Volta River Authority oversees activities in the Volta Basin, including the Volta estuary, while issues of maritime security, which includes illegal fishing, is being addressed by the Ghana Navy and the Marine Policy Unit. In some cases, the scientific community and the civil society assume that a major precondition for up-scaling adaptation is to reduce the degree of fragmentation and lack of coordination (World Bank, 2010; Würtenberger et al., 2011; MEST, 2012). However, the call is still a challenge given that there are degrees of influence among actors, making it difficult to bring all actors under a common harmonized institution.

Climate financing in Ghana has many challenges due to lack of institutional strength and reliable funding sources. The NCCP 2014 provides a cost budget to implement its proposed adaptation programmes, however, an explicit funding strategy for mobilizing both domestic and international resources is absent. Strong coordination between the implementing agencies for climate change is needed, however, the Natural Resources, Environment and Climate Change Unit established in 2010 to oversee, coordinate and manage the financing of natural resources and climate change activities has no mechanisms to track resources generated for climate change actions within the country or from external sources (Asante et al., 2015).

Opportunities for Policy Development

Among the different policy documents, there is concurrence of national priorities in protecting and increasing the resilience of built and natural infrastructure, water resources, and agriculture, as well as improved social support for gender equity, improved service delivery, and livelihood diversification. Despite inherent challenges of poor baseline data, inadequate human and institutional capacities and limited funding that is mainly donor driven, there are recognized opportunities in that adaptation is being more incorporated into planning processes with more support by strong leadership from key ministries and cross-sectoral institutions, political will and establishment and staffing of climate change units within government (Padgham, 2014). The decentralization of planning in Ghana, where ministerial and other government functions have been devolved to the districts, also provides the opportunity for effective implementation at the local levels. This can be more effective and successful with political commitment at all levels of

governance - from the national level, where there is formulation of appropriate policies and programmes, to local communities and traditional authorities at the local level where implementation occurs.

One critical challenge is the provision of adequate financial resources for the implementation of policy strategies at all levels. There are, however, a number of opportunities that can support investment plans for financing the actions, in addition to mainstreaming the implementation of activities into annual budgeting cycles of implementing and collaborating institutions. One option is international funding from the donor community which provides increased options for capacity building and training with improved availability and accessibility of information and data to support decision making processes. For example, climate financing options for Africa such as the Green Climate Fund (GCF) has provided Ghana with additional opportunities to enable investments and co-financing for adaptation options. Another option is engaging with donors, especially at the sub-national level, for funding support in project proposals. Many development partners have interests in a broad scope of climate change thematic issues. Finally, the role of the private sector is often de-emphasized as an implementation partner, but offer many entrepreneurial options to successfully achieve objectives of the proposed actions.

5. Conclusion

Ghana, as a signatory to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, has recognized the risks of global warming to its economy and has committed to take appropriate responsive actions. Through participation in these processes, international commitments have been made in addition to defining specific actions in national policies. The planning and implementation of these policies are geared not only towards reducing climate risk but also providing opportunities for various sectors to coordinate their activities for multiple benefits, while reducing costs and increasing efficiency of actions.

The survey reveals a plethora of national policies and plans that have recognized the importance of a changing and variable climate in its development processes; however, the recent National Climate Change Policy, 2014, and its draft implementation plan provide the most comprehensive set of adaptation guidelines that are relevant for various sectors. Also noteworthy is its focus on gender and migration, both of which have had minimal mentions in other national policies, but are critical in addressing vulnerabilities for improving resilience and adaptability of local communities. The NCCP, 2014, is therefore a positive step towards the integration of prioritized national policies and plans - namely rural development and poverty reduction, water resources and agriculture - through climate sensitive lens, and provides an opportunity for effective mainstreaming into national development processes.

This integration, however, is without its inherent challenges, especially with inadequate human and institutional capacities at the local level for effective implementation, unclear roles and responsibilities of various institutions working together to meet specific objectives, as well as challenges in funding the proposed programmes. On the other hand, recognition that the integration is still relatively recent, with increasing support and strong leadership at all levels - from international to national to local- and potential funding from various sources including development partners and the private sector, is instrumental for moving the adaptation agenda forward.

Within the context of the DECCMA project, the comprehensive review of national adaptation and related policies has shown that many of the adaptation options proposed in the policies are generic in nature and require context-specific and evidence-based strategies. With its focus on deltaic zones, DECCMA can, therefore, contribute towards improving the understanding of adaptation processes specifically for coastal and estuarine ecological systems, thereby enhancing the adaptive capacities of local communities in these areas. The policy review also identified that *improved quality and access to information* was the most important national strategy for increasing resilience and enhancing adaptive capacity at all levels. As such, the project would need to prioritize its communication and dissemination activities to ensure that relevant findings are made available to the different categories of stakeholders - governmental, private businesses communities and individuals - as well as different social groups, i.e., women, youth, elderly and disabled, among others. The role of traditional leaders and appropriate traditional knowledge can also be incorporated, as this would augment the uptake of scientific information generated, especially at the local levels.

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