AFB/PPRC.8/11
23 February, 2012

Adaptation Fund Board
Project and Programme Review Committee
Eighth Meeting
Bonn, 14 March, 2012

PROPOSAL FOR GHANA

I. Background

1. The Operational Policies and Guidelines for Parties to Access Resources from the Adaptation Fund, adopted by the Adaptation Fund Board, state in paragraph 41 that regular adaptation project and programme proposals, i.e. those that request funding exceeding US$ 1 million, would undergo either a one-step, or a two-step approval process. In case of the one-step process, the proponent would directly submit a fully-developed project proposal. In the two-step process, the proponent would first submit a brief project concept, which would be reviewed by the Project and Programme Review Committee (PPRC) and would have to receive the approval by the Board. In the second step, the fully-developed project/programme document would be reviewed by the PPRC, and would finally require Board's approval.

2. The Templates Approved by the Adaptation Fund Board (Operational Policies and Guidelines for Parties to Access Resources from the Adaptation Fund, Annex 3) do not include a separate template for project and programme concepts but provide that these are to be submitted using the project and programme proposal template. The section on Adaptation Fund Project Review Criteria states:

> *For regular projects using the two-step approval process, only the first four criteria will be applied when reviewing the 1st step for regular project concept. In addition, the information provided in the 1st step approval process with respect to the review criteria for the regular project concept could be less detailed than the information in the request for approval template submitted at the 2nd step approval process. Furthermore, a final project document is required for regular projects for the 2nd step approval, in addition to the approval template.*

3. The first four criteria mentioned above are:
   1. Country Eligibility,
   2. Project Eligibility,
   3. Resource Availability, and
   4. Eligibility of NIE/MIE.

4. The fifth criterion, applied when reviewing a fully-developed project document, is:
   5. Implementation Arrangements.

5. According to the Adaptation Fund Board Decision B.12/10, a project or programme proposal needs to be received by the secretariat no less than nine weeks before a Board meeting, in order to be considered by the Board in that meeting.

6. The following fully-developed project document titled "Increase Resilience to Climate Change in Northern Ghana through the Management of Water Resources and Diversification of Livelihoods" was submitted for Ghana by the United Nations Development Programme (UNDP), which is a Multilateral Implementing Entity of the Adaptation Fund. This is the first submission of the project, using the one-step proposal process. It was received by the secretariat in time to be considered in the 17th Adaptation Fund Board meeting. The secretariat carried out a technical review of the project proposal, assigned it the diary number GHA/MIE/Water/2012/1 and filled in a review sheet.

7. In accordance with a request to the secretariat made by the Adaptation Fund Board in its 10th meeting, the secretariat shared this review sheet with UNDP, and offered it the opportunity

of providing responses before the review sheet was sent to the Project and Programme Committee of the Adaptation Fund.

8. The secretariat is submitting to the Project and Programme Review Committee the summary of the project, prepared by the secretariat, along with the final, revised submission of the proposal in the following section. The secretariat is also submitting to the Committee the technical review sheet in an addendum to this document.

Project Summary

Ghana – Increase Resilience to Climate Change in Northern Ghana through the Management of Water Resources and Diversification of Livelihoods
Implementing Entity: *UNDP*

Project/Programme Execution Cost: USD 707,657
Total Project/Programme Cost: 8,156,682
Implementing Fee: USD 693,318
Financing Requested: USD 8,850,000

Project/Programme Background and Context:

The main objective of the programme is to enhance the resilience and adaptive capacity of rural livelihoods to climate impacts and risks on water resources in the northern region of Ghana. The objective will be achieved through key results centered on the improvement of water access and also increase institutional capacity and coordination for integrated water management to support other uses of water resources especially for the diversification of livelihoods by rural communities.

The programme is designed to support Ghana kick-start the implementation of the national priorities for climate change adaptation outlined in the National Climate Change Adaptation Strategy (NCCAS) of 2011 as well as those highlighted in the 2nd National Communication. Furthermore, the Programme is also meant to address climate change adaptation in Ghana's most vulnerable regions, especially building on recent recommendations of the WRC Report in climate change adaptation through integrated water resources management in the three northern-most regions. Similarly, the programme will support Ghana with the implementation of the national water policy of Ghana.

Component 1: Water resource management and planning under climate change (USD 750,000)

Component 1 focuses on the improvement of the current water resource management and planning especially of the major water sources such as the Volta basin, and other smaller basins, by mainstreaming climate change into the planning and management processes of water resources. The component is deemed crucial in adjusting community livelihoods and national development activities in the face of climate change impacts on water availability given the lack of contingency planning for climate change adaptation at any significant scale. Following the challenges that climate change impacts pose on the quantity and quality of water with potentially significant implications for the sustainability of Ghana‟s national development sectors, Component 1 focuses on the realization of specific outcome targets with measureable outputs guiding the implemented activities.

Component 2: Community level implementation of climate resilient water resource management activities (USD 4,149,025)

Capitalizing on Component 1 that improves the water management planning of water, Component 2 focuses on improving community level involvement in the planning and implementation of climate resilient water resource management activities. Current participation of communities, and in particular women, in planning and decision-making processes is highly limited resulting in lack of transparency, inequity in access and distribution of water resources. Therefore this component includes: community water supply and management plans to incorporate climate change-related risks, activities for the installation of small-scale irrigation

techniques to improve the productivity of agriculture, practices that reduces siltation, measures for water conservation under climate impacts, and flood management and protection measures.

Component 3: Diversification of livelihoods of rural communities under climate change (USD 1,650,000)

Component 3 is building on the opportunities emerging from community management of water resources of Component 2 in diversifying livelihoods away from climate-sensitive practices, into other activities that improve their resilience to climate risks. Assisting with the diversification of the livelihoods base into sectors that are not dependent completely on rainfed agricultural systems will be crucial for the resilience of rural livelihoods in the three northern regions. This component is therefore seeks to expand climate change adaptation for those people in Ghana that are most vulnerable by diversifying their livelihoods. The improvement of accessibility to water will have the potential of enhancing the resilience of livelihoods of communities by providing the opportunities for livelihood diversification. This will be achieved through activities such as the establishment of tree seedling nurseries, fisheries, tourism, construction, river transportation, etc. which could be used by local communities as sources of household incomes. The programme will build on existing programmes in supporting women's groups through training activities to gain marketable skills (such as food processing) to improve their livelihoods across the value chain.

Component 4: Knowledge, Institutional Capacity, and coordination on climate change (USD 920,000)

Component 4 targets knowledge and improved institutional capacity and coordination of national policies and community implementation activities, which will both contribute towards upscaling of the lessons learnt from Components 1, 2 and 3, thereby ensuring long-term sustainability of the programme and value for money. Activities for the collection of information following the implementation of Components 1, 2 and 3 will be carried out. The collected information will be used to develop knowledge materials, which clearly and simply explain how the management of multiple uses of water in the northern three regions. These materials will be used in enabling a range of stakeholders to improve resilience in terms of both water resources and rural livelihoods. These materials will also be disseminated and used to support institutional capacity development activities.

REQUEST FOR PROJECT/PROGRAMME FUNDING FROM ADAPTATION FUND

The annexed form should be completed and transmitted to the Adaptation Fund Board Secretariat by email or fax.

Please type in the responses using the template provided. The instructions attached to the form provide guidance to filling out the template.

Please note that a project/programme must be fully prepared (i.e., fully appraised for feasibility) when the request is submitted. The final project/programme document resulting from the appraisal process should be attached to this request for funding.

Complete documentation should be sent to

The Adaptation Fund Board Secretariat
1818 H Street NW
MSN G6-602
Washington, DC. 20433
U.S.A
Fax: +1 (202) 522-3240/5
Email: secretariat@adaptation-fund.org

ADAPTATION FUND

DATE OF RECEIPT:
ADAPTATION FUND PROJECT ID:
(For Adaptation Fund Board Secretariat Use Only)

PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY:	REGULAR PROJECT
COUNTRY/IES:	**GHANA**
TITLE OF PROJECT/PROGRAMME:	INCREASE RESILIENCE TO CLIMATE CHANGE IN NORTHERN GHANA THROUGH THE MANAGEMENT OF WATER RESOURCES AND DIVERSIFICATION OF LIVELIHOODS
TYPE OF IMPLEMENTING ENTITY:	MULTILATERAL IMPLEMENTING ENTITY
IMPLEMENTING ENTITY:	UNDP
EXECUTING ENTITY/IES:	MINISTRY OF ENVIRONMENT, SCIENCE AND TECHNOLOGY OF GHANA
AMOUNT OF FINANCING REQUESTED:	**8,850,000** (IN U.S DOLLARS EQUIVALENT)

PROJECT / PROGRAMME BACKGROUND AND CONTEXT:

Provide brief information on the problem the proposed project/programme is aiming to solve. Outline the economic social, development and environmental context in which the project would operate.

Geographic, Environmental and Socioeconomic Context:

- *Environmental context*

Located in Western Africa, Ghana is bordering the Gulf of Guinea, between Ivory Coast and Togo and by Burkina Faso in the north. Ghana falls between latitudes 4.5° N and 11.5° N and longitude 3.5°W and 1.3°E (Figure 1). The total land area is 239,460 km^2 and 8,520 km^2 of water. Ghana has extensive water bodies including the Lakes Volta and Bosomtwe with a surface area of 3,275m^2. There are other seasonally flooded lakes occupying over 23,350km^2. The terrain of Ghana is made up of mostly low plains with dissected plateau in the south-central areas. The elevation ranges between 0m from the Atlantic Ocean to Mount Afadjato (880m) as the highest point. The country is divided into five distinct geographical regions. There are the Coastal plains stretching across the southern portion of the country and featuring low sandy beaches interspersed with saltwater lagoons. There is a forested plateau region consisting of the Ashanti uplands and the Kwahu Plateau located inland in the southwest and south central Ghana. The remaining evergreen rainforest is located in the southwestern part of the country. The hilly Akwapim-Togo Ranges run north to south along the country's eastern border. The Volta Basin takes up most of central Ghana. Finally, the high plains characterize the northern third of the country.

Surface water covers 5% of the total area of country. The three major river systems are Volta River System, South Western River System and Coastal River System. The entire Volta River Basin of 174, 886 km^2 covers 70% of the country's land areas and includes the whole interior savannah zone. The Volta River and Lake provide water for industrial and domestic use, irrigation as well as livelihoods for a

number of people who are engaged in fishing along its banks and remains an important transportation link between southern and northern Ghana. The total annual runoff is estimated at 54 billion m^3 with 37 billion m^3 originating from within the country and 16.2 billion m^3 from outside.

All the major rivers in Ghana flow into the sea. The only area of internal drainage is found around Lake Bosomtwi, where only streams flow from the surrounding highlands into the lake. River valleys show diverse characteristics. The valleys of all the major rivers are bordered by terraces showing the former width and height of the rivers. Some of the valleys are guided in their direction by relief. The two main sources of water supply for the rivers are rainfall and spring. In areas with single rainfall maximum as in the north, the flow of rivers is intermittent. However, in areas with high and well-distributed rainfall within the year, the rivers flow throughout the year. Increasingly, water bodies are either dwindling or drying up across the country.

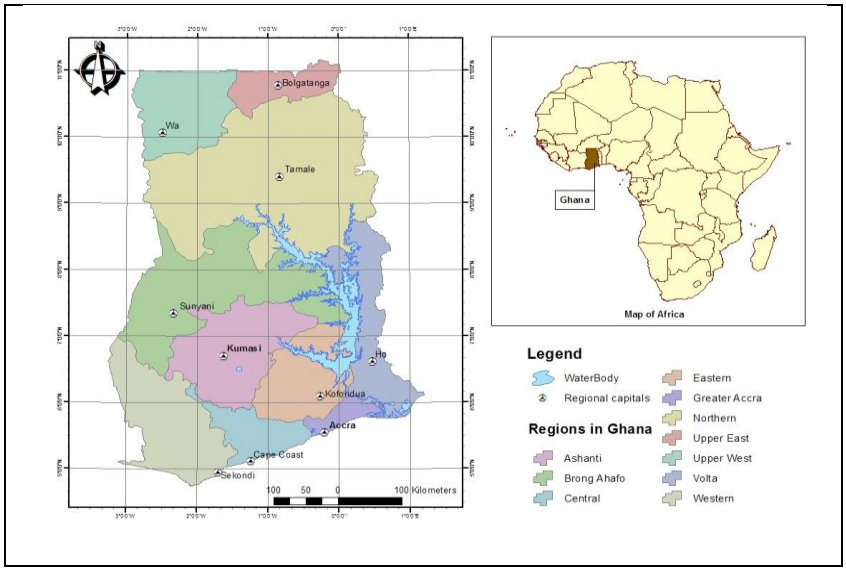


Figure 1. Map of Africa showing the location of Ghana

- *National socio-economic and development context*

Ghana has a population of about 22,409,572 with a population growth rate of about 2.07%.[1] In 2000, the urban population was estimated at about 44% and rural population of 56.2%. The increase in population is resulting in an increase in the demand for more arable land, food and biomass for energy as well as water resources for both livelihood and economic development. Current accessibility to water is limited. Agricultural production is mainly rain-fed, such that increase in output is largely linked to the lateral expansion of cultivated lands not on productivity over a unit area, thus, at the expense of other ecosystems such as wetland. Agriculture continues to be the mainstay of the Ghanaian economy, contributing an average 36% of Gross Domestic Product (GDP) for the period 2000-2006. Both extensive cropping and increase in demand for biomass has contributed to some land degradation.

Climate Change and Variability in Ghana

- *Current climate variability*

[1] Ghana Shared Growth and Development Agenda 2010-2013

Ghana is highly exposed to climate change and variability due to its location in the tropics. About 35 percent of the land mass is desert and desertification is already currently proceeding at a high rate. Ghana's geographic location, bordering the Atlantic Ocean to the south is exposed to contrasting oceanic influence and atmospheric changes that result in extreme weather events. In addition, the country's weather and climate patterns are also influenced by regional changes in oceanic (e.g. warming sea surface temperature) and atmospheric ((e.g. Inter-Tropical Convergence Zone[2]) circulation leading to important rainfall deficits, dry spells and drought variability, or rain sufficiency.

In Ghana, temperatures throughout the country are generally high and meteorological evidence predicts increases in temperature over the coming years. The mean annual temperature is generally above 24°C. The consequences of the low latitude position and the absence of high altitude areas have resulted in average temperature figures ranging between 24°C and 30°C. Extreme temperature conditions are experienced in some areas, for instance, temperatures ranging between 18°C and 40°C or more are common in the southern and northern parts of Ghana, respectively. Mean annual temperatures from 1960-2000 for the six major ecological zones (see Figure 2) revealed increasing surface air temperature for Ghana. Mean annual temperatures for two of the ecological zones (Sudan and Coastal Savannah) have increased greatly over the 40-year period with the Sudan Savannah experiencing an increase from 28.1°C in 1960 to 29.0°C in 2000 and the Coastal Savannah from 27.0°C in 1960 to 27.7°C in 2000. Even though such increase may appear negligible, a temperature increase of 0.1°C has serious implications for the survival of some plant species, animals and cropping patterns.

Rainfall generally decreases from the south to the north. The wettest area is the extreme southwest where annual rainfall is about 2000 mm. In the extreme north, the annual rainfall is less than 1100 mm and the driest area is the wedge like strip from east of Sekondi-Takoradi, extending eastward up to 40 km where annual rainfall is about 750 mm. Both rainfall intensity and seasonal distribution has changed in many parts of the country. Annual totals of rainfall amount in Ghana have decreased over the years. Rainfall is not only decreasing in some areas but also becoming erratic.

- *Projected climate change impacts*

Ghana's Second National Communication to the UNFCCC[3] assessed the predicted climate change for the six eco-climatic zones shown in Figure 2 and discussed below:

[2] Climate Change Adaptation. A Primer for Water Conservation, Flood Risk Reduction and Irrigation Strategy for Northern Ghana. WRC. 2011.
[3] Draft Ghana's Second National Communication to the UNFCCC. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.

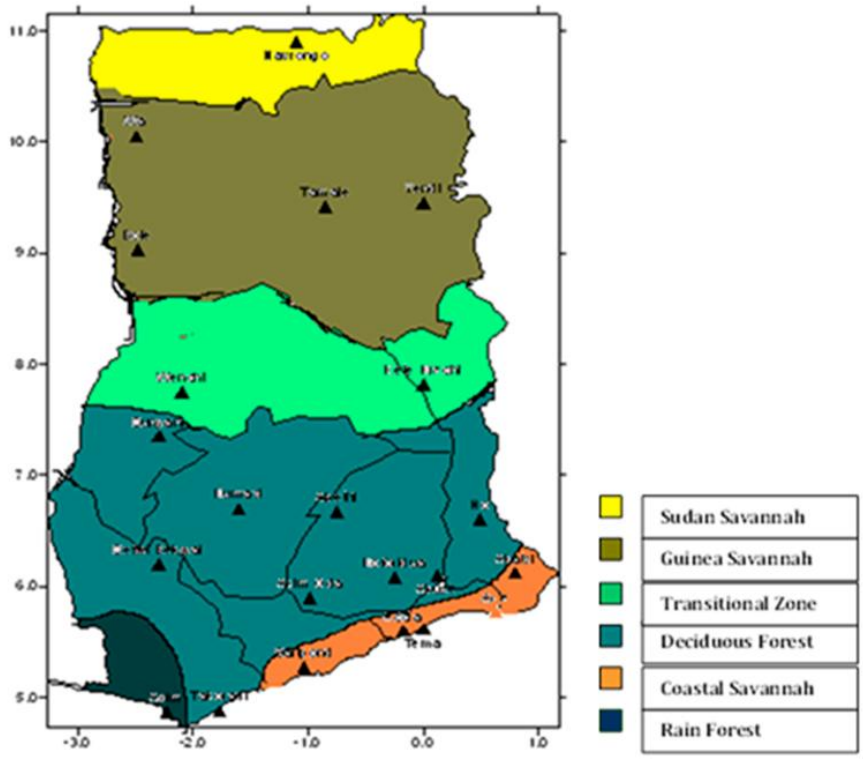


Figure 2 Areas on which climate change scenarios were developed

The Second National Communication provides a time series analysis of temperature and precipitation for these eco-climatic zones, as indicated in the Figures 3.1 – 3.5 below:

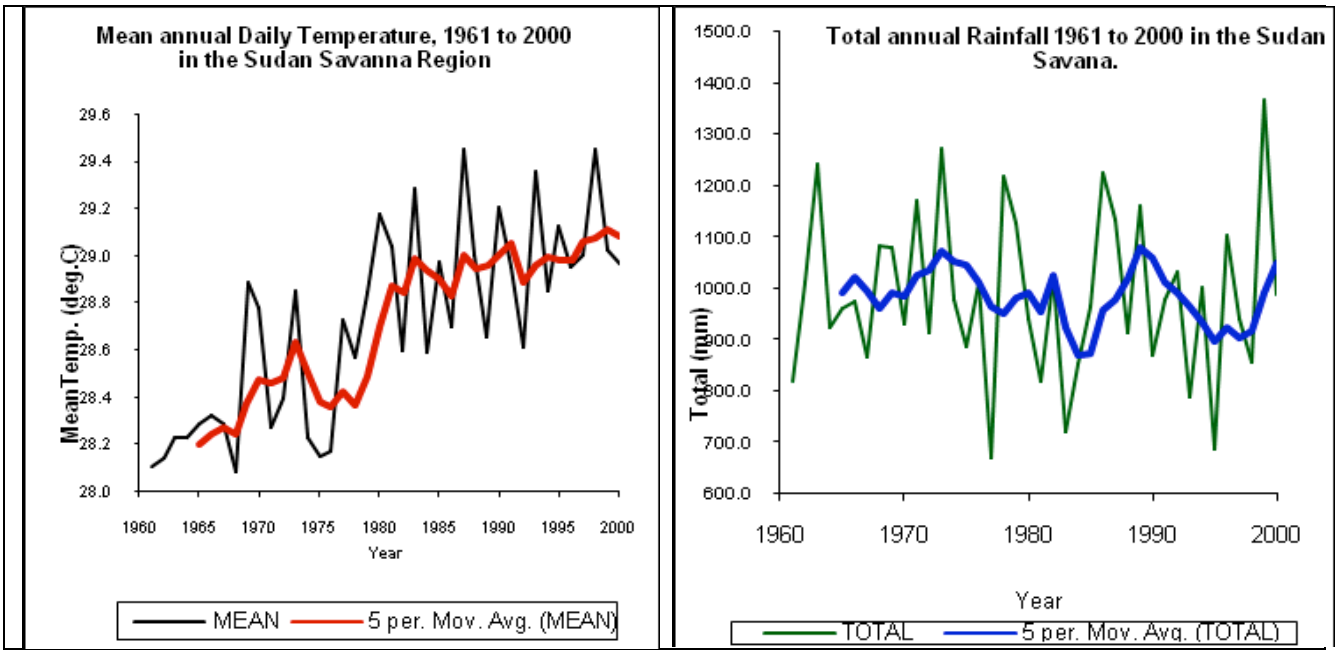


Figure 3.1 Mean Annual Daily Temperature and Total Annual Rainfall Amount: Sudan Savannah zone

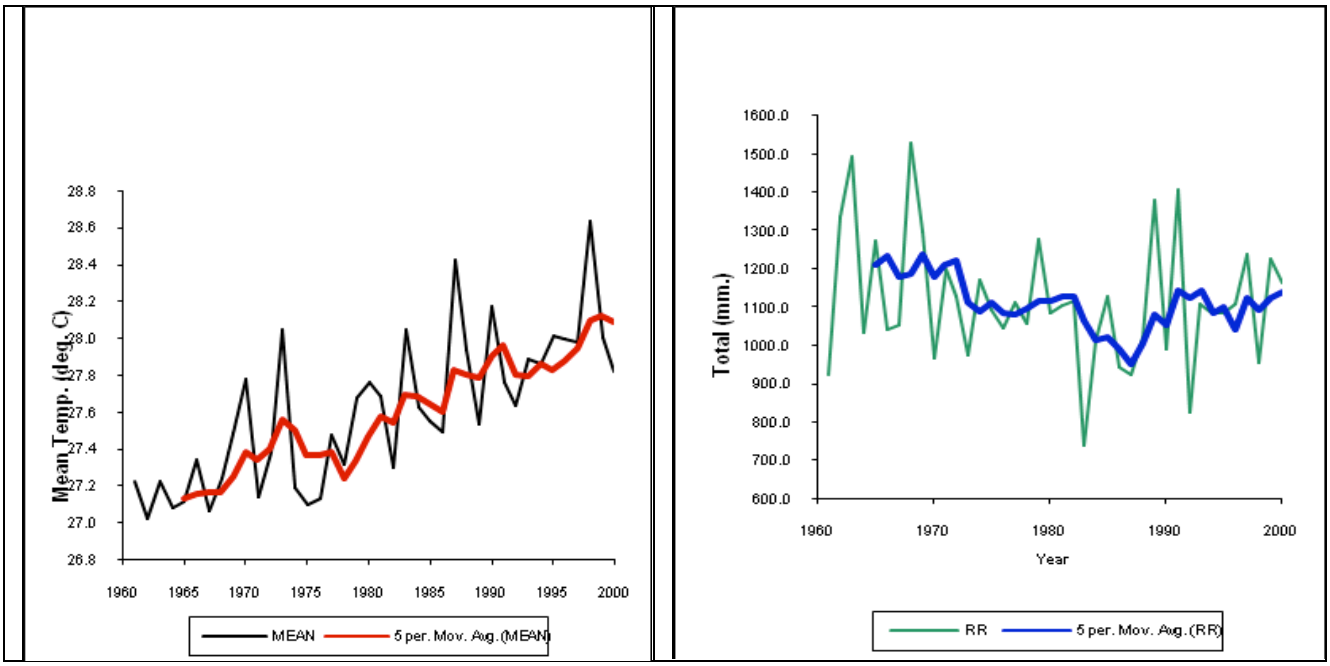


Figure 3.2 Mean Annual Daily Temperature and Total Annual Rainfall Amount: Guinea Savannah Zone

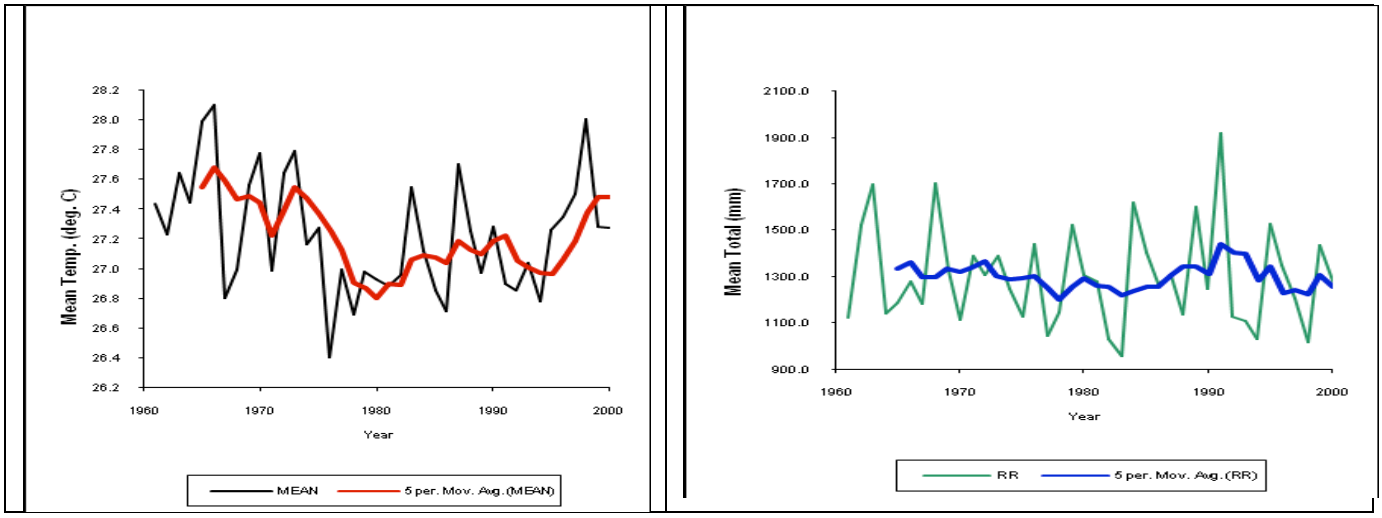


Figure 3.3 Mean Annual Daily Temperature and Total Annual Rainfall Amount: Transitional Zone

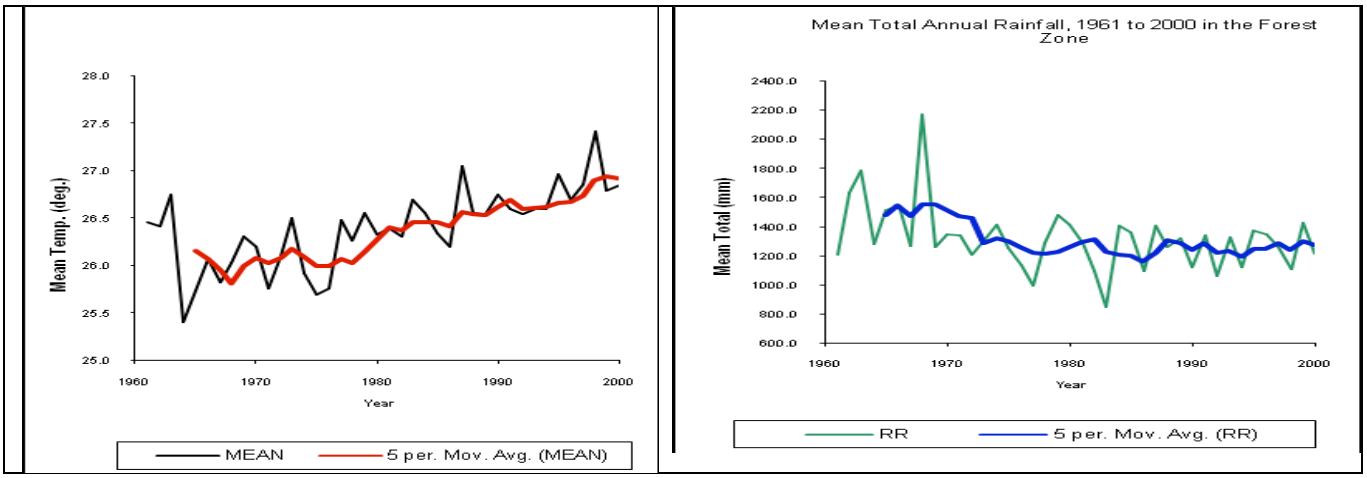


Figure 3.4 Mean Annual Daily Temperature and Total Annual Rainfall Amount: Forest Zone

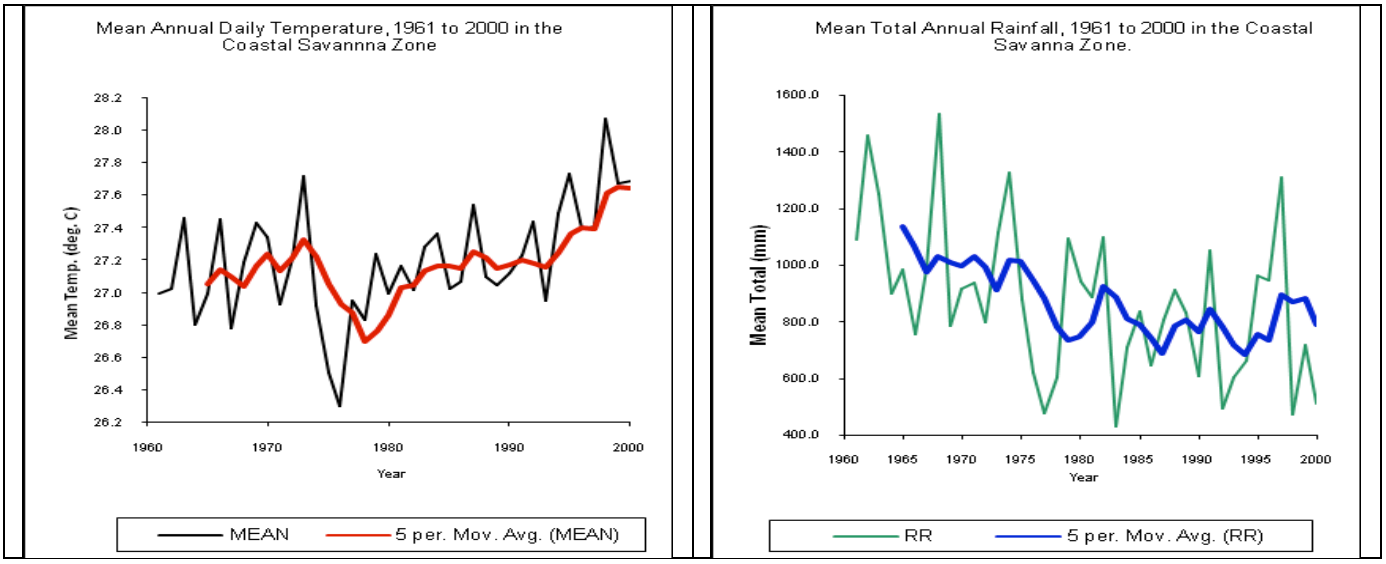


Figure 3.5 Mean Annual Daily Temperature and Total Annual Rainfall Amount: Coastal Savannah Zone

Following the 30-year mean of observed temperatures, the predicted scenarios developed over 2020, 2050 and 2080 time horizons, temperatures are generally expected to change by 0.6°C, 2.0°C and 3.9°C in 2020, 2050 and 2080 respectively (Table 1). The hottest months in the year are still likely to be between February and May whereas between June and September temperature will be relatively low.

Table 1 Scenarios of mean annual change in rainfall (%) for the ecological zones

Year	Sudan	Guinea	Transitional	Deciduous Rainforest	Rainforest	Coastal Savannah
2020	0.8	0.8	0.8	0.8	0.8	0.8
2050	2.6	2.5	2.5	2.5	2.5	2.5
2080	5.8	5.4	5.4	5.4	5.4	5.4

Using the observed rainfall records between 1961 and 2000, the scenarios for changes in rainfall for the six ecological zones for 2020, 2050 and 2080 predicts that annual mean rainfall levels are likely to reduce between 1.1% and 3.1% across all the agro-ecological zones by 2020 (Table 2). The highest reduction is expected in the rainforest and the coastal savannah zones. The changes in annual mean rainfall by 2080 is

expected to be between 13% and 21% of the observed baseline values. The rainforest zone is still likely to be the wettest areas in Ghana whereas Coastal and Sudan Savannahs continue to experience the least rainfall.

Table 2 Scenarios of mean annual change in rainfall (%) for the ecological zones

Year	Sudan	Guinea	Transitional	Deciduous Rainforest	Rainforest	Coastal Savannah
2020	-1.1	-1.9	-2.2	-2.8	-3.1	-3.1
2050	-6.7	-7.8	-8.8	-10.9	-12.1	-12.3
2080	-12.8	-12.6	-14.6	-18.6	-20.2	-20.5

Climate Impacts on Livelihoods, Water Resources and Food Security in Ghana

In Ghana just like other African countries, the life of 'the poor' is a life of vulnerability, which reflects the deeper problem of insecurity[4]. The poor depends heavily on environmental goods and services. Their livelihoods are punctuated by dependence on agriculture, fisheries and forestry (which revolve on the use of land and water resources), and on the capacity of ecosystems to provide the services vital for environment balance without which food production and other productive activities cannot be carried out on a sustainable basis. This trend puts the poor at risk relative to the rich. In both rural and urban Ghana, the poor are indeed highly vulnerable to environmental disasters and environment-related conflict and it is believed that the depth of vulnerability is correlated with the pace of environmental degradation exacerbating climate change impacts. Droughts, forest fires, and floods impact the poor in rural and urban areas more and show an increasing trend. Evidence of some extreme climate events that the country has experienced over the years includes:

- Floods
- Drought
- Bush fires
- Erratic rainfall patterns
- Sea level rise along the eastern coast
- Increased desertification/land degradation
- Consistent loss of forest cover
- Loss of some biodiversity

The country experienced severe drought in 1983. Since the late 1990s, floods have been increasingly frequent in the northern regions. Floods affected more than 300,000 people in 1999, 630,000 in 2007/08 and 140,000 in 2010, causing deaths, damaging farmlands, and destroying livelihoods. This resulted in severe hunger, which affected the poor and reduced gross domestic product for that year. The most severe flood occurred in 2007 during which 630,000 people were affected, through with losses of life and displacement, and extensive infrastructural damage and loss of crops. This phenomenon demonstrates the potential impact of climate change on Ghana's development.

Under a changing climate, poor farmers are finding it difficult to predict the timing of rainy seasons. Consequently, it is becoming difficult manage climate risks to crop production. Failure in crop production is one of the key factors undermining food security. The World Food Programme's Comprehensive Food Security and Vulnerability Analysis (2009) found that 5% of the population or 1.2 million people are food insecure. The bulk of the food insecure population is located in the northern regions: 34% in Upper West,

[4] Draft National Climate Change Adaptation Strategy. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.

by Upper East with 15% and Northern region with 10%. This is the equivalent of approximately 453,000 people.

Water is recognized as a cross-cutting resource underlying the National Growth and Poverty Reduction Strategy (GPRS 11) of Ghana[5] and the National Water Policy[6] with direct linkages to the realization of all the eight Millennium Development Goals. The consumptive demand for surface water resources is projected to be 5.13 billion m^3 (13% of the surface water resources) by 2020[7]. The lack of potable water through incidences of extreme climate events such as droughts and floods, increase the exposure of people especially women and children to water-borne and other hygiene related diseases such as diarrhea, cholera etc. Presently only 45% of the rural and 70% of the urban population have access to portable drinking water in Ghana. The burden of disease in Ghana indicates that about 70% can be attributed directly to environment, mainly due to the lack of drinkable water and means of sanitation. Besides household wellbeing, water plays central roles in many industrial activities providing livelihood opportunities and contributing to the national GDP. For example, hydropower generation, transportation services, tourism and the agricultural, livestock and fisheries sectors depend on water resources. Rainwater harvesting serves as the major source of surface water for many rural communities during the rainy season. In northern Ghana, aquifers have been located between 10 and 60 metres with an average of 27m.

Given the multiple uses of water (such as for agriculture, power generation, transport, industry, domestic purposes, ecosystems, fisheries and livelihoods), addressing the problems of adaptation that climate change poses cannot be achieved by those responsible for only managing water and acting in isolation. Multi-sectoral and multi-disciplinary collaborative responses are needed. However, given that the greater proportion of Ghanaians directly depend on agriculture for their livelihoods, it is particularly important that the relationship between water resources management and land management is cultivated. It is also important to treat water resources as a natural resource in tandem with forestry and direct land uses, rather than a commodity, which undermines its judicious use. Not only does the availability of water resources affect socio-economic conditions, but also its variations and especially the extremes (e.g. floods and droughts) present a serious hazard and threats to national growth and development (e.g. increased production costs).

Problem Statement: The Climate Change-induced Problem

There is high agreement by all national and regional scale analyses of vulnerability by various sources including government commissioned reports and independent scholastic research[10] that vulnerability especially to drought effects has geographical patterns and socioeconomic associations, with the three northern regions (Northern, Upper West and Upper East regions) the most vulnerable. Similarly, the adaptive capacity of these three northern regions is the lowest nationwide due to low socioeconomic development and heavy dependence of local economies and livelihoods, on rain-fed systems such as agriculture and forestry.

Decreasing annual rainfall and increasingly erraticrain fall patterns, due to climate change, are adversely affecting rural livelihoods in northern Ghana especially agricultural and pastoral practices. Such decreases in annual rainfall with erratic patterns are also expressed as drought and flooding posing enormous challenges to local communities to deal with such extreme events. Thus, against this backdrop, the problem statement therefore is that the livelihoods of communities in northern Ghana are increasingly vulnerable to water-related impacts of climate change, such as decreasing annual rainfall, increasingly

[5] Growth and Poverty Reduction Strategy II. National Development Planning Commission. 2005.
[6] National Water Policy. Ministry of Water Resources, Works and Housing. 2007.
[7] Draft Ghana's Second National Communication to the UNFCCC. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.

erratic rainfall patterns and increased frequency of high intensity rainfall events. The programme will therefore address climate change-induced decreases in the availability and increasing unpredictability of water resources, and the associated negative impacts of these trends on the livelihoods of rural communities.

Agriculture is the major driver of Ghana's economy; consistently contributing more than 30 per cent of GDP since independence and employing close to 60% of the population. The agricultural sector's contribution to national development is highly linked to its potential for poverty reduction. In the northern regions much of the agriculture is rain fed and on a subsistence scale. Food crops are cultivated mostly in only one season. In addition, since the agricultural practice is dependent upon the availability and distribution of the rainfall over the rainy season months, farmers suffer significant losses when the rains fail.

The water storage potential of the agricultural landscape is not at its full potential, which restricts agricultural production potential in northern Ghana. Land degradation, high rates of erosion and high intensity rainfall contribute significant volumes of sediment to the existing small dams and dugouts, reducing their water holding capacity. Efforts to reduce erosion such as reforestation and riparian zone management, coupled with efforts to de-silt and repair infrastructure will be necessary in order reduce the vulnerability of agriculture to increasing rainfall reductions and variability. In addition, a predicted overall reduction in rainfall, coupled with greater rainfall irregularity will have negative implications for the important hydropower component of Ghana's energy sources.

Non-sustainable forest management under high rate of deforestation is amplifying climate change impacts in Ghana manifested in scarcity of freshwater, desertification, loss of soil fertility, loss of agricultural productivity, loss of fuelwood, loss of safety nets in Non-Timber Forest Products (NTFPs), and increased sensitivity to human and natural hazards.

Programme Target Area

- *The target area – The Three Northern Ghana Regions (Savannah Region)*

The proposed programme will target the three regions in the northern part of Ghana, namely the Upper East, Upper West and Northern Regions (collectively referred to as the "northern regions"). Compared to other regions of the country, these three northern regions have high degree of exposure to climate variability and change characterized by increasing temperatures and decreasing and erratic rainfall, which, when coupled with low socio-economic development are classified by the government of Ghana as highly vulnerable to climate change and high priority regions for climate change adaptation. There is a visible developmental gap between northern and southern Ghana[8] with the north harboring significantly higher levels of poverty than the south. The programme will also explore whether different adaptation solutions are required for the three northern most ecological zones in the country.

[8] SADA Strategy and Workplan 2010-2030. Savannah Accelerated Development Authority. 2010.

Figure 4. The three northern regions of Ghana.

- *Programme target area – context*

In Ghana, vulnerability to climate change differs both spatially and socially. Rural areas and the northern region are more affected as well as social groups that highly depend on climate-sensitive sectors such as agriculture, livestock grazers, fisheries, forestry, etc. Furthermore, each ecological zone has a particular physical and socio-economic characteristic that defines its sensitivity and resilience to climate change impacts. Poverty for example is a good indicator of vulnerability, while occupation and location determine sensitivity, though occupation and location also define poverty. In spite these differences between the ecological zones, the vulnerability of a society is largely influenced by its development pathway, physical exposures, the distribution of resources to deal with the stressors, and social and government institutions[9].

According to the Ghana Living Standards Survey (GLSS) 4[10], 40% of the Ghanaian population has incomes below the upper poverty line, while about 27% of the population has incomes below the extreme poverty line. This forms nearly a third of the population of Ghana (about six million) who are unable to meet their basic nutrition needs, even if they devoted their entire consumption budget to food. Poverty is still predominantly severe in rural areas accounting for more than 70% of the poor. Five (5) out of the ten (10) regions in Ghana had more than 40% of their population living in poverty. The poorest areas are the three northern savannah regions.

The three northern regions have comparatively lower attendance rates for all school going ages which demonstrates the low turnover of capacity development through formal educational programmes which constitute an important factor in the adaptive capacity to climate change[11]. According to the Ghana Living

[9] Draft National Climate Change Adaptation Strategy. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.
[10] Ghana Living Standards Survey Round 4. Ghana Statistical Service. 1998.
[11] Ghana Living Standards Survey Report (GLSS 5) 2008

Standards Survey Report (GLSS 5) of 2008, the three northern regions (Upper West, Northern and Upper East) have highest household sizes of 6.5, 5.5 and 5.4 respectively in the country.

The dominance of men over women in the northern parts of Ghana, in terms of ownership of land, access to and control of resources, and in decision making is overwhelming. Although the low access of women to land is what is often reported in development circles, women also have limited access to household labour, and indeed, it is the latter limitation that may be the cause of the land access problem. The level of illiteracy among women is much higher than it is among men; cultural norms about visibility and traditional gender roles imply heavy workloads on women. All of these impose time constraints on women and tend to limit their awareness about opportunities in general and participation in development programmes in particular[12].

The current situation in the three northern savannah ecological belts can be described in terms of resource endowments (agriculture, water, mineral resources and energy) as affecting risks and vulnerability. The state of agriculture in the three northern regions is characterized by a number of factors including the availability of land; comparative advantage in the production of particular crops; untapped potential for livestock production. Despite showing some indication towards commercialization, subsistence agriculture remains prevalent in the northern regions

The northern regions of Ghana comprise of about 100,000 km^2, representing more than 40 percent of national land area and 65 percent of the savannah vegetation. Total agricultural land is 6.1 million hectares of which cultivated land area between 2001 and 2007 was 1.54 million hectares. Average land holdings range from 2.7 hectares in Upper West to 5.6 hectares in the Northern Region. Average size of smallholdings has grown over the decade 1998-2006. This is consistent with the trend of land expansion driving output growth.

A significant proportion of arable land has soils with poor physical properties and low content of organic matter. Relatively good soils are ground water laterites which tend to be limited in depth by hard pan. Soils are highly susceptible to erosion because of the thin vegetative coverage and torrential nature of poorly distributed rainfall. There is limited use of soil management practices (e.g. use of fertilisers, water management, mulching). This has resulted, under these poor conditions, in low productivity in both crops and livestock.

However, northern Ghana has a wealth of under-utilised resources to support an intensified agriculture modernisation programme. These include a network of river basins with highly fertile valleys (e.g. the oncho-freed basins of the Volta and Sissili rivers, the Fumbisi valley, Nasia, Tamne, Katanga, Naboggu, and Soo valleys). These areas can become major agricultural production zones for different crops[13]. With adequate water management, horticultural commodities, including tomato, okra, chili, mango, cashew, water melon and sweet melon can also be produced and marketed competitively and over a longer season than is currently the case. The north is the home of the shea tree, which can be developed into a major oils and fats industry with benefits to rural women (who are currently at the heart of the shea industry as nut collectors and processors), shea-nut merchants and the country at large. This current proposal can build on existing programmes supporting women's groups with training in marketable skills, such as food processing and handicrafts. Seedling cultivation for reforestation efforts presents another potential area for livelihood diversification.

[12] SADA Strategy and Workplan 2010-2030. Savannah Accelerated Development Authority. 2010.
[13] SADA Strategy and Workplan 2010-2030. Savannah Accelerated Development Authority. 2010.

Northern Ghana contributes 39 percent to national livestock numbers, 70 percent of beef cattle, and 36 percent of sheep and goats. Although generally higher than the rest of the country, livestock numbers per household are modest. The percentage of households owning livestock ranges from a low of 43 percent for pigs, to over 80 percent for goats and domestic fowls.

- *Climate Change Impacts in the Target Area*

Water availability is the single most important production and livelihood factor in the northern regions. There is thus a clearly articulated need to counteract the negative impacts of climate change on water resources-reliant development and livelihoods. It is also necessary to look at the efficiency of water use. Likewise the ability to cope with floods and droughts is necessary in order to protect people, livelihoods and development.

The northern regions are expected to witness the witness the widest range of temperature variability. One of the greatest influences of climate change on the environment has been desertification. According to the Environment Protection Agency of Ghana (EPA 2003), out of the 35% (~83,489 km^2) of Ghana's total land area prone to desertification, 33% (~78,718 km^2) is in the northern regions which tend to be increasing following recent assessments that show diminishing precipitation (World Bank 2009).

Climate change is expected to have an impact on agricultural production by increasing pressure on water resources. Agriculture in the three northern regions is predominantly rain-fed with only 4 per cent of irrigation potential developed nationally. About 90 percent of the rainfall is received between June and September and soil moisture surplus is only found during these months. Both the onset and the cessation of the rains are irregular and the temporal and spatial variability is high. Even within the humid months of June to September, 10 to 14 days of dry spells are common. Potential evaporation is in the range of 2000 mm per year. Most of the soils have low water holding capacity due to their light textured nature and low organic matter content[14]. High surface runoff rates during the rainy months result in silting up of water storage facilities such as small dams and community dug-outs. High evaporation rates in the dry and hot season, and siltation driven by erosion and land clearing contributes to reduced water holding capacity, and rapid drying up of these dugouts. This programme will support existing efforts supporting communities to rehabilitate and de-silt small dam and dug out infrastructure, to improve availability of water for agricultural, and domestic use. Land management programmes including reforestation, and rehabilitation of riparian zones will also be supported to reduce siltation in small dugouts and dams by reducing erosion.

Extreme flood events are increasing in the three northern regions, partly due to the impacts of climate change in the form of extreme rainfall events. Flooding results in a loss of crops, waterborne diseases and sometimes loss of life.

Climate change trends in the target area

Climate change is expected to exacerbate the current situation due to its impact on water resources and thus also on programmes and activities of water dependent sectors such as agriculture. A recent study by

[14] National Action Programme to Combat Drought and Desertification. EPA. 2003.

the Water Resources Commission[15] enumerates climate change scenarios for water resources in three representative water catchments (Pra, Ayensu and White Volta) across Ghana:

i. Runoff or discharges in all three representative basins are sensitive to changes in precipitation and temperature and thus to climate change. A 10 percent change in precipitation or a 1°C rise in temperature could cause a reduction in runoff of not less than 10 percent
ii. Simulations using climate change scenarios indicated reductions in flows between 15-20 percent and 30-40 percent for the year 2020 and 2050 respectively
iii. Climate change could cause reduction in groundwater recharge between 5 and 22 percent by the year 2020. Reductions for the year 2050 are projected to be between 30 and 40%
iv. Irrigation water demand could be affected considerably by climate change. For the dry interior savannah, increases in irrigation water demand are about 150 percent to 1200 percent for 2020 and 2050 respectively
v. A vulnerability index (persons/mill. m3 of water) shows that the White Volta basin was marginally vulnerable in 1990, while in 2020 the basin would be vulnerable (water stressed) and in 2050 it would be extremely vulnerable (water scarcity)

Climate change impacts in the northern region of Ghana will severely impact the livelihoods of rural communities following their high dependence on climate-driven sectors like agriculture, livestock production, fisheries, etc. There is therefore the need to minimize impact of climate change on traditional livelihoods through the provision of alternatives and diversifications. This programme is oriented towards to livelihood diversification from the traditional ones (particularly rain-fed agriculture) and capable of creating independent and profitable sources of incomes for the community. This is crucial as forest safety nets are lost following the rapid loss of forest cover currently at 62,000 hectares per annum. The three northern regions have comparatively lower attendance rates for all school going ages which demonstrates the low turnover of capacity development through formal educational programmes which constitute an important factor in the adaptive capacity to climate change[16]. According to the 2008 Ghana Living Standards Survey Report (GLSS 5), the three northern regions (Upper West, Northern and Upper East) have the highest household sizes of 6.5, 5.5 and 5.4 respectively in the country.

About 40% of household nationwide in Ghana have access to pipe-borne water[18]. In rural areas, the majority of the households (59%) get their water from a well or natural sources (26%). In the northern savannah region, 57.7% of households depend on wells and 36.5% on natural sources (rivers, streams, rainwater, dugouts, ponds, lakes, dams etc.). This demonstrates the vulnerability of household water supply to climate change impacts as temperature increases and rainfall amount reduces. With regards to other social amenities in the northern regions, 82.3% of household directly depend on wood as a source of cooking fuel and 80.9 % on kerosene for lighting. Over 68.9% have no formal toilet facilities. The majority of livestock activities in Ghana take place in the northern regions. The predicted trend in climate change in the three northern regions is therefore likely to have severe impacts on the livelihoods of communities.

- *Climate Change Accelerants and Impacts*

[15] Climate Change Adaptation. A Primer for Water Conservation, Flood Risk Reduction and Irrigation Strategy for Northern Ghana. WRC. 2011.
[16] Ghana Living Standards Survey Report (GLSS 5) 2008

Much of the poverty in the north is risk and vulnerability induced. This exposure to risks and vulnerabilities is determined by a number of factors, ranging from natural, social, and human made causes. These include the following[17]:

Climate induced risks and vulnerabilities: More than 80 percent of the population of northern Ghana depends on unimodal rain fed agriculture for their food, income and livelihoods. Therefore, incidents of droughts and floods have multiple effects on the coping strategies of the people. With climate change, it is expected that the frequency of the incidence of both droughts and floods will increase and hence erode the viability of coping strategies overtime.

Vulnerabilities associated with limited opportunities for off farm and non-farm economic activities: The north remains dependent on food crop farming with very little opportunity for non-farm activities. The share of household income deriving from non-farm activities remains significantly lower than the rest of the country and is the lowest in the most food-insecure region (Upper East). For seven to eight months in the year, the majority of the agricultural population in northern Ghana has no alternative or complementary means of securing their livelihoods, as infrastructure to support off season agricultural activities are underdeveloped or non-existent. Although women usually engage in micro-agro processing initiatives such as the production of seed oils (shea butter, groundnut oil), and handicrafts, the markets for these products are small, underdeveloped, and therefore provide only small margins that limit business growth and development. The livestock sector that holds a promise for providing alternative sources of income is also largely underdeveloped due to limited investments in the sector. Consequently, opportunities for supplementing food and income from the rain-fed subsistent farming activities during the long dry season are limited.

Weakening Traditional Safety Nets and Increased Vulnerabilities: Mutual support initiatives and remittances from friends and family members living outside the community once served as an important source of supplementary food, income, and livelihood support to the families in the north. However, due to social and economic pressures, this traditional safety net mechanism has been weakened, thereby increasing exposure of the poor, especially women, the young, and the aged to greater and increasingly more protracted poverty induced vulnerabilities. Incidentally, the risk exposure of these subcategories of the population to poverty induced vulnerability is greater because they face considerable cultural and institutional obstacles in gaining access to productive resources such as land, credit, and other support services for their farm and off-farm income generation ventures. This programme will build on ongoing income generating activities in the north including food processing and handicrafts. Efforts to retrain community members in other marketable skills will also assist communities to reduce their reliance on rain-fed agriculture, reducing their vulnerability to climatic shocks.

Preferred Solutions for Climate Change Adaptation

Climate change present societies with a variety of new challenges especially in the poorest regions of the world as changes in mean temperature affect food productivity and water availability triggering other burden of malnutrition, diarrheal illnesses and other water and airborne infections. Ghana's water resources and water supply systems are extremely vulnerable to current climatic patterns that generate periodic droughts and flooding. Similarly, the production sectors (agriculture, grazing, fisheries, forestry etc.) that sustain the livelihoods of the majority of the population especially in rural areas, are also severely affected by climatic patterns affecting water resources and supply. Both vulnerability and adaptation are unevenly distributed, and in many cases, it is the most vulnerable individuals and communities who are least able to adapt. This further shapes the scale and types of adaptation actions

[19]SADA Strategy and Workplan 2010-2030. Savannah Accelerated Development Authority. 2010.

required in response to the nature and context of the climatic vulnerability. The primary problem addressed by this programme that requires adaptation is climate change-induced decreases in the availability and increasing unpredictability of water resources, and the associated negative impacts of this on the livelihoods of rural communities in the northern regions of Ghana. Under such circumstances, the preferred solutions for adaptation should address climate impacts on water availability and well as measures that reduce the vulnerability of sectors (e.g. agriculture, livestock, forestry etc.) supporting community livelihoods in the northern region. Although the consequences of climate change effects on water have been well established[18], an understanding on how to cope with the potential impacts at regional, national and local levels is still not properly managed by developing countries due to limited investigation[19] to generate knowledge required for adaptation and resilience of natural or human systems to actual or expected climatic threats. There is need for in depth knowledge in addressing the underlying causes of vulnerability of water resources in order to tailor adaptation measures and interventions put in place. Adapting water management systems to ensure regular supply and distribution under climate change so as to reduce the vulnerability of local communities and their livelihood activities remains a significant challenge in the northern region of Ghana. Natural disasters such as floods, droughts, wildfires and famine have characterised the Northern region of Ghana for decades and now becoming more frequent and intense especially flooding that have led to seasonal stress among inhabitants. The adaptation actions in this programme will target the principal causes of vulnerability identified in the northern regions of Ghana that include:

a. Water resource management planning takes into account the impacts of climate change

Although the government of Ghana has invested in major catchment development programmes, the basin wide management plan for the White Volta, for example, fails to take into consideration climate change impacts and the vulnerability of the sectors and communities that depend on the White Volta as their primary source of water. Furthermore, there is currently only an overarching management plan for the White Volta without plans for the small basins and tributaries directly used by local communities. For both the main basin and the sub-basins, climate change has not been mainstreamed into the current water resource management planning.

The importance of this programme's interventions therefore is to ensure that water as a natural resource, can sustainably provide the range of goods and services required for social, economic and environmental adaptation. Therefore, some of the proposed measures targeting the underlying sources of vulnerability for communities and institutions affecting their capacities for climate change adaptation are provided under the main sources of vulnerability identified above.

The enhancement of current water management plans for catchments with plans for small sub-catchments is proposed, as well as mainstreaming climate change into current and future water management plans of both the main and sub-catchments. These are considered to be important measures for adaptation in the northern region of Ghana.

In order to increase the resilience of communities against the adverse impacts of climate change and variability through water resources management, concerted efforts must be made in scaling up of integrated water resource management (IWRM) to include climate change adaptation issues. IWRM is considered as a way to maximize water quality and quantity to meet water needs for consumptive use and aquatic ecosystems by integrating water and land-use decision-making by local and regional agencies.

[18] IPCC 2007 – IPCC Fourth Assessment Report

[19] GWP-TEC 2007 – Climate change adaptation and integrated water resource management- An initial overview. Policy Brief 5. Global Water Partnership Technical Committee, Elanders, Stockholm

This is based on four principles formulated by the International Conference on Water and the Environment in Dublin, 1992. These include:

1) Freshwater is a finite and vulnerable resource, essential to sustain life, development and the environment;
2) Water development and management should be based on a participatory approach, involving users, planners and policymakers at all levels;
3) Women play a central part in the provision, management and safeguarding of water,
4) Water has an economic value in all its competing uses and should be recognized as an economic good.

Mainstreaming adaptation into IWRM will help local communities who are usually the most vulnerable in society, to respond timely to climate change disasters. More practically, this programme will draw on diverse options for adaptation of water management strategies as highlighted by the WRC[20], such as (i) conserve water supplies efficiently; (ii) adopt innovative means of harnessing water, especially supplies for irrigation and livestock watering; (iii) increase water storage and improve availability; (iv) explore the role of groundwater; and (v) improve water basin management, and restore ecosystems through catchments protection and buffer zones.

b. Grassroots participation in water management planning and community capacity for the implementation of water resource management activities to reduce vulnerability to climate change impacts on community livelihoods

There are only limited communities that benefit from community water supply. Management planning and implementation is required to expand the number of beneficiaries and to enhance climate resilient management of water resources in communities in northern Ghana. This compromises water supply measures for multiple uses. Historically there is a limited human capacity development in northern Ghana with high levels of poverty and very limited financial resources for investment in agricultural management techniques and water capture and storage infrastructure. There is a weak knowledge-base and capacity for effective water capture, management and conservation in addressing climate-induced shortages in water supply.

The establishment of community supply and management plans drawing from diverse sources of water supply in addressing shortages under climate change is crucial. This will require financial support for the improvement of infrastructure for water harvesting, storage and distribution. There is also need for support for capture, management and conservation of water.

- *Coordination of smallholders' community activities*

Following the predominance of smallholders' community activities, proper coordination systems will be put in place to improve on their cost effectiveness and thereby reduction in transaction costs, and thus, improving on their competitiveness in the market following post-harvest and other climate-risk sharing measures and their ability to manage water resources. Importantly, emphasis will be placed on developing and building the capacity of existing community level institutions where possible, taking advantage of existing institutional arrangements. (e.g. water management bodies)

- *Mainstreaming Climate Change Adaptation into Water Management Planning*

[20] Climate Change Adaptation. A Primer for Water Conservation, Flood Risk Reduction and Irrigation Strategy for Northern Ghana. WRC. 2011.

Mainstreaming adaptation into water management planning of communities will help these local communities who are usually the most vulnerable in society, to respond timely to climate change disasters and improve the resilience of their water supply sources. More practically, this programme will draw on and implement diverse options for adaptation of water management strategies as highlighted by the WRC[21], such as (i) conserve water supplies efficiently; (ii) adopt innovative means of harnessing water, especially supplies for irrigation and livestock watering; (iii) increase water storage and improve availability; (iv) explore the role of groundwater; and (v) improve water basin management, and restore ecosystems through catchments protection and buffer zones.

c. Diversification of livelihoods of local communities as safety nets to climate change impacts

There is over-reliance on rain-fed agriculture and livestock in the northern region of Ghana that makes them vulnerable to climate change under limited capacity to capture, manage and conserve water. Because of erratic rainfall patterns, there is limited ability to increase productivity and low capacity for livelihood diversification. Financial resources and capacity enhancement will be required to provide the knowledge and alternative means of livelihood activities and the ability for agricultural intensification.

- *Diversification of Livelihoods*

Improving rainwater harvesting, water storage and conservation techniques by the local communities of the northern regions of Ghana is crucial since such measures have the potential to create opportunities for livelihood diversification in addressing climate risks in a region that is currently heavily dependent on rain fed agriculture. The diversification of livelihood options into sectors that are not dependent on rainfall will be supported. This could include options such as food processing, small ruminants and guinea fowl raising and tree seedling nurseries. This adaptation solution will have a particular focus on supporting livelihood options for women.

- *Improving water supply systems to enhance agricultural process.*

Encouraging small scale irrigation schemes and instituting water harvesting measures will provide adaptation solutions for improving agricultural productivity and improving community livelihoods.

- *Improving agricultural techniques*

Encouraging the use (and where appropriate development) of agricultural techniques and approaches which are more favourable than those used currently in future water availability scenarios. This includes the use of seed varieties that enable adaptation to a changing climate such as the use of rapidly maturing maize varieties that secure production during a decreasing growing season.

d. Institutional capacity enhancement to deal with climate risks

The current knowledge base on the impacts of climate change on the water resources of the regions is weak to support institutional processes and development, from a regional to local institutional level. Improving the knowledge base in institutions to support "on the ground" measures in terms of water resource management and livelihood diversification is an important solution targeted in the programme. Building the capacity local communities and regional and national institutions in addressing climate change will also provide sustainability and the required ownership of the programme by the community.

Development and dissemination of knowledge products on alternative livelihood options and community level water management, as well as strengthening institutional capacity via "learning by doing" are crucial measures for adaptation.

[21] Climate Change Adaptation. A Primer for Water Conservation, Flood Risk Reduction and Irrigation Strategy for Northern Ghana. WRC. 2011.

e. Promoting Land tenure systems that favor contiguous crop fields for supply of services

To improve productivity of crop fields and efficiency in the use of inputs and other services, local institutional policies that facilitate land use planning and tenure systems that provide for contiguous crop fields for local communities, will be advocated. There are some institutional regulations prohibiting the tree clearing in riparian zones but enforcement remains a challenged.

f. Adapting Agricultural Practices

Agricultural practices will be adapted to take advantage of any improved supplies to water that are possible, but also to be more resilient to low water conditions, moving away from a reliance on rainwater. For example, lessons will be sought from more northern, drier areas, such as further north in Ghana or in Burkina Faso.

- *Barriers to achieving preferred solutions*

The persistence of risks and the exacerbation of vulnerability in northern Ghana also derive from an intricate network of causal factors that have their roots, in many cases, in both historical and contemporary failures of national development policies related to the north. Central to these are some major barriers that limit the realization of the preferred solutions for adaptation. Addressing these barriers will constitute the overarching change by the Adaptation Fund resources in order to reduce vulnerability of the local communities in the northern regions. The barriers are discussed under the expected outcomes in providing preferred solutions for adaptation:

a. Improved planning and management of water resources taking into account climate change impacts on surface and groundwater sources.

- *Limited institutional capacity in integrating climate change in water resources planning and management in the northern region of Ghana*

Attention on climate change in Ghana is gaining leap momentum both at the highest political level and across sectors. At the policy level, climate change is being mainstreamed into the main national development, in particular, into Ghana's Shared Growth and Development Agenda, coordinated by the National Development Planning Commission (NDPC). The Ministry of Environment, Science and Technology (MEST) is the lead institution for climate change and UNFCCC activities in the country and the host of a functional National Committee on Climate Change (NCCC). At the implementation level, the EPA is the main Country Implementing Institution (CII) for technical coordination of activities on climate change, the UNFCCC and some other environmental conventions ratified by Ghana. Within the Agency, a specialized unit on "Energy Resources and Climate Change" has been established. The capacity of these and other institutions to mainstream climate change resilience into their activities is being addressed by programmes such as the Africa Adaptation Programme (AAP). However, detailed technical capacity to respond to specific climate-induced problems, particularly the development and implementation of solutions "on the ground", such as those relating to water resources, remains los. For example, there is a lack of climate change projections and impact analysis for the White Volta river basin, which is crucial in managing climate change impacts on the water catchment and the vulnerability of the sectors and communities that depend on it for their water supply.

Through the Adaptation Fund resources, the programme will contribute towards raising institutional capacity to increase community resilience in the northern regions to climate change induced problems relating to water resources and livelihoods and infrastructure. It will achieve this by obtaining their full involvement and ownership in the adaptation activities within the programme, as well as generating knowledge products and dissemination mechanisms to assist in future understanding of problems and implementation of solutions.

- *Limited capacity to manage trans-border sources of risks and Vulnerabilities*

Much of northern Ghana also shares common borders with neighboring countries. The Volta basin is shared with Burkina Faso and Ivory Coast, meaning that there is a potential off-site vulnerability resulting from the transboundary users of the water resources. There are cases of flooding triggered by incoherence in the management of the basin across national frontiers. Following the transboundary nature of the water basins in the northern region, this might pose a barrier to implementation of some adaptation measures, as the activities of up-river countries including those intended to increase their own resilience to climate change impacts, may adversely affect water resources in Ghana. For example, the opening of the Bagre Dam in Burkina Faso has resulted in flood problems in Ghana, which is downstream of the dam. These issues can, at least in part, be overcome by this programme using the currently established regional institutional platform of the Volta Basin Authority between Ghana, Burkina Faso, Ivory Coast and Togo responsible for the management of the river basin, as well as the Volta Basin Observatory for monitoring changes in the river basin, by providing them with critical information and knowledge materials for the management of the shared water body. The proposed programme will assist in improving institutional capacity and coordination abilities in order to manage trans-border risks better. Enhancing the capacity of local communities in floodwater harvesting and storage will provide opportunities for livelihood diversification during periods of water shortages such market gardening, local brick construction etc.

b. Climate resilient management of water resources by communities in Northern Ghana

There is currently a lack of encouragement and preparedness of poor rural communities and local organizations in the management and better oversight of their natural resources especially water resources. Risks and vulnerability in the north are often exacerbated by increased human induced disasters under poor management of resources, which sometimes degenerate into conflicts. Indeed, Northern Ghana has been home to most of the violent intra and inter-ethnic conflicts in Ghana. In the main, chieftaincy succession and land ownership disputes have been mutually reinforcing causal factors especially under scarcity of water resources.

Food and income vulnerabilities in northern Ghana are accentuated by the limited investment in the development of agricultural infrastructure in the north. Incidentally, the limited investment in the construction of dams, dugouts and the judicious management of watersheds is not only negatively impacting on the ability of the north to produce food for home consumption and the market, it also creates the situation where the poor management of water resources have contributed to increased risks and vulnerabilities due to weather-induced disasters. For instance, the high rates of surface water run-off during the short rainy season not only washes off the top of the already fragile and exhausted soils; the flash floods associated with the sudden and heavy downpours constantly destroy life and property of communities caught in their pathways. This affects the short and long term livelihood securities of communities lying within the drainage paths of major rivers such as the Volta Rivers.

c. Enhanced diversification of livelihoods of communities in northern Ghana

There is lack of knowledge regarding alternative livelihood as safety nets for communities, as well as a deep-seated cultural situation in which communities remain rooted in rain-fed agriculture as a means of existence, and do not look for opportunities for economic advancement. There is a national recognition that agriculture is a vehicle for growth and poverty reduction in the northern Ghana[22]. However, the dwindling agricultural production and productivity for food and cash crop in northern Ghana is due to the over dependence on rain-fed agricultural, coupled with dwindling soil fertility and outmoded agricultural

[22] Ghana Shared Growth and Development Agenda 2010-2013.

practices (slash and burn techniques, shifting cultivation, etc.). These local factors have been exacerbated by ineffective agricultural policies and inadequate investments in infrastructure support systems for the agricultural sector such as irrigation and agricultural market systems to promote efficiency and diversification in production. Burkina Faso, Niger and Mali, lying to the much drier north of the country are known to produce more home-grown cereals and vegetables than Ghana, largely due to their investment in the development of basic infrastructure for in and off season farming. This has been made possible by the development and/or adaptation of low cost appropriate technologies to enhance agricultural production. Indeed, GPRS II notes that "the example of Burkina Faso shows that simpler and cheaper technologies for the harvesting and use of rain water endowments could yield Ghana immense benefits in agricultural productivity and poverty reduction".

The low population density in the three northern regions, ranging from 25 persons per square kilometer in the northern region to 31.2 persons per square kilometer in the Upper West and as high as 104 persons per square kilometer in the Upper East region, encourages continuous land expansion practices as opposed to intensification practices to improve crop yield under climate change. There are however, opportunities to overcome this barrier. Agricultural growth through intensification is possible because of the current gap between potential yields and achieved yields which provides the opportunity to increase yield on the same piece of land. Secondly, the agro-ecology in general, supports a wide range of arable crops. Using the Adaptation Fund resources in improving year-round water availability will create emerging income generating opportunities in market gardening and livelihood diversification e.g. fishing, construction etc. that would shift communities away from purely climate dependent sectors.

d. Improved knowledge and institutional capacity for coordination, management of water resources and diversification of livelihoods of communities in northern Ghana

The most important asset of the north for its development is its human resources. Unfortunately, the quality and potential of this human resource base has remained largely underdeveloped and untapped due to the limited investment in the provision of access to good quality education at all levels since the colonial era. Fifty years after independence, the north still lags behind the rest of the country in terms of educational development, even though the people of the north embraced education as the ladder for social mobility out of poverty, despite the late start and the current limitations of the educational sector. This programme will help to address this barrier through a range of capacity development and knowledge generation activities, with an emphasis on using concrete demonstration actions that enable a 'learning-by-doing' process.

PROJECT / PROGRAMME OBJECTIVES:

Water is highly relevant to the thematic priorities and cross-cutting issues of Ghana's Development agenda and rural livelihood activities. An integrated management of water resources that takes into consideration climate change, especially in river basin and other sources of water supply for rural communities is therefore a pre-requisite for any water-related intervention in addressing climate change impacts and vulnerability of communities. Therefore, cross-sectoral and inter-community coordination is highly essential in addressing climate impacts on multiple sectors and sections of Ghana society and to improve the efficiency and effectiveness of water capture and distribution and reduce losses and wastefulness of water.

List the main objectives of the project.

The programme is designed to support Ghana kick-start the implementation of the national priorities for climate change adaptation outlined in the National Climate Change Adaptation Strategy (NCCAS) of

2011[23] as well as those highlighted in the 2nd National Communication[24]. As a country that does not belong to the Least Developed Countries (LDCs) obliged and supported to prepare a National Adaptation Programme of Action through the UNFCCC process, it is a commendable that Ghana developed National Climate Change Adaptation Strategy. Out of the ten priorities listed in the National Climate Change Adaptation Strategy, with the support of the Adaptation Fund resources, this programme will directly operationalize priorities # 2 and 6, and contribute to priority #3:

- Priority 2: Alternative livelihoods: minimizing impacts of climate change for the poor and vulnerable
- Priority 3: Enhancing national capacity to adapt to climate change through improved land use management
- Priority 6: Managing water resources as climate change adaptation to enhance productivity and livelihoods

Furthermore, the Programme is also meant to address climate change adaptation in Ghana's most vulnerable regions, especially building on recent recommendations of the WRC Report in climate change adaptation through integrated water resources management in the three northern-most regions[25]. Similarly, the programme will support Ghana with the implementation of the national water policy of Ghana. The programme will be building on other ongoing projects and programmes that are also contributing towards the NCCAS, such as:

- The Africa Adaptation Programme (AAP) in Ghana. Funded by the Japanese Government, and part of a programme being implemented in 20 African countries, AAP will promote systemic change for a more integrated and holistic approach to climate change adaptation, through providing inputs to a comprehensive programme that will develop early warning systems in the country, as well as by supporting strategic policy dialogue and capacity development approaches.
- Integrating climate change into the management of priority health risks in Ghana. Funded by the Special Climate Change Fund, this project will develop systems and response mechanisms to strengthen the integration of climate change risks into the health sector. Critical barriers will be overcome to shift the current response capacity of the health sector from being reactive towards being more anticipatory, deliberate and systematic.

Programme Objective:

The main objective of the programme is to enhance the resilience and adaptive capacity of rural livelihoods to climate impacts and risks on water resources in the northern region of Ghana. The objective will be achieved through key results centered on the improvement of water access and also increase institutional capacity and coordination for integrated water management to support other uses of water resources especially for the diversification of livelihoods by rural communities.
There are four components, each with the following outcomes that will be delivered by the programme:

1. **COMPONENT 1:** WATER RESOURCE MANAGEMENT PLANNING

[23] Draft National Climate Change Adaptation Strategy. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.
[24] Draft Ghana's Second National Communication to the UNFCCC. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.
[25] Climate Change Adaptation. A Primer for Water Conservation, Flood Risk Reduction and Irrigation Strategy for Northern Ghana. WRC. 2011.

Outcome 1: Improved planning and management of water resources taking into account climate change impacts on surface and groundwater sources

2. **COMPONENT 2:** COMMUNITY LEVEL IMPLEMENTATION OF WATER RESOURCE MANAGEMENT ACTIVITIES
   Outcome 2: Climate resilient management of water resources by communities in Northern Ghana

3. **COMPONENT 3:** DIVERSIFICATION OF LIVELIHOODS OF RURAL COMMUNITIES
   Outcome 3: Enhanced diversification of livelihoods of communities in northern Ghana

4. **COMPONENT 4: KNOWLEDGE, INSTITUTIONAL CAPACITY AND COORDINATION**
   Outcome 4: Improved knowledge and institutional capacity for coordination, management of water resources and diversification of livelihoods of communities in northern Ghana

PROJECT / PROGRAMME COMPONENTS AND FINANCING:

Fill in the table presenting the relationships among project components, activities, expected concrete outputs, and the corresponding budgets. If necessary, please refer to the attached instructions for a detailed description of each term.

For the case of a programme, individual components are likely to refer to specific sub-sets of stakeholders, regions and/or sectors that can be addressed through a set of well defined interventions / projects.

Table 3. Programme components and the expected outcomes, outputs and financing

PROGRAMME COMPONENTS	EXPECTED OUTCOMES	EXPECTED CONCRETE OUTPUTS	AMOUNT (US$)
1. WATER RESOURCE MANAGEMENT AND PLANNING UNDER CLIMATE CHANGE	**Outcome 1:** Improved management and planning of water resources taking into account the climate change impacts on surface and groundwater sources	**Output 1.1:** White Volta management plan reviewed and updated to take into account climate change impacts	180,000
		Output 1.2: Water management plans that takes into account climate change impacts are established for the Black Volta and for three sub-basins in the White Volta	570,000
Total Component 1			750,000
2. COMMUNITY LEVEL IMPLEMENTATION OF CLIMATE RESILIENT WATER RESOURCE MANAGEMENT ACTIVITIES	**Outcome 2:** Climate resilient management of water resources by at least 15 communities in northern Ghana	**Output 2.1** Community water supply and management plans developed in 15 communities to incorporate climate change-related risks	450,000
		Output 2.2: Water supply increased for multiple uses and	1,100,000

		users during period of shortages under climate impacts e.g. droughts, heat stress etc.	
		Output 2.3: Small scale irrigation techniques installed in 6 districts to improve the productivity of agriculture under climate change risks	1,029,025
		Output 2.4: Measures for water conservation under climate impacts e.g. dugout wells, ponds etc. and mechanisms for quality control put in place in at least 10 districts	750,000
		Output 2.5: Flood management and protection measures against loss of lives and properties are implemented in flood prone communities	800,000
Total Component 2			4,149,025
3. DIVERSIFICATION OF LIVELIHOODS OF RURAL COMMUNITIES UNDER CLIMATE CHANGE	**Outcome 3:** Enhanced diversification of livelihoods under climate change by communities in northern Ghana	**Output 3**. Improve infrastructure (e.g. canals, pipes etc.) for water distribution for CCA and use in agricultural systems installed in 6 districts	1,000,000
		Output 3.2: Dry-season gardening activities by women improved for CCA	250,000
		Output 3.3: Tree nurseries and wood lots for climate risks management e.g. for rehabilitating floodplains, hillsides, watersheds etc. are established and managed by communities	150,000
		Output 3.4: Community based fish farming for livelihood diversification under climate is established in 5 districts	250,000
Total Component 3			1,650,000
4. KNOWLEDGE, INSTITUTIONAL CAPACITY AND COORDINATION ON CLIMATE CHANGE	**Outcome 4:** Improved knowledge and institutional capacity under climate change, for coordination, management of water resources and diversification of	**Output 4.1:** Regional Climate Change Adaptation Monitoring Committee (as envisioned by the National Climate Change Adaptation Strategy) established in the three target regions	250,000
		Output 4.2 Learning platforms and systems for	250,000

	livelihoods of communities in northern Ghana	integrating climate change-related risks into their management of water resources and livelihood activities in northern Ghana institutionalized	
		Output 4.3. Best practices for adaptation and lessons learned from the implemented actions and related policy processes are recorded and disseminated through appropriate mechanisms	420,000
Total Component 4			920,000
	6. Programme Implementation – Total Costs		7,449,025
	7. Project/Programme Execution cost		707,657
	8. Total Project/Programme Cost		**8,156,682**
	9. Programme Cycle Management Fee charged by the Implementing Entity (8.5%)		693,318
	Amount of Financing Requested		**8,850,000**

PROJECTED CALENDAR:

Indicate the dates of the following milestones for the proposed project/programme

MILESTONES	EXPECTED DATES
Submission of Full Project Proposal to AF	January 2012
Approval of the Concept by the AF Board	March 2012
Start of Programme Implementation	November 2012
Mid-term Review (if planned)	July 2014
Project/Programme Closing	October 2015
Terminal Evaluation	November 2015

PART II: PROJECT / PROGRAMME JUSTIFICATION

A. Describe the project / programme components, particularly focusing on the concrete adaptation activities of the project, and how these activities contribute to climate resilience. For the case of a programme, show how the combination of individual projects will contribute to the overall increase in resilience.

The components detailed below have been designed to provide an integrated solution to the climate risks in the region. The Components, which can be considered as "project", are inter-linked. The linkages between the components constitute the consolidation of institutional planning and management of water resources, followed by enhancing community level organisation and capacity in carrying out water resource management activities in addressing climate impacts. Furthermore, the benefits of managing water resources in the region, provides emerging opportunities for diversification of rural livelihoods for increased resilience to climate impacts. Finally, the information and knowledge generated during programme implementation will be used for improving institutional capacity, sharing lessons with other communities and better coordination between water basins and local communities. The activities for the realization of this Component will commence with the selection of communities, during an Inception Phase. Although there were local community consultations during the proposal preparation phase, this is considered insufficient for lining up pilot sites. A detailed set of selection criteria will be developed during the inception workshop to fully capture other issues that may increase the vulnerability of different groups in the community such a gender, youths, elders etc. The inception workshop will bring together all key stakeholders, including organisations that particularly represent women and other vulnerable groups, and will jointly identify and target those communities most vulnerable to climate change impacts, especially those that previous support has never been provided. Women's groups, as well as a representation across different climatic zones, etc. will be of particular focus. Using the selection criteria each workshop participant will be required to prepare a short-list of potential communities to be targeted in the programme. This will be complemented drawing on the expertise of development practitioners working across the three northern regions in matching the views expressed by the participants' assessments. A summary of the ranking of the prioritized communities will be prepared during the workshop. Each of the communities on the prioritized short-list will then be visited for further on-the-ground assessments before finalizing the 15 (minimum) communities that will pilots for the programme. This multiple consultative approach undertaken with communities with a particular emphasis placed on obtaining the view of women and identifying pilot communities for programme implementation, provides a better ost effectiveness of AF funds

An alternative would have involved taking a more prescriptive approach to the implementation of water management measures, which is not driven by community level management planning and place of execution. Such an approach is of high risk of implementing measures that are not appropriate for particular local context and miss out in targeting some vulnerable groups. Similarly using a "one-size fits all" approach could have been proposed. Such an approach would have a high risk of inappropriate solutions and also offers a piecemeal solution with the likelihood of redundancy following the end of the programme. Finally, another alternative approach would have been targeting solutions at the household level. This would not result in wide benefits and offers less value for money than a community level response.

Component 1: WATER RESOURCE MANAGEMENT AND PLANNING UNDER CLIMATE CHANGE

Component 1 focuses on the improvement of the current water resource management and planning especially of the major water sources such as the Volta basin, and other smaller basins, by mainstreaming climate change into the planning and management processes of water resources. This is crucial in adjusting community livelihoods and national development activities in the face of climate change impacts on water availability. This is important because existing water management practices are based solely on historical run-off records, which will no longer be tenable given climate change projections that show run-off reduction of as much as 15.8% in 2020 and 37% in 2050. (Barry, et al. 2005). Observable climate trends also show severe and frequent pattern of drought/flood events as was experienced in the northern regions in 2007 and 2010. Yet contingency planning for climate change adaptation has not yet taken place at any significant scale in reducing the impacts on community livelihoods and national development programmes.

The National Water Policy of Ghana emphasizes the role of water for the realization of the national development agenda driven by the Growth and Poverty Reduction Strategy (GRS11), which is aligned to the commitments to the Millennium Development Goals (MDGs) and the New Partnership for African Development (NEPAD). Neither the GPRS II nor the National Water Policy fully consider the implications of climate variability and climate change in the decision making framework, hence adaptation is required to reduce cost and disruption caused by the effects of extreme weather events leading to floods and drought. Following the challenges that climate change impacts pose on the quantity and quality of water with potentially significant implications for the sustainability of Ghana's national development sectors, Component 1 focuses on the realization of specific outcome targets with measureable outputs guiding the implemented activities. This will involve:

Outcome 1: Improved management and planning of water resources taking into account climate change impacts on surface and groundwater sources. The achievement of this outcome will be measured through two inter-related outputs.

Output 1.1: White Volta management plan reviewed and updated to take into account climate change impacts

Ghana's Water Resources Commission has produced a management plan for the White Volta Basin. However, this management plan does not consider adaptation to climate change in detail meaning that it is not currently "climate proofed". This output will therefore involve activities aimed at reviewing and revising the White Volta management plan, with a focus on strengthening its consideration of climate change, including a consideration of gender roles in terms of the differing roles of women and men in managing water resources. To achieve this, AF resources will be used to undertake an activity on conducting a gap analysis of the White Volta management plan. The plan will be examined taking into account climate change. This will require having access to existing or new analysis of climate change impacts on water resources based on a range of climate projections. The AF financed programme will

draw on technical modeling capabilities that already exist within the Ghana Meteorological Service and national academic institutions, to support the review of the White Volta management plan. The revised management plan will be implemented in the White Volta, monitored and adjusted where necessary to ensure that it is working properly.

As part of the process of reviewing the management plan, technical staff within relevant institutions such as the Ghana Meteorological Service, Water Resources Institute, SADA, Volta Region Authority will also be trained developed to generate, interpret, and apply climate change hydrological projections in medium to long-term water resources management decisions. The capacities developed by the AF financing through this plan (as per output 1.2 below) will be maintained by domestic budgetary resources that finance these institutions. This capacity will also feed into more effective nationally led delivery of Component 2, which focuses on community level water management.

The lessons learned from the White Volta river basin will be documented and packaged for application to other basins within the Volta River system as as well in the Black Volta under component 1.2 as cost-effective measures.

Output 1.2: Water management plans that take into account climate change impacts are established for the Black Volta and for three sub-basins in the White Volta

There is currently no management plan for the Black Volta. In addition sub-catchment management plans for the White Volta have not yet been developed. The absence of these plans means that water management planning is essential to enable increased resilience to climate change, is hindered.[26] AF resources will be used to develop a number of sub-catchment management plans taking climate change into account. The AF fund will be used to conduct an activity that generates climate projections for the sub-catchments of the White Volta just like for the main catchment in Output 1.1. This will provide an important linkage in addressing climate risk in both the main basin and the sub-basins and maintaining a common management plan. These plans will focus on those sub-catchments in which communities are situated, in order that a fully integrated planning approach, scaling from the catchment level, to sub-catchment level to community level can be implemented. An activity to downscale climate projections using technical capacity within national institutions will be carried out in order to develop a management plan for each sub-catchment. This is essential because the Volta River Basin is such a large basin and straddles across different ecological zones. Different parts of the basin are influenced by different rainfall regimes. Climate change is expected to potentially impact the different sub-catchments in different ways. Therefore, the adaptation strategies should be tailored to the specific area. A comprehensive national water resources inventory in relation to climate trends will be conducted. That will be followed by an activity that links basin plans to community plans for water management. All these will be used in supplementing the revised management plan for the entire White Volta basin. Plans will also be developed with an emphasis on exploring and developing solutions for gender specific management of water resources, particularly in terms water use. In order to replicate this for the Black Volta, the AF funds will be used to carry out training and capacity building activities using the lessons from the White Volta, in preparing a management plan for the Black Volta. The dissemination of the produced water resource management plans for the sub-catchment and for the Black Volta will be carried out.

Ghana is a riparian state that shares a number of basins with neighboring countries. The Volta River basin is shared with Cote d'Ivoire, Burkina Faso, Togo, Benin and Mali. An activity to mainstream climate change into the management of the Volta river basin will be conducted. This will enhance the resilience of the river and regional cooperation especially in abiding to some of the laws, protocols and agreements

[26] Downscaling can be carried out using two main techniques: dynamical and statistical. Dynamical downscaling is possible at about 50 km or in some cases up to 25 kms. These data could be cross -checked with outputs from statistical downscaling and interpreted for sub-catchment applications.

surrounding the shared basin such as the Volta Basin Declaration. Component 1 also supports the realization of Ghana's Water Vision for 2025 whose main objective is to "promote an efficient and effective management system and environmentally sound development of all water resources in Ghana."

Component 2: COMMUNITY LEVEL IMPLEMENTATION OF CLIMATE RESILIENT WATER RESOURCE MANAGEMENT ACTIVITIES

Capitalizing on Component 1 that improves the water management planning of water, Component 2 focuses on improving community level involvement in the planning and implementation of climate resilient water resource management activities. Current participation of communities, and in particular women, in planning and decision-making processes is highly limited resulting in lack of transparency, inequity in access and distribution of water resources. For Ghana to achieve its Water Vision for 2025, the Governments' chosen approach is a participatory approach to water resources management and development with the devolution of responsibilities to communities in order to achieve sustainable management in the long run. This is in line with the Government's current policy of a decentralized approach to climate change risk management. Thus, the expected outcome and outputs of Component 2 are detailed below.

Outcome 2: Climate resilient management of water resources by at least 15 communities in northern Ghana. There are five outputs addressing different aspects of community level water management in addressing scarcity during droughts and excesses like flood periods.

Output 2.1 Community water supply and management plans are developed in 15 communities to incorporate climate change-related risks

In recognition of water as a finite and vulnerable resource given its multiple uses, developing a community water management plan is crucial. The establishment of a plan for water supply and management is expected to empower local communities in providing an enabling environment for the diversification of their livelihoods and embarking in self-actions in reducing vulnerability to climate change. In order to achieve this output will require an activity putting in a place a transparent process for the establishment of selection criteria for a participatory process by communities in the programme. That will be followed by an activity for the identification and review of any existing water supply management plans in the three target regions. A review of existing community structures/institutions that are capable to develop and implement water supply management plans in, will be conducted. Using AF funding, an activity to generate climate impact scenarios for pilot communities will be carried out. This will be closely followed by vulnerability and capacity assessment of each targeted community. Using such information, climate risks and opportunities will be identified in planning and programming water supply for the community. Options for integrating water resources management in communities will be identified and tested and assessed for implementation. This will require monitoring reviewing these options in their effectiveness. Such interventions will ensure integrating water resources management and development with environmental management at the community level, in order to ensure the sustainability of water resources in quality and quality, as well as resilience under climate change. The activities that will be implemented will build upon, and learn from previous projects on water management planning that has been undertaken in some communities in northern Ghana, as part of civil society-led Global Water Initiative projects and will follow a highly participative process, that specifically ensures the inclusion of women, young people, the elderly and other particularly vulnerable groups.

Output 2.2: Water supply increased for multiple uses and users especially during period of shortages due to climate impacts e.g. droughts, heat stress etc.

Under climate change impacts, ensuring that there is adequate water supply year-round for multiple uses and users is crucial but constitutes a challenge. To achieve this using AF funding will requires an activity that mobilizes community planning and implementation of practices that restore and preserve the natural character and functioning of the water system. The stipulated standards of water quality and regulations will be an important activity to ensure that human activities do not adversely impact on the long-term availability of water. Other activities to achieve this output will include training of communities in water supply measures. There will also be construction and rehabilitation of water collection facilities, e.g. dugouts, boreholes etc. Other technologies and traditional systems for rainwater harvesting, e.g. wells will be identified and their use enhanced in the local communities. Practices that reduces siltation in the watershed, e.g. grass and tree planting, etc. will be promoted.
Using the available water for increasing productivity, **Output 2.3** will involves activities for the installation of small-scale irrigation techniques in at least 15 communities to improve the productivity of agriculture. This is will lead to emerging opportunities for the diversification of livelihood under Component 3. This output will first of all require an activity that fully identifies the suitability of various small-scale irrigation techniques for the region. That will be conducted by reviewing all the small-scale irrigation techniques already being used and known to work well in northern Ghana, such as seasonal shallow-well systems, permanent shallow-well systems, shallow-tube well systems and communal borehole systems. Seasonal shallow-well irrigation systems in particular are dominant in Upper White Volta Basin but under the programme, it is necessary to thoroughly examine the various options based on climate change, poverty reduction, and gender considerations. A study in three sub-catchments within the Upper East region of Ghana suggests that there are trade-offs associated with each particular irrigation technique; i.e. the system that could provide the highest level of income to users is not necessarily the one that also allows for greater women participation. The communities will be informed of the trade-offs required and will be empowered to make the decisions themselves under Output 2.1.

The strategy for post-project repair and maintenance will be a crucial activity spelled out in the community water management plans (under Output 2.1) drawing upon lessons of existing practices in the northern regions of Ghana. This will involve training of the community in how to carry out the repairs and maintenance. The programme will encourage the formation of a water users' association (WUA) by the communities with the mandate of carrying out user fee collection and management decisions. It will be set up such that the fees collected are used for activities such as canal repairs and maintenance. If the communities decide to adopt this approach, the programme will work with them in strengthening the WUA to make sure that they function as expected.

Output 2.4: Measures for water conservation under climate impacts e.g. dugout wells etc., and mechanisms for quality control put in place in at least 10 districts

Achieving sustainable management of water resources for reliability in supply requires measures for water capture, conservation and quality control. This is crucial to ensure equitably sustainable exploitation and utilization in a way that maintains biodiversity and the quality of the environment for future generation. The activities for the realization of this output will include the establishment of appropriate baselines to determine the effectiveness of current water conservation measures in the region. Similarly, quality control measures will be assessed. Training of communities in water conservation and quality control measures will be carried out. There will be an activity directly supporting the communities to put in place water conservation and quality control measures. Support will be provided for the implementation of conservation tillage techniques in selected communities. The installation of communal freshwater harvesting facility from rain or groundwater sources will be implemented. The designing and constructing of contour bunds in reducing runoff will also be carried out as measures of water conservation.

Output 2.5: Flood management and protection measures against loss of lives and properties are implemented in flood-prone communities

As part of a community water management plan, the management of flooding is crucial as a source of climate change vulnerability of local communities. This is not only in addressing the risks associated with flooding but also taking the surrounding opportunities such as in harvesting and storing flood waters for period of shortages. With the Adaptation Fund resources, there will be activities conducted to achieve output 2.5. There will be training of communities in flood management measures. The mapping of locations prone to flooding will be carried out. The installing of flood water harvesting facility at different points along the river will be implemented. The constructing and/or refurbishing of drainage canals/ditches in selected communities will be carried out. There will be an activity for channelling water (e.g. using road designs) with culverts for storage in reservoirs will be implemented. Finally, the rehabilitation of water catchments using afforestation techniques in selected communities will be carried out.

Overall, Component 2 will therefore support the realization of Ghana's Water Vision 2025 by:

- Strengthening and ensuring sustainability of ongoing community management, operating and maintenance of facilities, in order to safeguard investment already made;

- Strengthening district assemblies (thereby also strongly linking to and benefitting from Component 4) to assume a central role in supporting community management of water and sanitation facilities, and in maintaining the integrity of aquatic systems

COMPONENT 3: DIVERSIFICATION OF LIVELIHOODS OF RURAL COMMUNITIES UNDER CLIMATE CHANGE

Component 3 is building on the opportunities emerging from community management of their water resources of Component 2 in diversifying their livelihoods away from climate-sensitive practices such as red-fed agricultural production, into other activities that improve their resilience to climate risks.

Outcome 3: Enhanced diversification of livelihoods under climate change by communities in northern Ghana

Assisting with the diversification of the livelihoods base into sectors that are not dependent completely on rainfed agricultural systems will be crucial for the resilience of rural livelihoods in the three northern regions. As highlighted previously in this proposal, many communities in northern Ghana are dependent on rain-fed agriculture which is extremely vulnerable to the impacts of climate change. This component is therefore seeks to expand climate change adaptation for those people in Ghana that are most vulnerable by diversifying their livelihoods. The improvement of accessibility to water will have the potential of enhancing the resilience of livelihoods of communities by providing the opportunities for livelihood diversification. This will be achieve through activities such as the establishment of tree seedling nurseries, fisheries, tourism, construction, river transportation, etc. which could be used by local communities as sources of household incomes. Communities, especially women will be support by the programme in the engagement in market activities such as market gardening and handicrafts etc. The programme will build on existing programmes in supporting women's groups through training activities to gain marketable skills (such as food processing) to improve their livelihoods. With 'off-farm' income generating activities to complement their incomes, their resilience to shocks affecting agricultural outputs is increased. Very importantly, this outcome will place a high emphasis on activities that improve the capacity of communities across the value chain. For example, activities for the identification of actions that enhances market demand of a commodity, marketing of products and financial management and adding value to

products will be promoted. This is crucial to ensure the long-term sustainability and success of livelihood interventions and also ensures far better value for money than simply livelihood support activities that provide initial infrastructure/capital but which do not link communities to a market. There are four inter-related outputs for the realization of the outcome.

These four outputs are all related to water management and therefore to Component 2. As Components 2 and 3 will be implemented in the same communities, this will help enable a seamless approach and commonality in implementation, and hence value for money. Indeed the community water management planning within Component 2 will feed into and draw from individual community planning for livelihood diversification. During the proposal development a number of different livelihood options were also considered, such as raising small ruminants, crafts and guineafowl raising. However, none of these livelihood options link so closely to Component 2, and therefore were considered to offer less opportunities for synergies and cost sharing and to represent less value for money in terms of overall impact.

For each of the outputs listed below under Component 3, the measures to be implemented in particular communities, including their detailed design, will be determined by the requirements of the particular communities, local environmental and biophysical conditions, a consideration of local environmental impacts, cost effectiveness/economic viability and land ownership constraints. Lessons learnt from other previous/ongoing projects will be integral in this detailed design phase, to ensure cost effectiveness and appropriateness of particular solutions in particular communities.

Output 3.1: Improve infrastructure (e.g. canals, pipes etc.) for water distribution for climate change adaptation (CCA) and use in agricultural systems installed.

Access to water is a key constraint to agricultural production in the northern regions of Ghana and this constraint will become more acute with climate change impacts. Therefore, the programme will implement activities that improve water distribution and use efficiency and productivity in agriculture in getting more value from every drop of water used. The activities that will be conducted with AF funding will include the training of local communities in small scale water saving techniques, such as pitcher irrigation, sub-surface pipe irrigation and low-drip head irrigation. There will be community based training for the selection of most appropriate crop, water, and nutrient management techniques that are viable under different climate conditions. There will also be activities for the training of extension services to enable them to provide ongoing support to the local communities. Findings from earlier research initiatives (e.g. Fatondji, 2010) that looked at practices that enhance rainwater and nutrient use efficiency to improve crop productivity in the Volta Basin will be reviewed and considered for implementation.

Output 3.2: Dry-season gardening activities by women improved for CCA

Market development activities for non-state cash crops such as cocoa, is already well established with demand for locally sourced vegetables and fruits. However, the issue is rather one of supply and productivity with water availability under climate change as the main limiting factor. Undertaking agricultural activities that maximize the economic benefits from increased capacity to drawdown water and increased capacity to use it productively, such as market gardening is crucial for diversification of livelihoods of rural communities. The activities that will be implemented to achieve this will include; training of women in how to increase yields from market gardens and to successfully market their products. The programme will provide small scale infrastructure support to facilitate market gardening such as watering cans, pumps and pipes. There will be activities to train extension services to enable them

to provide ongoing support women with their market gardening activities. With the Adaptation Fund resources, it is considered vital that to demonstrate the efficacy of community scale water adaptation approaches that enhances the profitability of market gardening commonly practiced by women who often lack access to major resources and land for other cash crop production.

Output 3.3: Tree nurseries and wood lots for climate risks management e.g. for rehabilitating floodplains, hillsides, watersheds etc. established and managed by community

The programme will undertake activities for the establishment of community nurseries and woodlots to provide opportunities for income generation and diversification of rural livelihoods. Not only can nursery serve as stocks for rehabilitation and regeneration purposes, they also constitute direct employment opportunities especially for youths in filling up nursery bags, topsoil collection and composting. It should also be recognized that nursery establishment provides the opportunity for activities that targets the selection of crop types or varieties on the basis of their drought tolerance for improving agricultural productivity or increasing soil fertility as the cases with agroforestry tree species. This is a cost effective and relatively simple approach in addressing water shortage with tolerant crop types/varieties as commonly used further north into the Sahelian belt, rather than channeling or harvesting groundwater. It is possible that these activities may indicate that economic resources can more effectively be directed towards changing agricultural practices than substantial investment in water supply infrastructure.

The activities to realize this output will also include the training of communities in establishing and managing tree nurseries and wood lots. Other training will target how to successfully market the wood products. There will be activities supporting community identification of sites for nurseries and wood lots. Activities for the collection/purchasing of planting seeds of native tree species more adapted to the local conditions will be implemented. Similarly, training activities for extension services to enable them to provide on-going support to the activities carried out by communities for climate risks management using ecosystem-based approaches will be undertaken. Where appropriate bee-keeping activities will be developed within the nurseries and wood lots, thereby providing additional income and also a strong disincentive for burning of the trees, as is often the case because of hunting activities and traditional beliefs. Opportunities will also be sought to include traditional medicinal plants within the nurseries. Women will be involved in all aspects of the training and it will be a requirement that all wood lots that are established must involve women in the groups that plan and manage these lots.

It is expected that the Component 2 will support the reframing of water legislation to include climate change considerations, and help introduce regulations that support communal management of water delivery services.

Output 3.4: Community-based fish farming for livelihood diversification under climate change is established in 5 districts

Improving the availability of water in catchment and river systems allows for the establishment of fishery resources. These are emerging opportunities which could be harnessed by the communities in improving household dietary intake and protein supplement, as well as serve for income generation activities. In promotion of community based fish farming, training activities will be provided to communities in how to establish and manage small scale community fish farms and how to successfully market the products. As part of the ownership process, communities will trained to identify the sites for fish farming. The programme will support the communities by providing the fingerlings as initial stocking of the fish farms. There will also be training of extension service agents to enable them to provide ongoing support to the activities. Women groups will be involved in all aspects of the training and it will be a requirement that all fish farms that are established must involve women in the planning and management of these farms.

Component 4: KNOWLEDGE, INSTITUTIONAL CAPACITY AND COORDINATION UNDER CLIMATE CHANGE

Component 4 targets knowledge and improved institutional capacity and coordination of national policies and community implementation activities, which will both contribute towards upscaling of the lessons learnt from Components 1, 2 and 3, thereby ensuring long-term sustainability of the programme and value for money. Activities for the collection of information following the implementation of Components 1, 2 and 3 will be carried out. The collected information will be used to develop knowledge materials, which clearly and simply explain how the management of multiple uses of water in the northern three regions. These materials will be used in enabling a range of stakeholders to improve resilience in terms of both water resources and rural livelihoods. These materials will also be disseminated and used to support institutional capacity development activities. An alternative to Component 4 would have focused only on knowledge product development and dissemination. However, it was decided that the outputs related to institutional development were essential to ensure the long-term sustainability of the programme in terms of not only disseminating, but implementing the lessons learnt and embedding these into planning and development processes. As such this alternative was considered to offer less value for money than the Outputs presented below.

Outcome 4: Improved knowledge and institutional capacity under climate change, for coordination, management of water resources and diversification of livelihoods of communities in northern Ghana.

To date no significant effort has been made to understand the impact of climate vulnerability at the regional level in the northern part of Ghana, nor to mobilize stakeholders and the wider public in assessing the range of rising vulnerabilities and adaptation options. There have been no efforts to bring the lessons learnt into national sustainable development policy processes. The programme will contribute not only in strengthening knowledge base on water vulnerability and adaptation, but also to connecting practical demonstration solutions with policymaking processes. There are three outputs for the realization of outcome 4.

Output 4.1: Regional Climate Change Adaptation Monitoring Committee (as envisioned by the National Climate Change Adaptation Strategy) established in the three target regions.

Following the development of a national climate change strategy, there is need for coordination for regional implementation of the strategy. This programme will implement activities on capacity assessment of regional institutions, such as SADA and the regional coordinating council in order to provide adequate support. There will also be an activity to design and implement capacity building trainings programmes across the region targeting local governments and institutions. The Adaptation Fund will enable the programme to support the establishment of Regional Climate Change Adaptation Monitoring Committees which is necessary for the sustainability of the entire programme. The activities undertaken within Components 1, 2 and 3 will provide an initial focus for these Committees and most importantly, provide substantial materials and opportunities for capacity development. The Committees in turn will be used to further integrate the Adaptation Fund activities into regional planning processes, as well as providing long-term support to the activities of local communities by developing the platforms for future upscaling of the activities within Components 1, 2 and 3. It will be ensured that Committees including representation by women.

Output 4.2 Learning platforms and systems for integrating climate change related risks into their management of water resources and livelihood activities in northern Ghana institutionalized.

Current capacities of communities and local institutions such as the district assemblies and SADA to analyze and interpret climate data and utilize this in development and decision making are lacking. The programme will therefore carryout activities to build up institutional capacities and individual skills of the local communities. There will be activities aim at developing the capacity of district assemblies for integrating climate change into their district development planning and budgetary processes. As a key agent of mass communication and awareness raising, the capacity of the local media will also be developed. It should be recognised that a number of different institutions, at different spatial scales, are responsible for managing resources and development in Ghana. Output 4.2 addresses this, and will work alongside Output 4.1 to further integrate the Adaptation Fund activities into resource management and planning processes, as well as enabling long-term sustainability by developing the platforms for future upscaling of the activities within Components 1, 2 and 3.

Output 4.3: Best practices for adaptation and lesson learned from the implemented actions and related policy processes are recorded and disseminated through appropriate mechanisms

The programme will dedicate resources on activities to share knowledge and experiences in terms of utilizing information and data from the programme to inform decision making and replication across the country. To facilitate this, a communication strategy will be developed by the programme. Different ways of dissemination of information such as local radio stations, drama and theatres will be employed. Previous projects, such as that implemented by the Global Water Initiative, have successfully brought together community participants on a regular basis for knowledge sharing. This model will be adopted by this programme. Approaches will be identified and used to target different sections of society, including a consideration of communication methods that target young people, old people, women, including illiterates, and those that communicate only in local languages, etc.

B. Describe how the project / programme provides economic, social and environmental benefits, with particular reference to the most vulnerable communities.

In terms of social benefits, the programme will provide safe and reliable freshwater supply to a vast majority of the vulnerable population particularly in rural areas in the three northern regions of Ghana. Climate change is expected to have an impact on agricultural production by increasing pressure on water resources. Projection scenarios indicate that in addition to a certain reduction in annual flows of rivers, a substantial increase in the water requirement per hectare under irrigation will also occur in step with an increase in temperature due to global warming. The GPRS II and the National Water Policy recognize access to water and sanitation, increase in agricultural productivity, pollution control, integrated transboundary river basin management, and development of water infrastructure as key factors in the poverty alleviation campaign in Ghana. Ghana's economy continues to revolve mainly around agriculture, which accounts for nearly 40% of GDP and employs 56% of the work force. Most of the agriculture practiced is on a subsistence basis with yields per hectare lower than the Sub-Saharan Africa average and mostly non-irrigated. The food import bill in the country is rapidly increasing and putting a substantial burden on the country's foreign exchange balances. The cost of importing food has accelerated in recent years, jumping to US$ 500 million annually on a country basis. The potential irrigable land is estimated at about 350,000 hectares, of which only 10,000 hectares are under irrigation at present.[27]

Programme benefits:

[27] Growth and Poverty Reduction Strategy (GPRS II) 2005

The proposed programme will promote four types of adaptation intervention: 1. livelihood enhancement; 2. livelihood diversification; 3. ecosystem protection and enhancement; and 4. community-level water infrastructure planning. These approaches will build up financial, natural, physical and social capital of the communities. A conservative estimate gives a total of 60,000 people as direct beneficiaries of the project. The indirect number of beneficiaries is the entire population in the Volta River Basin which is estimated to be 8,570,068 as of 2010. The main indicator of vulnerability reduction will be changes in access to water and diversification of livelihood activities and income generation will increase by 30% in at least 50% of households in the communities.

(i) Improved institutional capacity to respond to climate change: The main adaptation benefits of the programme are that it will be able to provide concrete inputs into water resource management planning in the northern region by ensuring that climate change concerns are taken into account. The programme will be able to build and enhance the adaptive capacity of the ecological systems of water catchments to climate change, once the proposed measures are adopted and implemented. This is expected to be the first show case in the Ghana where climate concerns are taken into account and lessons learnt will be replicated to other river basins of the country that share similarity to the selected basins. There is already great interest among the CSOs currently running the Global Water Intiative (GWI) are interested in learning from the experiences from other projects (particularly from the White Volta) to develop a similar plan for the Black Volta – the largest sub-basin of the Volta River system in terms of length and total land area. Since the GWI is planned to last until 2017 and will outlive the AF-funded programme, the opportunity for cross-learning is assured. The activities that will be implemented will include producing knowledge products that capture lessons learnt on management of water resources and diversification of livelihoods under climate change. The capacity to document traditional knowledge systems as well as methods for managing knowledge will be developed, as well as the engagement of community service organisations for knowledge transfer.

i) Household level livelihoods resilience to climate shocks including livelihoods diversification
There is clearly the need for a transition to alternative less-climate sensitive and higher income-generating activities as the necessary condition for a successful adaptation to climate change impact on livelihoods in the northern regions. Priorities include the diversification of crops, the introduction of drought and flood-resilient crop options, more water efficient crop, water, and nutrient management practices, and strengthening fishing capacity.

ii) Community-level adaptation measures
Ecosystem protection and enhancement: establish sizable plant nurseries in each of the sites. The programme will invest mainly in native plant species in the rehabilitation of degraded land and riparian zones.

Table 4 below summarises the anticipated economic, social and environmental benefits of the proposed programme, both for vulnerable communities and Ghana more widely.

Table 4 – Economic, Social and Environmental Benefits

Benefits	Programme (Over 3 Years)	Baseline
Social Benefits		
a) Vulnerable Households b) Communities	• Improved food production by about,000 people (or 12,000 households) in the northern regions • Improvement of child nutrition in about 150,000 people (or12,000 households) • Greater mutual trust among populations and the communities under climate change conditions • Reduced social conflict among the stakeholders sharing the common resources (e.g. water, forest etc.) especially among semi-mobile pastoralists and sedentary farmers because of increased availability of water and livestock fodder • Better community cohesion through planning and working together • Increase solidarity through the creation and enhancement of various women groups • Reduction of risks of conflicts among communities • Enhancement of social cohesion and autonomy for management committees and community radio stations • More community empowerment achieved through the participatory approach in general, through enhanced knowledge and ability to act on climate change, and through implementation of the community-based early warning system. • Low risks of conflicts • Reduction in migration, especially for young people in search of new prospects and means of subsistence • Greater mutual trust among the communities and communes in the framework of climate change • A knowledge base is set up to enable best practices to be identified and replicated • A multi-partner cooperation framework is supported and tested Decentralized departments (Environment and Agriculture,	If integrated water/agriculture adaptation actions are not implemented, the population of the programme area will continue to experience increasing vulnerability and growing insecurity due to decreased availability of water. Conflicts between crop and livestock uses. This will damage the social fabric in rural areas and exacerbate existing migration to urban areas, thus resulting in increased urban joblessness and poverty. Women and children will be particularly hard hit. Vulnerable rural communities and their associated livelihood would diminish over time, with loss of economic productivity and increased migration to urban areas, resulting of increasing pressure on already constrained urban economies.

c) Local Government Institutions and National Government	Department of Community Development, Department of Community Water and Sanitation) get more strategically involved, their role is identified and reinforced	
Economic Benefits		
a) Vulnerable Households b) Communities	• Job opportunities through the programme activities • Increase in income through increased agricultural productivity and commercialization of woody and non-woody products • Stabilization of food supply through increased and regular flow of water for food production • Diversification of livelihood activities e.g. fishing, forestry, livestock etc. improving safety nets for vulnerable households. • Increase in productivity (yield/ha) of production systems following improvement in the effectiveness and efficiency of resource-utilization • Increase in market access • The increased water storage capacity of the channels and waterways, and the associated irrigation and introduction of climate resilient production practices will support the agro pastoralist community to expand the current hectares of land used from subsistence rain-fed production to irrigated vegetable production. Farmers will be able to produce at least twice a year. Households of agro-pastoralists using the water supply will increase their production by several folds. • Risk of crop failure reduced: In areas where soil water conservation on farmlands and flood diversion for supplementary irrigation is introduced, the risk of crop failure is reduced, crop yield is expected to increase, and availability of animal	Highly depleted cereal production; Highly depleted forests and pastures Highly depleted fish population

c) Local Government Institutions and National Government	feed is increased (crop residue and pasture land carrying capacity). The development and dissemination of drought-resistant and early-maturing seeds will similarly reduce the risk of crop failure. • The dissemination of drought-resistant and crop management techniques will enhance the economic benefits of the off-farm SWC, and, together with the improved extension services, will result in improved rangeland management in the programme area, with associated economic and environmental benefits. • Increase revenue through local taxes following the improvement of income-generating activities by the communities • A concerted planning on climate change adaptation, leading to investments designed and selected in optimal and perennial ways • Reduction in food imports and greater independence from international prices • Improvement in the GDP following increased productivity of the rural economy • Improvement in economic decentralization and distribution of the wealth of the nation	
Environmental Benefits		

a) Vulnerable Households and Communities	• A better conservation of natural resources (waters, land and forests) which deliver various environmental services (water purification, transportation, non-woody produce, less degraded lands etc.) • Improvement in the availability of water • Reversing degradation of natural resources such as land, waters, forests and biodiversity will improve the livelihood of the programme's most vulnerable people. Introduction of multipurpose trees including forage and wild fruit trees within catchments and woodlots will reinforce the coping mechanisms of communities during times of drought. • Increased regularity of water availability by securing water ways and channels from erosion and siltation • Increased protection against desertification and land degradation • Improvement of aquatic habitats with the rehabilitation of the riparian zones • Reestablishment of fish stock and fisheries with the improvement of water flow into the riverine systems, and breeding areas in the riparian zones • Increase in forest cover and stabilization of dunes with vegetation planting, thereby decreasing the rate of desertification • A better conservation of natural resources resulting in higher community resilience to climate change • Establishment and rehabilitation of nursery sites and tree planting, and expanding multipurpose trees in household woodlots and community enclosure areas, will enhance ecosystem services.	In the absence of the programme increased climatic variability, reduced rainfall and increased incidence and severity of drought will exacerbate existing pressures on ecosystems already stressed through land degradation, soil erosion and reduced soil moisture. This will reduce the availability of ecosystem services and further hamper precarious livelihoods. There will be ongoing and increased out-migration in search of animal feed and water and the associated spread of bush fires which will have negative impacts on natural resources and on ecosystem functioning. Social conflict between different resources users such as between pastoralists and sedentary farmers will increase. Erosion and siltation of the water ways and channels Highly depleted fish population

	• A better understanding of the interaction between climate, environment and human factors which impact the sustainable use of natural resources • The programme will result in increased carbon sequestration through integrating tree planting within the soil water conservation works outside of farm lands and by expanding temporary and permanent enclosures, which will enhance vegetation regeneration. Increase in crop plant coverage and density will also contribute on carbon sequestration from agricultural activities. • Environmental degradation will be reduced by reducing vulnerable communities' high dependency on natural resources for fuel wood, construction and other purposes, through tree planting and woodlots	

C. Describe or provide an analysis of the cost-effectiveness of the proposed project / programme.

Strengthening the resilience of local communities to climate change impacts in the three Northern regions of Ghana was identified in the NCCAS as an urgent and immediate adaptation priority, with the highest immediate benefit in achieving MDG1 on food security and poverty reduction. Without such targeted efforts proposed by the programme in the northern regions, Ghana's ability of achieving the MDGs by 2015 will be greatly affected. The proposed interventions by AF financed programme are guided by their effectiveness in achieving the NCCAS. The programme thus, focuses on developing adaptive capacity and strengthening livelihood resilience through practical and locally appropriate "soft" adaptation measures as more cost-effective than "hard" engineering measures assuming that soft measures can

adequately withstand the impacts of future climate change even under the worst case scenarios. The programme will emphasize the integration of climate risk planning into water management planning and catchment development at all levels which does not currently exist even for larger water basins like the White Volta. Such measures will reduce physical exposure of the water basins to climate risks, and help avoid the additional costs resulting from mal-adaptive land use and development planning and practices such as destruction vegetation of the water catchment by farming and grazing that currently characterize the water catchments.

A number of alternative options have been assessed during the programme design in order to identify the most cost-effective options. For example, a number of different options to promote water infiltration, storage and flow for increased water availability for improved productivity were weighed for cost-effectiveness and sustainability, before the current programme components were selected and elaborated. Mainstreaming climate change into the management plan of the White Volta is considered more cost effective in providing a sustainable measure for improving the management of water resources in the northern region under climate change than seeking alternative ways of seeking additional water supply from new sources. It is also amenable to further adjustments as information with respect to climate and hydrological scenarios of the river system become more reliable into the future. By generating climate projections under different water use scenarios in the White Volta, it is possible to regulate and plan multi-purpose and multi-stakeholders usage of the water resources with compromising resilience to climate change.

The mobilization and support of the local community and their various committees, groups and associations is a cost-effective way of coordinating their activities in achieving climate resilient management of water resources in northern Ghana than allowing uncoordinated activities. Experiences from other places have shown that both the extent of long-term benefits, and in particular their sustainability, are directly related to the community ownership promoted through such mobilization efforts and strengthening of community-based groups.

The programme's approach is in line with increasing resilience, as the best cost-benefit approach of mitigation and adaptation in the demonstrations sites in providing synergies in the implementation of the NCCAS as well as the NAMA. The programme's approach also has significant potential for up-scaling and replication across Ghana. By the end of the programme, it will be possible to assess the proportion of the population and the value of critical infrastructure and other economic assets as a result of the adaptation measures implemented through the programme and to make comparisons with the costs and benefits of alternative adaptation measures that have been implemented elsewhere in the Ghana. The irrigation application method selected for the irrigation schemes are drip and surface irrigation application methods which are easily manageable, provide flexibility on the type of traditional cropping pattern practiced, have a low energy requirement, are not capital intensive and therefore remain affordable to communities, and the maintenance cost is cheaper.

The continuation of the adaptation strategy developed by the programme upon completion will depend on the extent and depth of all stakeholder engagement in the programme, the capacity of the community and local institutions that will be developed, and the mainstreaming of adaptation into relevant policy-making processes and water management plans.

The programme has been designed through close consultation with key stakeholders (see Annex 1). In addition, the Government of Ghana and other key stakeholders have expressed their full support as it addresses urgent and immediate adaptation priorities identified in the recently completed NCCAS. This relates to one of the most vulnerable elements in Ghana, i.e. water resources that support livelihoods and national development. The programme is strongly anchored in several major national policies and programmes (as indicated in Section F) and the results will be institutionalized in the following ways:

adaptation measures developed will be mainstreamed into key water sector policies and river basin planning tools will guide implementation.

Capacity development of planners and all levels of government will provide a central focus for all activities. Climate change training will be developed with a focus on community based adaptation and water ecosystem restoration activities. These will be designed with replicability in mind and remain after programme completion as a continuing key resource for river basin management workers and authorities and other sectoral agencies.

Financial sustainability: This programme will channel support to communities with a focus on them becoming become independent, self-sustaining, and eventually profitable financial institutions. In the context of the programme, this would mean that the s would continue to operate beyond the period of programme grant. It is intended that micro-financing institutions could also replicate micro-finance for livelihood-related adaptation initiatives to other communities.

Community-level infrastructure investments, such as water harvesting structures, will undergo a financial feasibility assessment during the prioritisation process to ensure sustainability and maximize the cost-benefits of particular interventions for particular communities.

Institutional sustainability: The programme builds mainly upon existing institutional structures of the government both at national and local levels and on existing community structures. For example the functions of the Programme Board will be taken on by the coordination structure that exists within MEST at central level. At sub-national level the programme will provide support functions through its existing Regions. The approach taken will be to engage with as many staff as possible at different levels to reduce the effects of attrition of staff over time. The proposed project activities will assist Ghana to improve and create management plans for the black and white Volta Rivers, and mainstream these into the activities of a number of relevant institutions. These plans will also inform local plans in the 15 communities. Building strong national and local management plans will be important to the sustainability of the activities implemented under component 2 (such as increased water supply, small scale irrigation schemes, soil and water conservation measures).

The programme will develop evidence of adaptation cost per beneficiary unit (e.g. household, productive hectares of irrigated land, etc.) .

Social sustainability: The capacity building activities, networking and field-level presence will help achieve social sustainability of the programme. The build up of trust through dialogues and stakeholder consultations and stakeholder mobilization done through capacity building will help to achieve sustainability. A strong focus on building local knowledge, capacities and incentives – as well as strong programme focus on ensuring gender equity in all operational matters are expected to lead to social sustainability.

Environmental Sustainability: The programme's focus on climate change adaptation within existing ecological zones in the northern regions are expected to lead to better environmental sustainability and enhanced natural resources management. Reafforestation and all the variety of "soft" measures being adopted to protect water catchments will stabilize the physical environment. The programme will promote integrated water management with full engagement of the community and community based organizations (CBOs). The programme will support the use of renewable energy such as solar energy as opposed to fossil fuel, to operate mechanized boreholes. This will be building on the lessons learnt in using solar energy from World Vision's rural water projects in the region, in demonstration of the feasibility of this technology.

The programme will demonstrate how investments in climate-resilient livelihoods can be profitable, thereby promoting the extension of similar activities beyond the programme sites. With increased awareness of the market opportunities related to adaptation to climate change, the programme would be promoting further investments in adaptation.

Sharing of methodologies, results and lessons learned will be compiled and disseminated to other districts and regions through the programme and through a range of communication media. A public awareness campaign and field demonstrations will be organised.

The programme will emphasize cost effectiveness of the outcomes. In particular, the proposed approach will include a logical step-by-step sequence of activities, to identify and appraise adaptation options before they are implemented. Cost effectiveness will be an essential consideration of the evaluation process.

The programme has been developed to complement and build upon other recently completed and ongoing projects and programmes, such as the Africa Adaptation Programme and WRC's "Climate Change Adaptation through Integrated Water Resources Management (IWRM) in the three Northern Regions of Ghana". In this way, the programme will utilize existing understanding, information and human capacity.

D. Describe how the project / programme is consistent with national or sub-national sustainable development strategies, including, where appropriate, national or sub-national development plans, poverty reduction strategies, national communications, or national adaptation programs of action, or other relevant instruments, where they exist.

The processes of agricultural modernization constitute the second most important strategic priorities established by under the Growth and Poverty Reduction Strategy II (GPRS II) of Ghana as well as addressing issues relating to vulnerability and exclusion for improved social development performance to bolster economic growth. The proposed AF Programme will contribute to the operationalization of the Ghana's GPRS II especially in the northern region recognized as highly vulnerable and less developed than other regions in the country.

The Ghana Shared Growth and Development Agenda (GSGDA), 2010-2013 which spells out the Medium-Term National Development Policy Framework, considers adaptation as the principal way to address the potential impacts of climate change. Adaptation is considered by GSGDA as "*a mechanism that allows the management of risks, adjust development, including economic, environmental, and socio-cultural activities, to reduce vulnerability of the national economy, population and ecosystems to the impact of climate change in order to achieve national development and economic growth*". The proposed AF programme is directly contributing to the realization of the GSGDA and targeting the most vulnerable region highlighted in all national documents.

The proposed AF programme also supports regional strategies. The programme is aligned to the strategies of the Savannah Development Authority[32] (SADA) which is a Sustainable Development Initiative for the Northern Savannah covering the period of 2010-2030. The vision of SADA considers economic growth as the most efficient means of addressing chronic poverty and development gap and inducing long-term adaptation to climate change while maintaining the dignity of people by utilizing the north's most abundant resources. To achieve this vision SADA considers a framework for long-term adaptation to floods and drought as the premise for economic growth that provides opportunities to individual households in reducing vulnerability and overcoming poverty. SADA considers vulnerability in the northern region to be associated with limited opportunities for off-farm and non-farm economic activities. The proposed AF programme includes livelihood diversification in reducing climate induced risks and

vulnerabilities for more than 80% of the population that depends on unimodal rain-fed agriculture for their food, income and livelihoods. SADA vision of developing a healthy and diversified economy is based on the concept of a "Forested North, where food crops and vegetables are inter-cropped with economic trees that are resilient to weather change, sustain a stable environment, and creating a permanent stake in land for poor people." Activities of the AF programme will directly contribute to the realisation of this vision.

As a signatory to the Kyoto Protocol and the United Nations Framework Convention on Climate Change (UNFCCC) Ghana has prepared a Second National Communication to the UNFCCC which clearly demonstrates evidence of climate change impacts on agriculture and water resources which in turn affect social development in terms of poverty reduction, health and women's livelihoods. Although Ghana has made significant progress on poverty reduction in recent decades, climate change could overturn such gains unless adaptation measures are put in place. According to Ghana's Second National Communication of 2010, "*a north-south poverty divide is exacerbated by climatic stress in northern regions where temperatures are already relatively high. Lower agricultural productivity and periodic flooding are also increasing the pressure on the vulnerable youth from the north to migrate south"*.

As part of Ghana's effort in addressing climate change, a National Climate Change Adaptation Strategy (NCCAS) has been developed under an internally driven and government-led initiative. The NCCAS proposes adaptation options using qualitative and quantitative analyses to bring the diverse options into more manageable units and in harmony with other cross-sectoral strategies. A national approach referred to as Akropong was used. The Akropong Approach is designed to help the sectoral experts assess the inter-relationships between the sectoral proposed options, identifying both synergies and conflicts and using the multi-criteria analysis (MCA) to evaluate and rank the options required by the sector. To be most effective in national adaptation interventions, it was decided that ecosystem and programmatic-based harmonized adaptation interventions be developed.

The programmatic-based approach led to the identification of ten top national priority adaptation programmes which have been provided in Table 5 below.

Table 5. National Priorities for Climate Change Adaptation in Ghana

Item	Titles of Adaptation Programmes
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.	Enhancing national capacity to adapt to climate change through improved land use management
4.	Adapting to climate change through enhanced research and awareness creation
5.	Developing and implementing 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 on human health through improved access to healthcare
9.	Developing demand- and supply-side measures for adapting the national energy system to impacts of climate change
10.	Adapting to climate change: sustaining livelihoods through enhanced fisheries resource management

The proposed AF Programme directly contributes to the realization of numbers 2, 6 and to some extent 3 of the ten national priorities for adaptation.

The National Water Policy of Ghana considers water as a cross-cutting element of the Growth and Poverty Reduction Strategy (GPRS II) which is also linked to the Millennium Development Goals. The objective of Ghana's Water Vision for 2025 is to "*promote efficient and effective management system and environmentally sound development of all water resources in Ghana*". The proposed AF Programme directly contributes to the realization of the vision in the driest northern regions of the country, by employing water harvesting techniques recognized in the national water policy, as well as mainstreaming climate change into water management plans especially for the White Volta which is a principal national water source. The overall goal of the National Water Policy is to "achieve sustainable development, management and use of Ghana's water resources to improve health and livelihoods, reduce vulnerability while assuring good governance for present and future generations". This policy identifies a number of focus areas, under the headings of water resources management, urban water supply and community water and sanitation. The proposed programme contributes very well to a number of these focus areas, such as "access to water", "water for food security" and, in particular "climate variability and change". The policy objectives of this last focus area are as follows:

i. To minimize the effects of climate variability and change.
ii. To institute measures to mitigate the effects of, and prevent damage caused by extreme hydrological occurrences (floods and droughts).

E. Describe how the project / programme meet relevant national technical standards, where applicable.

One of the primary focuses of the programme is the development of community management approaches, and demand side management technologies for which no environmental assessments are required (unlike in the case of large dam construction). Infrastructure investment is expected to be undertaken as part of local government and community-based programmes to upgrade water supply and storage capacity. It is not envisaged that there will be large-scale water extraction activities, beyond the provision of sustainable watering points for livestock and some water harvesting. Some activities will require licenses from the WRC, such as borehole construction. Where applicable, the local regulations will be followed. The watering points and wells that will be established in the regions are expected to be relatively following the specified standards. Before construction, a hydrology review will be undertaken in association with the Water Resources Commission to ensure the selection of the best-suited locations. From a water quality perspective, the programme will follow the country's water quality standards as outlined under the section that regulates water extraction and use as well as set standards of minimum quality of water for direct consumption. The Sanitary Code that sets water pollution prevention measures will be observed in designing water supply side measures. The programme will fully comply with the water code that regulates overall water management. More specifically, it will closely observe the rules for establishing the water user associations defined by the water code.

There are good environmental legislative framework in place in Ghana and laws and institutions with responsibilities for enforcing them. The Government of Ghana, environmental regulating bodies and civil society are taking steps to solve environmental problems. Some of the initiatives include:

- The establishment of the Ministry of Local Government, Rural Development and Environment to provide policy direction.
- The setting up of the Environmental Protection Council in 1974 which became the Environmental Protection Agency (EPA) in 1994 as the main body to advise and enforce environmental laws
- The National Environmental Policy (NEP) and the National Environmental Action Plan (NEAP) was adopted in 1991 to provide the framework for the implementation of environmental policies
- Development of guidelines and standards on air, water and noise by EPA for the regulation of development activities
- The provision of Environmental Assessment Regulations, 1999 (LI 1652) to promote environmentally sustainable development
- Mainstreaming of environment into development policy planning processes
- Establishment of Chemical Control and Management Centre
- Control of the use and sale of Ozone Depleting Substances
- HCFC phase out management plan

The specific programme outcomes and outputs proposed will ensure that all activities follow the standards established by Government, in particular the Ministry of Environment, Science and Technology (MEST), the Ministry of Food and Agriculture (MOFA) and Ministry of Water Resources, Works and Housing. It is in this framework that the programme ensures that, all activities shall meet the standards established by the government.

A limited number activities implemented under the programme will require an Environmental Impact Assessment (EIA), (under the Environmental Assessment Regulations, 1999 (LI 1652) and the Ghana EIA Procedures, in accordance with the Environmental Protection Agency Act, 1994 (Act 490)), because some of the activities to be implemented are covered by the Regulations depending on their scale. All activities will be screened against EIA regulations to determine if EIA is required.

The programme meets the standard set by the National Action Programme to Combat Drought and Desertification. Some of the proposed activities such as ecosystem rehabilitation and the establishment of woodlots, directly address land degradation and combating desertification.

The proposed programme is also in line with the Strategic Environmental Assessment (SEA) of the GPRS undertaken in 2003 and 2004 which constitutes an integral part of policy and planning process in Ghana. The programme will contribute to sustainability of the management of natural resources as required by SEA, by the communities and local authorities who are the beneficiaries of the programme.

The programme builds on the expertise and recommendations of local research centres and government agencies as well as those of UN when considering specific measures such as the choice of water supply and conservation measures, and agricultural methods. It shall put an emphasis on local and traditional species capable to adapt and having a good nutritional value.

F. Describe if there is duplication of project / programme with other funding sources, if any.

In alignment to the national vision, the entry point of the proposed AF programme was a mapping of previous, ongoing and planned project interventions on environment and climate change nationwide as well as other relevant project activities in other thematic areas but within the proposed programme sites (See Table 6). These projects were identified and reviewed for their objectives, scope of intervention, duration and details of each activity conducted. The mapping provided the landscape of the types of interventions in guiding the establishment of synergies and complementarities with the proposed programme activities for capitalization and re-enforcing previous interventions and to make sure there are value added and no duplication. The matrix from the mapping was presented to MEST and other government representatives in a national consultation workshop held in Accra on 18 November 2011, to their satisfaction that there is no duplication of the proposed programme with other funding sources. In addition, in-depth discussions were also carried out with institutions that are based in and implementing water-related and livelihood initiatives in the northern regions. Instead, the proposed AF programme builds on earlier water and climate change project activities, such as the recent project funded by the Danish International Development Agency (DANIDA) and implemented by Ghana's WRC: "Climate Change Adaptation through Integrated Water Resources Management (IWRM) in the three Northern Regions of Ghana". The proposed programme has been developed via close consultation with the WRC and takes account of lessons learnt from this project.

Table 6. Climate Change Initiatives in Ghana

Project	Source and Amount of Funding	Implementing Organization	Status/Duration	Link with the AF Programme
Adaptation to climate change projects				
1. Innovative Insurance Products for Climate Change Adaptation	$3.50 Million GIZ	Ministry of Finance and Economic Planning (MoFEP), National Insurance Commission (NIC)	2009-2013	Agricultural insurance products developed under the project could contribute to adaptation in AF programme sites. This is not considered as core to the AF programme but linkages will be explored during programme implementation.

2. Integrating Climate Change into the Management of Priority Health Risks	$1.72 Million GEF/Special Climate Change Fund	Ministry of Health, Ghana Health Service, UNDP	2011-2013	Capacity building for CC response at local level; addresses National Climate Change Adaptation Strategy (NCCAS) priority on health. As such there are not direct linkages to the AF programme, but together these both contribute towards implementation of the NCCAS.
3. Promoting Value Chain Approach to Adaptation in Agriculture	$2.6 Million GEF/Special Climate Change Fund	IFAD, MOFA, EPA	Project Preparation Grant Phase as of November 2011	During Inception Phase AF programme will consider results of project preparatory activities, such as the social implications of CC with a focus on women, assessment of CC impacts on targeted production systems, cost-benefit analysis of proposed adaptation alternatives, and feasibility study on the technical and financial potential of different types of technologies for adaptation, in selection of programme communities and to inform decision making criteria for appropriate technologies in specific communities.
4. Sustainable energy and water supply for the University of Accra	€ 1,356,425 German Federal Ministry for Environment, Nature Conservation and Nuclear Safely (International Climate Initiative)	Valley View University	2008-2009	Techniques for storing rainwater storage and choosing vegetation that is appropriate for new climate conditions will be used to inform detailed decision making regarding AF project-supported community interventions
5. African Adaptation Programme (AAP)	$2.7 M Government of Japan	EPA, UNDP, Japan	2010-2012	AAP resources have been used to support development of the AF proposal – access to adaptation funding is a key area for AAP. In 2012 AAP will be supporting capacity building in the economic analysis of climate change impacts and this increase in capacity will assist in detailed design of interventions under AF. In addition AAP is supporting initial activities leading the development of mechanisms for coordinating of climate finance in Ghana.
6. Climate Change Adaptation and Development Initiative (CC-DARE)	Ministry of Foreign Affairs – Denmark	UNDP, UNEP, MEST	Completed 2012	Formulation of the National Climate Change Adaptation Strategy (NCCAS). Strategy identifies water resource

				management to enhance productivity and livelihoods as one of the priority adaptation programmes. This AF programme s is therefore a key component in the implementation of the NCCAS.
7. Climate Change Adaptation through Integrated Water Resource Management (IWRM) in the three Northern regions of Ghana	Ministry of Foreign Affairs – Denmark	Water Resources Commission	Completed in 2011	AF programme builds upon the research findings and pilot studies undertaken as part of this project, which was implemented to develop recommendations for future approaches and activities. The AF programme has been developed to implement many of the recommendations of this project and via close collaboration with the Water Resources Commission.
8. Enhancing resilience to climate and ecosystem changes in semi-arid Africa: an integrated approach	Japan Science and Technology Agency	Kyoto University, United Nations University	2011 to 2015	This recently commenced research project will develop and experiment with adaptive water resource management methods. Via regular and ongoing collaboration through the One-UN system, feedback and learning between this project and the AF programme will take place, so that they inform one another.
9. Adaptation learning Programme for Africa (ALP)	UK DFID, Ministry of Foreign Affairs of Denmark, Ministry of Foreign Affairs of Finland, and the Austrian Development Cooperation	CARE International	2008-2014	Effective approaches to community-based adaptation (e.g. multiple water use systems for livelihood improvement) tested by this project have informed the development of the AF programme. CARE International have been extensively consulted during the programme development.
10. Global Water Initiative Project	432,454.10 Ghana Cedis Howard G. Buffet Foundation	CARE and Catholic Relief Service	Since 2008; envisioned to continue for at least 10 years	Target communities are implementing Integrated Water Resource Management (IWRM) plans (albeit in the Black Volta Basin); AF programme has been developed using lessons learnt from interventions implemented by this project, such as those that seek to help communities meet with water needs (e.g. through boreholes, hand-dug wells).

11. URAdapt: Managing water in the urban-rural interface for climate change resilient cities	IDRC of Canada and DFID	Council for Scientific and Industrial Research – Water Research Institute; International Water Management Institute	2009- 2012	This project has used an approach to bringing together stakeholders (climate change and water management experts, decision-makers, and community representatives) to collectively design adaptation strategies for water-use and a similar approach will used within the AF programme.
12. Ghana Sustainable Water and Sanitation Project	World Bank	GoG, Community Water and Sanitation Agency	2010-2016	AF programme will build on result of the institutional strengthening and project management component which targets key stakeholders in water and sanitation sector
13. Joint FAO/UNDP/WFP on climate change adaptation and disaster risk reduction	To be identified	FAO, UNDP, WFP, and relevant MDAs	Under consideration	Mainstreaming of disaster risk reduction and climate change adaptation into district development plans; strengthening resilience of poor communities that are dependent on agriculture. This is being implemented by the UNDP CO and as such synergies between the two proposals have been developed in order that they are complementary but avoid duplication.
Mitigation and adaptation co-benefits				
14. REDD Readiness Preparation Formulation Grant	$0.20Million World Bank Forest Carbon Partnership Facility	Forestry Commission	Development of REDD+ strategy completed; 2012-2013 activities to focus on implementation of strategy & performance-based actions	REDD+ Strategy will include wider aspects of policy, including agro-forestry activities. Policy will need to be taken account of during implementation as it may have implications for the feasibility/effectiveness of specific livelihood diversification activities
Mitigation Projects				
15. Energy Development and Access Project (formerly) Development of Renewable Energy and Energy Efficiency	$5.50Million GEF Trust Fund – Climate Focal Area (GEF 4)	Ministry of Energy, IBDRD/World Bank	2007-2012	Goal to provide increased access to affordable, clean, and efficient energy services may help enable adaptation of communities that also benefit under the AF project
16. Promoting of Appliance Energy Efficiency and Transformation of the Refrigerating Appliances Market in Ghana. (Under West Africa Energy Program: 3789)	$1.72Million /[GEF Trust Fund – Climate Change Focal Area (GEF 4)]	Energy Commission, UNDP	2011-2014	Indirect link
17. Ghana Urban Transport	$7. 00 Million GEF Trust Fund – Climate Focal Area	Ministry of Roads, IBDRD/World Bank	2007-2008	Indirect link

	(GEF 4)			

G. If applicable, describe the learning and knowledge management component to capture and disseminate lessons learned.

Recognizing the importance of knowledge management (KM) to enhance impacts and facilitate replication, the programme has dedicated one component on knowledge and capacity development and institutional coordination. The knowledge management approach is two-pronged. On the one hand, the programme develops skills and knowledge for socio-economic activities and scenario-based planning that are essential to achieve climate sensitive policies in water – the main limiting factor for development in the three northern regions of Ghana. At the same time, the programme will generate field-based experience of local adaptation measures that will feed back to the national policies and social protection and development programmes. Under component 4, the programme will organize local knowledge identification and management for integration with other knowledge types and sources.

This programme will serve as an experience that will generate foundational capacities and develop basic tools and information to ensure that climate risks are incorporated into water management planning and investment processes of river basins Ghana. The capacities of local institutions and local governments will also be develop in a range of adaptation responses within an integrated package for community water resource management plans in the northern region. The lessons learnt from the programme, will be used to improve knowledge and institutional capacity for coordination, management, management of water resources and diversification of livelihoods of communities in northern Ghana. In order to achieve this, there will be capacity assessment of regional and local institutions such as SADA, district assemblies etc. including those of media institutions e.g. journalists, press media etc. Following on the gaps analyses, capacity building training programmes will be designed and implemented for targeted groups. The capacity for the identification and documentation of local knowledge systems will be enforced.

Outreach will also be undertaken to River basin management structures, district assemblies and other key stakeholders who are responsible for the majority of supply side water design within the country.The programme will employ various learning tools and different methods of knowledge dissemination such as:

- Local media news items in local language;
- Public debates, focus group sessions;
- Water management briefs for Volta Basin Authority;
- Water management briefs with the relevant sectors e.g. agriculture, hydropower operators;
- Government newsletters;
- Targeted information materials to support the activities of SADA and the district assembly
- Awareness actions for parliamentarians;
- Awareness actions for water utilities;
- Best practice guidance materials and tools;
- Websites and virtual fora;
- Community learning platforms

Implementation of concrete adaptation actions on the ground will constitute the primary learning experience, which will feed into all awareness, training and knowledge management actions facilitated and conducted by the programme. Apart from consultative face to face meetings and interactive events, the programme will also prepare brochures, leaflets and posters on the effects of climate change on freshwater resources, and on the relationship between water management practices and other sectors and

ecosystems in the northern region. Existing awareness materials on IWRM will be adopted. Key findings both in terms of the economics of adaptation in the water sector under Component 1 and 2, and in terms of best practices identified for livelihood diversification under Component 3 will be prepared in a format for dissemination to key stakeholder audiences. These may include government officials, private sector farmers and providers of water management and agricultural support services. It is also envisaged that a number of training and consultation events will be held under the various component work-streams, and the outcomes of these events will be captured.

H. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation.

Stakeholder involvement plan

The Ministry for the Coordination of the Environment (MEST), was established (2007) has coordinated consultation with all major stakeholders during the programme conceptualization and design phase as part of their mandates as key governmental counterparts of the process.

All the major government stakeholders have been consulted during the development of the programme proposal and there is consensus with regards to the main components as well as the logframe (outcomes, outputs, activities, indicators etc.) of the programme. Given the fact that Ghana has just completed a national climate change adaptation strategy, it was necessary to first approach the key stakeholders individually prior at the conceptualisation stage of the proposal. The following stakeholders' were consulted in July, August and September 2011:

- Ministry of Environment, Science and Technology (MEST)
- Environmental Protection Agency (EPA)
- Water Resource Commission (WRC)
- World Food Programme (WFP)

The draft proposal was next presented to a wide range of stakeholders (national/regional and Municipality scales and from the Government and Civil Society sectors) at a National workshop in November 2011 and their inputs to comprehensive logframe and activities were used to further develop the programme design and the elaboration of the Programme Document (attendance list of meeting in Annex 4). The following organisations/agencies were represented:

- Ministry of Environment, Science and Technology (MEST)
- Environmental Protection Agency (EPA) – Ghana's UNFCCC focal point
- Africa Adaptation Programme (AAP) Project Management Unit
- CARE International/Adaptation Learning Platform
- Water Resources Commission (WRC)
- World Food Programme (WFP)
- Canada International Development Agency (CIDA)

- Council for Scientific and Industrial Research-Water Research Institute (CSIR-WRI)
- Ghana Irrigation Development Authority (GIDA)
- Friends of the Earth Ghana
- Africa 2000 Network
- Global Environment Fund Small Grants Programme

These stakeholders represented organisations responsible for both policy level development/ implementation and the development and implementation of community level projects across Ghana, including in the northern regions.

Discussions at this workshop included an intensive dissection of the logical framework and analysis of activities and their likelihood of success in improving resilience to climate change at the community level. A particular development that arose from this workshop was inclusion of groundwater resources within the programme, whereas before the focus had been on surface water only. An emphasis in discussions was also the need to consider multiple uses of water, e.g. for drinking water and for livestock. In addition previously the concept that had been developed did not address flood management but it was clear from the workshop discussions that this is necessary in order to take an integrated approach.

Following the workshop in Accra a mission was carried out to the northern region in December 2011 for consultation with the three target regions to establish the baseline of Communities' vulnerability towards and to find out about community priorities for adaptation. In order to capture gender-based vulnerability, women groups were consulted at the local level. Attendance lists of meetings are provided in Annex 4. A rapid local government CC Capacity Assessment (CCA) was also undertaken during the mission for an appraisal of existing capacity in the regions. This mission was targeted to ensure consultation was undertaken with organisations that work with, and understand, the issues and vulnerabilities of rural communities in northern Ghana. In total 37 individuals, from the following 12 Government and CSO organisations were consulted during this mission:

- World Vision – delivering community level development programmes in northern Ghana
- CARE International/Adaptation Learning Platform - delivering community level development programmes in northern Ghana
- Catholic Relief Service/Global Water Initiative - delivering community level water programmes in northern Ghana
- Opportunities for Industrialisation Centre (OIC) – a local CSO working with communities
- Integrated Development Centre (IDC) – a local CSO working with communities
- Centre for Sustainable Local Development (CSLD) – a local CSO working with communities
- UNDP Recovery Programme – delivering a programme to communities in northern Ghana, with a focus on sustainable livelihoods
- Community Water and Sanitation Agency – Government Agency
- Environmental Protection Agency (EPA) Regional Office
- National Disaster Management Organisation (NADMO) regional office
- Ministry of Food and Agriculture (MoFA) – regional office
- Department of Community Development

These meetings validated the logical framework and included extensive discussions on proposed activities. Particular emphasis was placed on the need to engage with communities in planning water resource interventions, the need to utilize existing organization structures including in particular district assemblies, the need to ensure that funds lead to actual measures on the ground and on the scale of interventions that could be possible within particular quantities of funding. There was considerable

discussion on which livelihood options would be most effective and on the need for communities to be part of the decision making process in choosing particular options for themselves. Dry season gardening was identified during consultation meetings as being a livelihood option that is particularly suited for women. In addition, the need to ensure that support to livelihood diversification addresses the whole value chain was very strongly emphasized by stakeholders, following their experience on previous community level projects. As with the stakeholder meeting in Accra, the importance of considering multiple-uses of water was identified by stakeholders as an important issue.

As a whole the consultation process revealed the need for complimentary activities, included under Component 4 and relating to knowledge management and institutional strengthening, to strengthen and maximize the success of the community level interventions included within Components 2 and 3.

I. Provide justification for funding requested, focusing on the full cost of adaptation reasoning.

Component 1: WATER RESOURCE AND MANAGEMENT PLANNING UNDER CLIMATE CHANGE

Baseline (without AF Resources)

Water is the most limiting factor to the improvement of productivity of agricultural, livestock and fishery practices in the drought-prone programme area located in the northern region of the country where extremely variable seasonal and inter-annual rainfall and water productivity is often insufficient to support production systems and human populations. Furthermore land degradation and soil erosion are serious environmental problems in the region. These constraints are projected to increase as the impacts of climate change become more severe in the region. There is currently the prevalence of water insecurity following the drying up of rivers and spring, unsustainable use of groundwater causing increased water stress and scarcity of potable water. While many development projects conducted by NGOs, IGOs etc. have tried to implement water resource management and livelihood measures, these have not always taken climate change into consideration to make the investment resilient to future climate impacts. As a result there has not been optimization in harnessing the investment so far.

The White Volta River which is one of the main rivers in Ghana and with extensive coverage of the northern region is also a transboundary river shared by neighboring Burkina Faso, Cote d'Ivoire and Benin. Although there is a Volta Basin management plan developed, it does not currently take climate change into consideration in the management of the multiple services of the water resources of the basin. Similarly, the sub-basins linked to the Volta Basin have no management plan. Therefore, there is no understanding of climate change impacts and the potential changes in the volume of water in the White Volta River Basin and its sub-basins in order to plan and manage water resource availability in a way that takes into account climate change projections.

Additionality (with AF resources)

While integrated water resource management (IWRM) does not explicitly integrate climate change considerations in the planning process, with the AF resources, the underlying principles of good water resource management the AF resources will facilitate a process whereby information required for adaptation to climate change, including data and records, will be integrated into the water resource management plans of the regions. As the impacts of individual water management actions can accumulate within a particular water system, basin planning, especially that they cover multiple political jurisdictions, will be encouraged as adaptation to climate change is identified and implemented using the AF resources. Transboundary cooperation is both necessary and beneficial in adapting to climate change. Following the shared nature of the White Volta River Basin, using the AF resources, adaptation planning across boundaries will be encouraged in the management plan of the river basin by the riparian countries in preventing transboundary impacts, sharing benefits as well as the risks in an equitable and reasonable

manner and cooperating on the basis of equality and reciprocity. This will assist in avoiding actions that might be adaptive in one location but maladaptive elsewhere, potentially increasing conflict over water management and allocation.

The Global Water Initiative (GWI) project is a member of the White Volta Management Steering Committee under the Ghana Water Resource Commission (WRC). GWI plans to develop a similar plan for the Black Volta which will be facilitated by the proposed AF Programme with the integration of climate change considerations into the current water management plan of the White Volta. The AF programme can have great implications for the management of the Black Volta and the creation of opportunities for cross learning. Currently, the sub-basins have no management plans. Thus, developing management plans for the different basins using AF resources is an important activity.

AF resources will be used to create a diversified, adaptive freshwater supply system in three vulnerable northern regions. This system will be characterized by a) rehabilitation of water catchments to improve retention and storage capacity in order to buffer the effects of less reliable rainfall and lack of new freshwater supply during longer dry periods; and b) implement rainwater harvesting to improve supply. The Adaptation Fund resources will enable the implementation of the National Water Policy, which sets of strategic goals and key strategies for the management, use conservation of water resources in the three driest northern regions. With the AF resources, climate projections will be generated for the White Volta river basin and its sub-basins. A gap analysis will of the current water management plan will be conducted in order to revise the management plan using the climate change projections of the White Volta River, and the integration of climate change response measures.

Component 2: COMMUNITY LEVEL IMPLEMENTATION OF CLIMATE RESILIENT WATER RESOURCE MANAGEMENT ACTIVITIES

Baseline (without AF Resources)

Community involvement and implementation of water resource management activities are very limited which exacerbates their vulnerability to climate change impacts. As a result there is community water management plans based on their needs and opportunities. There are also no linkages between river basin management plans and community needs limiting the cross-services of water with social and economic potentials highlighted in the Growth and Poverty Reduction Strategy (GPRS II). As a result, the drive and purpose required for integrated, climate-resilient water resources management is lost and unsupported by local communities, or harnessed by civil societies and government programmes to in addressing the MDGs. There is lack of information for communities on how to manage their water resources and streamline or for diversification of their livelihood activities in response to climate change impacts on their water resources thereby limiting their abilities to respond and adapt to climate change. Thus, climate change projections have not been developed for integration into water resource management plans in support of local communities guiding their choice of technological options in addressing climate change vulnerability and avoiding degradation of their natural resource-bases. There is an urgent need to assist these vulnerable communities to build adaptive capacity through enhancing climate-resilient agricultural and livestock production. This will support an integrated and holistic programming response by vulnerable communities in managing climate risks and capitalising on emerging opportunities through improved water supply.

Additionality (with AF resources)

For the water related adaptation measures described under components 1 and 2 to be sustainable over longer periods of time, locally appropriate communal management structures will have to be put in place. This will enhance the ability of communities to improve water delivery services, through improved management rights and greater accountability. With the AF resources, climate resilient management of water resources by communities will be instituted in the Northern Ghana through the establishment of

community water supply and management plans. Water supply measures for multiple uses will be implemented in order to improve on the reliability of water availability. Using the AF resources, a number of activities will be undertaken to achieve these outputs. For example, a review of any existing community water management plan will be done as well as mapping climate risks and opportunities such water re-charge and collection points, etc. to facilitate planning and developing of community water supply programmes. Through empowering communities with the implementation of water resource management planning, the importance of rainwater harvesting techniques will be emphasized as well as training in efficiency in the utilization of water. The construction and rehabilitation of water collection facilities will be implemented. Households will be empowered to participate in integrated water resources planning on their localities, and encouraged to view water resources as an interconnected economic good that is valuable and needs to be managed collectively rather than individualistically in a changing environment. The AF programme will support the creation and fostering linkages for sharing water across communities and district authorities.

For the past 3 years, GWI has been groundwater harvesting through boreholes in the northern regions and using solar power to pump out the water. This has provided the local communities the skills and experience in how to manage them sustainably. The AF programme will capitalize on this in providing water from boreholes used for different purposes, not just for domestic water use. The GWI project is also supporting the development of water management plans in the communities. The communities in turn submit these plans to the District Assemblies (DAs) which gets the DAs involved in the process. The plans contain an overview of challenges related to water (quality, sanitation, and siltation) and proposed activities to address these challenges. The action planning identifies specific people and timelines. Annual review sessions are also carried out to discuss the status of implementing the plans. With the AF resources, climate change will be mainstreamed into the community water management plans to make them more resilient and also this excellent initiative will be strengthened and implemented more widely.

There is a Community Water and Sanitation Agency that has guidelines for managing water resources (e.g. Water Board, WatSan Committee). These bodies manage all issues, including maintenance and repairs. It is mandated that at least 50% of the members are women. In addition, there is an apex body that has representation from different communities. GWI strengthens these bodies and establishes one in communities where they don't exist. With AF resources, climate change adaptation will be integrated into the GWI activities. Based on Vulnerability and Capacity Assessments (VCA) in each of the regions, community-based adaptation plans will be developed with particular focus on water delivery services.

Component 3: DIVERSIFICATION OF LIVELIHOODS OF RURAL COMMUNITIES UNDER CLIMATE CHANGE

Baseline (without AF Resources)

Making informed decisions by communities and policymakers on practical adaptation actions and measures such as diversification of livelihoods in respond to climate change impacts on water resources using sound scientific, technical and socio-economic bases taking into considerations current and future climate change and variability is not possible limiting the realisation of major national programmes and targets. In the northern region where the expected ratio of precipitation to evaporative demand is expected to decrease, rain-fed agricultural production is vulnerable to climate change. Even where erratic increase in precipitation could contribute to increase yields, this could be vulnerable to crop damage linked to heavy storm events, excessive soil moisture and flooding. Similarly livestock production practices are restricted under traditional grazing practices under reduced grazing grounds and the drying up of important water bodies. Seasonal and circular migration that is considered as traditional adaptation strategies to climate variability in the region, offering opportunities for trade and the exchange of ideas, are incapable to deal with the magnitude of the risks. Thus, these traditional migration patterns are increasingly being replaced by a more permanent southward shift. Northern pastoralists, for example, have pushed further southwards into regions used by sedentary farmers, while increasing demand for food

has meant that farmers have expanded cultivation into lands used primarily by pastoralists or into water catchment areas. Unfortunately, coupling climate change with ongoing agricultural land expansion in arid areas only leads to an increased vulnerability to climatic shocks[28]. All these have placed different community groups in direct competition with each other over land and water, leading to local-level tension and conflicts. In terms of fisheries, negative impacts of climate change on both aquaculture and freshwater capture fisheries are likely because of increased temperatures and oxygen demands, along with decrease in water quality. Given that more than 80% of agricultural land in the northern regions is rain-fed, changes in water quantity and quality due to climate change are expected to have significant impacts on the agricultural sector in terms of productivity, hence affecting food security.

Additionality (with AF resources)

Livelihood diversification is therefore a key response to climate change that has affected the viability of traditional livelihoods. An effective adaptation process hinges on the ability of livelihoods, which include social networks, cultural traditions and activities that provide food and income, to be sufficiently flexible so that no adverse impacts of climate change are discernable on the social system. With AF resources, there will be improvement in water availability thereby allowing for diversification of livelihood activities and sources of income for rural communities. Improved water use efficiency will be done in agricultural systems. Market gardening activities, mostly practiced by women, will be promoted and the purchase of equipment to facilitate production will be done using AF resources. Multiplication fields, nurseries, etc. will be established for more resilient cultivars. Using the AF resources, the programme will encourage a broader range of livelihood activities easily linked to the marketplace, for income generation. These include: raising small ruminants, shea butter processing, mushroom farming, soap making, small scale processing of agricultural products for women, dry season vegetable gardening etc. Some of these activities require small capital investment to kick-start. Support in the development of the whole market chain of some of the community investments will be provided as well as linking communities to sources of credit. Hybrid seeds and seeds that are higher yielding, fast maturing, more drought tolerant will be introduced. Capacity building for farmers on how to use hybrid cultivars will be developed. Using the AF resources, disaster risks reduction (DRR) will be mainstreamed or incorporated into the livelihood activities of local communities. DRR in livelihoods should be promoted by giving technical assistance to farmers.

Component 4: KNOWLEDGE, INSTITUTIONAL CAPACITY AND COORDINATION UNDER CLIMATE CHANGE

Baseline (without AF Resources)

Although water is regarded of cross-cutting importance in the national water policy, there is no activity focus on capacity building and for institutional reform and coordination at national and regional government level to ensure that water policies are evidence-based (particularly integrating climate change projections), and that water management techniques are implemented from a cost benefit perspective with equal focus on supply and demand side approaches. Without such evidence, it is unlikely that demand side or community level approaches will be considered sensible by policy makers. Since the majority of the AF resources will be channelled into concrete actions, there is need to develop the knowledge required to enhance institutional capacity, community management plan, and coordination of water management at both national and regional levels.

The relevant ministries in charge of water resource management agro-industrial activities currently lack the capacity and expertise to scale up climate related water activities into national priority programmes, such as the communal management of water delivery services. Without the AF programme, it is likely that the pace of reform within the sector will be slow, with limited development to community water

[28] UNFCCC 2011. Water and climate change impacts and adaptation strategies

management systems, adaptation planning and dissemination of best practice. Vital flexible mechanisms, such as seasonal water allocation and new payment regimes will remain untested since there is no knowledge-base and capacity to draw from. In this respect, the most marginal communities engaged in agricultural, livestock management are likely to suffer most, as government resources continue to be focused on national-level management.

Additionality (with AF resources)

Using AF resources the programme will generate knowledge and develop knowledge materials and modules that will enhance institutional capacity and transboundary coordination and cooperation. Broadening the knowledge base will enlarge the range of measures available for prevention, preparedness and recovery, and so help to find better and more cost-effective solutions. The analytical approach for integrating climate change considerations into water resource management planning and decision-making is likely to differ from one basin to the other, thus, knowledge materials will be critical for organised training of water management professionals under alternative planning paradigms.

Training will be organized for community based groups on different options for adaptation various livelihood activities under climate change impacts on water resources. Leadership training to foster group dynamics will be organized. The capacity of communities in how to use the markets, micro-finance and processing agricultural will be done. A communication strategy will be developed, which will include the use of mass media outlets such as radio, in disseminating lessons learned. The specific needs of children who are more vulnerable to water borne disease under climate impacts on water resources, will be targeted in keeping children as one of the primary stakeholder groups in building their capacity. School education programmes will be strengthened by mainstreaming climate change into the curriculum to enable proactive planning using climate forecast and scientific information.

There is a WASH platform in one district under the S3 project in the northern region, which tries to address the weak culture of cross sharing and learning. Knowledge management and sharing are being implemented under this programme following the mapping of existing initiatives that has been carried out. Capacity building strategy will be developed through organizing workshops and provision of equipment and follow up programmes.

Lessons learned on community-based adaptation options for water resources in various agro-climatic conditions of the northern regions will be codified and disseminated (e.g. through ALM and other networks). Successfully tested adaptation measures under components 2 and 3 will be advocated for further replication. Community associations will be empowered to manage water harvesting infrastructure. This community based arrangement will allow for more equitable distribution of water. By driving water service delivery to locally appropriate and self-sustained communal systems, water services will be sustained under the conditions of a changing climate. A well-tailored hybrid of government and community managed services of water delivery will emerge as a more cost-effective solution compared to top down, subsidized and poorly maintained service. Regular *lessons learned* notes providing field-based experiences of local, community-based adaptation measures, improved preparedness and resilience of local livelihoods to drought and water shortages will be produced for dissemination.

The cross-cutting services of water to different development sectors imply that this programme will provide cross-cutting solutions serving several national strategies of Ghana following the holistic approach in the design and implementation plan which provides an important justification for the funding requested. The programme is therefore designed to:

- Develop a well-coordinated program to articulate and support the adoption of climate ready activities by the water sectors

- Improve and better integrate watershed planning and management in response to climate change impacts and uncertainty, and
- Advocate for better coordination of national sectors' climate change programmes and services

The programme recognises that mainstreaming adaptation into integrated water resource management can build climate resilience of the water sector and watershed management which can in turn provide co-benefits for livelihoods and national development in addition to climate adaptation. The programme allows for the development of a comprehensive response to climate change in two phases – assess and plan, and implement and evaluate. Assessment allows for an understanding of how to addresses the climate challenges whereas implementation encourages the design and carry out of short- and long-term adaptation strategies and actions. With the ongoing decentralization process and devolution of power to the regions and local authorities in Ghana, this programme will enhance the capacity of decision-makers in the northern regions to integrate climate change into regional and local government planning processes.

The programme will support the activities of the Savannah Accelerated Development Authority (SADA), a sustainable development initiative for the northern region, with the implementation of their strategy and work plan for 2010-2030. In addressing a visible development gap between Northern and Southern Ghana this strategy, which is built on a growth and sustainable development approach is adopted to both increase incomes among the poorest and transform the northern Ghanaian economy and society into a regional nexus of increased productivity of food, with improved resilience to persistent droughts and sporadic floods[29]. The strategy is designed using the vision of a "Forested North and Green North" that defines a major paradigm-shift in stimulating economic growth and sustainable development by ensuring that small-holder families and poor farmers develop a long-term stake in agriculture by inter-cropping with economic trees. The trees will provide a protective buffer against floods, serve to renew soils and enhance environmental regeneration. This requires water adaptation to climate change for it to succeed.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

The Project will be implemented through UNDP's **National Execution Modality (NEX),** with the Ministry of Environment, Science and Technology (MEST) serving as the designated national executing agency ("*Implementing Partner*") of the programme. MEST will have the technical and administrative responsibility for applying AF inputs in order to reach the expected outcomes/outputs as defined in this programme document. MEST is responsible for the timely delivery of programme inputs and outputs, and in this context, for the coordination of all other responsible parties, including other line ministries, local government authorities and/or UN agencies.

Upon the request of the Government of Ghana, UNDP will serve as the Multilateral Implementing Agency (MIE) for this programme. Services that UNDP will provide to the Implementing Partner in

[29] SADA Strategy and Workplan 2010-2030. Savannah Accelerated Development Authority. 2010.

support of achieving project Outcomes are outlined in Annex 1. UNDP's services will be provided by staff in the UNDP Multi-Country Office in Ghana, UNDP Africa Regional Centre in Pretoria (with a Regional Technical Advisor on Adaptation out-posted in Mali) as well as UNDP Headquarters (New York).

A **Programme Board** (PB), responsible to approve key management decisions of the programme and will play a critical role in assuring the technical quality, financial transparency and overall development impact of the programme, will be established as soon as this programme is approved. The PB will be composed of designated senior-level representatives of the MEST, a sub-committee of the National Climate Change Country Team. A complete list of PB members and their designated alternates will be provided in the inception report.

MEST will appoint a **National Programme Director** (NPD), who will be designated over the course of the programme inception phase. The costs of the NPD role will be borne by the Government of the Ghana as in-kind contribution to the programme.

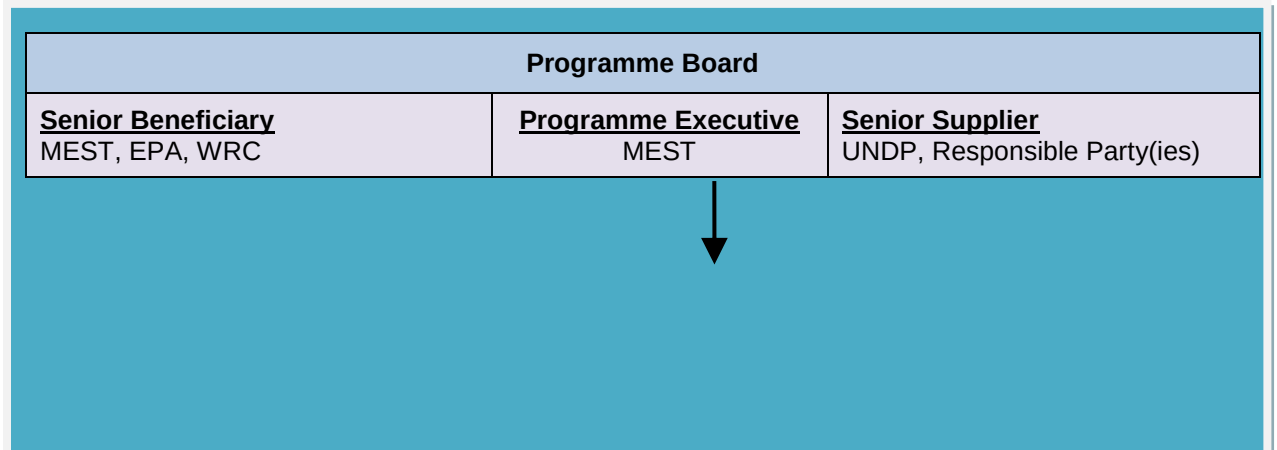
National Project Manager (NPM): He/she will be a dedicated professional designated for the duration of the programme. The PM's prime responsibility is to ensure that the programme produces the results specified in the programme document to the required standard of quality and within the specified constraints of time and cost.

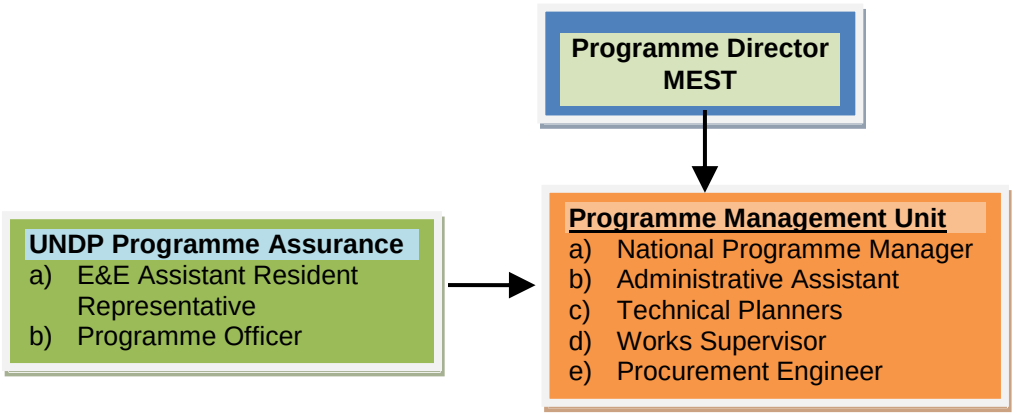
Project-Support: The NPM will be supported by a core team of technical and support staff forming the **Programme Implementation Unit** (PIU) located at MEST to execute programme activities, including day-to-day operations of the programme, and the overall operational and financial management and reporting.

Project assurance: UNDP Ghana will support programme implementation by assisting in the monitoring of programme budgets and expenditures, contracting programme personnel and consultancy services, and subcontracting and procuring equipment at the request of the MEST. On the technical side, UNDP Ghana will monitor progress of programme implementation and achievement of programme outcomes/outputs as per the endorsed programme document. A designated Programme Officer will be assigned in the Country Office in Ghana to provide financial and technical monitoring and implementation support services.

To deliver specific Outputs as outlined in the logical framework, MEST can delegate such responsibilities to external partners (to be referred to as *Responsible Parties*) through direct contracting. MEST will bear responsibility for the delivery of those Outputs and put in adequate place measures to oversee such work. Such institutions will be contracted through appropriate modalities (as advised by UNDP). The corresponding Letters of Agreement (LoA) will be annexed to the programme document that will be signed between UNDP and the Government of Ghana after the AF programme document has been endorsed.

The organogram of the programme is as follows:




Programme Director
MEST
UNDP Programme Assurance
a) E&E Assistant Resident Representative
b) Programme Officer
Programme Management Unit
a) National Programme Manager
b) Administrative Assistant
c) Technical Planners
d) Works Supervisor
e) Procurement Engineer

Programme Execution Costs

Cost Item	Year 1	Year 2	Year 3	TOTAL
1. National Programme Coordinator Salary - Project Management Unit	36,000	36,000	36,000	108,000
2. Technical Officer - Project Management Unit	33,600	33,600	33,600	100,800
3. Administrative Assistant - Project Management Unit	18,000	18,000	18,000	54,000
4. Field Coordinator - Northern region	33,600	33,600	33,600	100,800
5. Field Coordinator - Upper West region	33,600	33,600	33,600	100,800
6. Field Coordinator - Upper East region	33,600	33,600	33,600	100,800
7. Office Furniture	12,457	0	0	12,457
8. Computers/IT equipment	10,000	1,500	1,500	13,000
9. Stationary and supplies	4,000	4,000	4,000	12,000
10. Vehicle and travel to project field sites	25,000	5,000	5,000	35,000
11. Monitoring, Evaluation, and Audit (see Section C for breakdown of cost)	23,000	13,000	34,000	70,000
TOTAL				**707,657**

B. Describe the measures for financial and project / programme risk management.

Key risks underlying the programme have been analyzed during the formulation phase in connection with the target sites of the programme. Over the course of the programme, a UNDP risk log will be regularly updated in intervals of no less than every six months in which critical risks to the programme have been identified.

Table 4 Programme Risks and Mitigation Measures

Risks	Level	Mitigation Measures	Responsibility
Delays in programme inception impact on achieving outputs and outcomes and reduce scope to deliver programme as outlined in proposal	**Medium**	➢ Develop detail inception work plan to guide inception phase	MEST and UNDP
Insecurity in the area – terrorist attacks or regular banditry – may jeopardize the implementation and follow-up of the programme	**Medium**	➢ The program shall take this into account through various measures ❖ cooperation with local communities and structures ❖ a good cooperation with local organizations for the programme implementation ❖ Using UN security alert system ❖ distance follow-up and reporting tool	MEST and UNDP
A poor understanding of the objectives by the programme team	**Low**	➢ A strong involvement of leaders, particularly in implementing agencies and key stakeholders ➢ Support of national experts ➢ Adapted trainings	MEST
Low mobilization of the target group caused by a poor understanding of climate change issues	**Low**	➢ Increased collaboration with the target communities ➢ A participatory approach ➢ Sensitization to the effects of climate change	MEST
Lack of capacity to meet financial, and in particular resource commitments by partners in programme implementation	**Medium**	➢ A continuous dialogue before and after the signing of the programme document will be established among programme partners ➢ Sufficient allocation within the detailed proposal and implementation arrangements made to developing teams with sufficient capacity (both in terms of size and technical abilities), which are sufficiently embedded into implementing agencies ➢ Setting realistic targets for partner contributions in the first instance	MEST

Lack of sufficiently qualified partners	**Low**	➢ Capacity-building ➢ Screening and evaluation of partners ➢ Collaboration with communities at a decentralized level	MEST

Has the sustainability of the project/programme outcomes been taken into account when designing the projectprogramme?

The proposed programme activities will help the country to create management plans for the black and white Volta Rivers, and mainstream these into the works of Volta Region Authority and other relevant institutions. These plans will also inform local plans in 15 communities. Building strong national and local management plans will surely be important to the sustainability of the activities implemented under component 2 (such as increased water supply, small scale irrigation schemes, soil and water conservation measures). The ownership created through local community engagement and building community-level capacity for water resource planning and management activities further ensures sustainability of programme actions.

C. Describe the monitoring and evaluation arrangements and provide a budgeted M&E plan.

Programme monitoring and evaluation (M&E) will be in accordance with established UNDP procedures and will carried out by the Programme team, verified by the MHE and the UNDP Country Office in Accra. Dedicated support by the technical adaptation teams in the UNDP Regional Center and UNDP New York will be provided on a regular basis. A comprehensive Results Framework of the programme below (Part III, Section D) defines success indicators for programme implementation as well as the respective means of verification. The table in Part III, Section D also indicates where sex-disaggregated data, targets and indicators will be collected. A Monitoring and Evaluation (M&E) system for the programme will be established, based on these indicators and means of verification. Costs associated with implementing this system are detailed below.

Type of M&E activity	**Responsible Parties**	**Budget US$** *Excluding programme team staff time*	**Time frame**
Initiation Workshop and Report	▪ Programme Manager ▪ UNDP CO	Indicative cost: 5,000	Within first two months of programme start up
Measurement of Means of Verification of programme results.	▪ Programme Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members.	Indicative cost: 10,000 To be finalized in Inception Phase and Workshop.	Start, mid and end of programme (during evaluation cycle) and annually when required.
Measurement of Means of Verification for Programme Progress on *output and implementation*	▪ Oversight by Programme Manager ▪ Programme team	Indicative cost: 5,000 To be determined as part of the Annual Work Plan's preparation.	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	▪ Programme manager and team ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG	None	Annually
Periodic status/ progress reports	▪ Programme manager and team	None	Quarterly
Mid-term Evaluation	▪ Programme manager and team	Indicative cost: 10,000	At the mid-point of

Type of M&E activity	Responsible Parties	Budget US$ *Excluding programme team staff time*	Time frame
	▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)		programme implementation.
Final Evaluation	▪ Programme manager and team, ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	Indicative cost : 10,000	At least three months before the end of programme implementation
Programme Terminal Report	▪ Programme manager and team ▪ UNDP CO ▪ local consultant	5,000	At least three months before the end of the programme
Audit	▪ UNDP CO ▪ Programme manager and team	16,000	
Visits to field sites	▪ UNDP CO ▪ UNDP RCU (as appropriate) ▪ Government representatives	9,000	Yearly
TOTAL INDICATIVE COST Excluding programme team staff time and UNDP staff and travel expenses		US$70,000	

D. Include a results framework for the project proposal, including milestones, targets and indicators.

A detailed Programme Results Framework, including quantified Outcome and Output targets as well as specific, measurable and time-bound indicators is provided below. Many of the indicators will be verified by interviews, etc. within communities. As a matter of course all information will be collected on a sex disaggregated basis. All documentation, plans, etc, developed under the programme will be reviewed using a "gender lens" to ensure that gender has been properly addressed.

Programme Strategy	**Objectively verifiable indicators**				
Goal					
	Indicator	**Baseline**	**Target**	**Sources of verification**	**Risks and Assumptions**
Objective: To enhance the resilience and the adaptive capacity of rural livelihoods to climate risks on water resources in the northern region of Ghana.	Number of communities with the adaptive capacity to climate risks				
Outcome 1: Improved management and planning of water resources taking into account climate change impacts on surface and groundwater sources	Water management laws and regulations that introduce progressive pricing policies and communal management for local water services are in place and operational.	Ghana government has made progress towards improving water management systems developing a national water policy. There are management plans for the White Volta	Update of the water management plans to ensure explicit recognition of climate impacts on water resource availability by end of 2015	Programme annual reports; Midterm evaluation, final report; Water Catchment plans Programme website Gender lens review of plans	
Output 1.1: White Volta management plan reviewed and updated to take into account climate change impacts	Number of water regulations to introduce progressive change in the White Volta management plan under climate change	White Volta management plan is in place, but does not effectively take account climate change	Revised White Volta management plan which effectively takes account of climate change	White Volta Water management plan Programme annual and terminal reports; Programme website Gender lens review	Plan may be established but not operationalised

Programme Strategy	Objectively verifiable indicators				
Goal					
	Indicator	**Baseline**	**Target**	**Sources of verification**	**Risks and Assumptions**
Output 1.2: Water management plans that takes into account climate change impacts are established for for the Black Volta and for three sub-basins in the White Volta	Number of operational basin and sub-basin plans established	No operational basin and sub-basin plans have been established	4 basin and sub-basin plans established, which effectively take account of climate change	Annual and terminal reports Mid-term review report Website Gender lens review	Plans may be established but not operational
Outcome 2: Climate resilient management of water resources by at least 15 communities in northern Ghana	- Percentage of population (disaggregated by sex) with improved water management practices resilient to climate change impacts in the targeted regions.				
Output 2.1: Community water supply and management plans developed in 15 communities to incorporate climate change-related risks	- Number of community water supply management plans established - Number of district assemblies with modified mandates strengthening the institutional roles of communities to manage and deliver water services	The current water policies do not involve community participation in water supply management plans	- At least 15 water supply and management plans are designed - By the end of the programme at least 80% of targeted population have access to improved water services that are resilient to drought and flooding	- Annual review of status of plans, - Inspection visits - District assembly reports	Plans may be established but not operational
Output 2.2: Water supply increased for multiple uses and users especially during period of shortages due to climate impacts e.g. droughts, heat stress etc	- The number of water delivery services under communal management - Percentage of population (disaggregated by sex) with improved water access resilient to climate change impacts in the targeted regions.	Inadequate supply of water in communities, particularly during dry season	- By the end of the programme 70% of target communities are able to meet water supply requirement throughout the year -	- Annual review of status of plans, - Inspection visits - District assembly reports	

Programme Strategy	Objectively verifiable indicators				
Goal					
	Indicator	**Baseline**	**Target**	**Sources of verification**	**Risks and Assumptions**
Output 2.3: Small scale irrigation techniques installed in 6 districts to improve the productivity of agriculture under climate change risks	- Number of small scale irrigations put in place - Number of farmers using irrigation systems	Few irrigation programmes to improve productivity during dry periods	- More efficient irrigation techniques put in place - At least 15 communities will be have small irrigation programmes which have demonstrably increased productivity	Field visits Field visits. Measurement of crop yields.	
Output 2.4: Measures for water conservation under climate impacts e.g. dugout wells, ponds etc. and mechanisms for quality control put in place in at least 10 districts	Number of community based adaptation solutions implemented at the local level to conserve water - Community based wells and watering points management measures tested and demonstrated in targeted communities	- Lack of water conservation measures causing scarcity during drier periods - Inadequate supply of water in communities, particularly during dry season	- Set of measures in production systems (e.g. terracing, intercropping, tree planting) implemented in at least 3 communities to conserve water - At least one water harvesting technique and saving measures implemented in each region to benefit 4,000 agri-pastoralists by end of 2015	Annual field monitoring visits to establish water demand and extent to which this can be met	
Output 2.4: Flood management and protection measures against loss of lives and properties are implemented in flood prone communities	Number of households in target communities that suffer financial and/or loss of livelihoods from each flood event	Communities regularly suffer disruption and losses from flood events.	All target communities are able to manage risks from flood events to minimize disruption and losses	Post flood event field visits to assess loss and damage via household interviews, with interviews targeting both women and men	
Outcome 3: Enhanced diversification of livelihoods under climate change by communities in northern Ghana.	Number of communities with livelihoods diversified to provide resilience to climate change impacts	There is no established programme supporting livelihood diversification	An established programme is in place. All communities in programme have moved from a situation of dependency on	Annual interviews with all beneficiary communities, following a gender targeted approach	

Programme Strategy	Objectively verifiable indicators				
Goal					
	Indicator	**Baseline**	**Target**	**Sources of verification**	**Risks and Assumptions**
	Number of individuals (disaggregated by sex) with livelihoods diversified to provide resilience to climate change impacts		rain-fed agriculture to a situation of a wider livelihood base, which enables them to support themselves throughout the year.		
Output 3.1: Improve infrastructure (e.g. canals, pipes etc.) for water distribution for CCA and use in agricultural systems installed in 6 districts	- Number of farmers using irrigation systems within target communities Agricultural yields in target communities	Water efficient agricultural systems are not currently being used	Operational water efficient agricultural systems in all target communities 50% improvement in agricultural yields in all target communities	Annual assessment of systems implemented by programme to assess effectiveness Measuring income from agriculture	
Output 3.2: Dry-season gardening activities by women improved for CCA	Number of women in target communities that benefit from improved food security and economic status by participating in market gardening	Women are particularly vulnerable to droughts and flooding and have insecure livelihoods	50% of women in all target communities benefit from improved food security and economic status	Annual assessment via interviews within communities	Poor infrastructure e.g. farm-to-market roads to facilitate access to markets Pests and disease outbreaks
Output 3.3: Tree nurseries and wood lots for climate risks management e.g. for rehabilitating floodplains, hillsides, watersheds etc. are established and managed by communities	Number of community managed tree nursery/wood lots in target communities Number of individuals (disaggregated by sex) benefitting from community tree nurseries/wood lots	Very few operational community managed tree nursery/wood lots currently exist	Operational community managed tree nursery/wood lots in 5 target communities. Women to be actively involved in all lots.	Field visit Annual report Terminal report	Pest and disease outbreak e.g. Locust outbreaks
Output 3.4: Community based fish farming for livelihood diversification under climate is established in 5 districts	Number of community based fish farms in target communities	Very few community based fish farms currently exist	Operational community based fish farms 5 target communities. Women to be	Field visit Annual report Terminal report	Disease outbreak

Programme Strategy	Objectively verifiable indicators				
Goal					
	Indicator	**Baseline**	**Target**	**Sources of verification**	**Risks and Assumptions**
	Number of individuals (disaggregated by sex) benefitting from fish farms		actively involved in all fish farms.		
Outcome 4: Improved knowledge and institutional capacity under climate change, for coordination, management of water resources and diversification of livelihoods of communities in northern Ghana	Number of participating institutions	No relevant lessons learned are currently being captured or disseminated	By 2015, at least five lessons learned codified ad disseminated	Progress reports Government documents	Lack of political will
Output 4.1: Regional Climate Change Adaptation Monitoring Committee (as envisioned by the National Climate Change Adaptation Strategy) established in the three target regions	- Number of associations, district assemblies, communities etc. with shared management programmes (water, knowledge, trade etc.)	Limited capacity of regional institutions to support community management of water resources and livelihood diversification	At the end of the programme regional institutions are providing support to communities for management of water resources and/or diversifying livelihood activities Membership of institutions represents a gender balance – all institutions established under the programme include at least 50% female membership	Annual capacity assessment of regional institutions and review of their activities in supporting communities Data obtained regarding gender balance of institutions	Lack of interest
Output 4.2: Learning platforms and systems for integrating climate change-related risks into their management of water resources and livelihood activities in northern Ghana institutionalized	- Number of water management plans developed by communities - Number of diversifying their livelihood activities	Weak capacity of communities and local institutions to manage water resources and livelihood diversification	At the end of the programme all target communities are initiating interventions themselves.	Annual review of community activities relating to water resource management and livelihood options, including decision making processes. Review to obtain results disaggregated by sex.	Lack of interest
Output 4.3: Best practices for adaptation and lessons learned from the	- Number of knowledge products produced	Limited knowledge products available	By the end of the programme measurable	Baseline assessment of target audience	Lack of interest

Programme Strategy	Objectively verifiable indicators				
Goal					
	Indicator	**Baseline**	**Target**	**Sources of verification**	**Risks and Assumptions**
implemented actions and related policy processes are recorded and disseminated through appropriate mechanisms	and disseminated - Number of lessons learned included in the ALM and other knowledge networks - Number of training workshops, seminars etc. organized - Number of people		increases in knowledge in at least 5 organisations and in all target communities, with at least as many women benefiting as men	to establish current level of knowledge Record of numbers of knowledge products. Independent assessment post-dissemination to assess whether knowledge has been improved, with sex of beneficiaries recorded	

PART IV: ENDORSEMENT BY GOVERNMENT AND CERTIFICATION BY THE IMPLEMENTING ENTITY

A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT[30] *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project/programme, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project/programme proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project/programme:*

Hon. Sherry Ayittey, Minister, Minister of Environment, Science & Technology of Ghana	Date: December 30, 2011

B. IMPLEMENTING ENTITY CERTIFICATION *Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project/programme contact person's name, telephone number and email address*

I certify that this proposal has been prepared in accordance with guidelines provided by the Adaptation Fund Board, and prevailing National Development and Adaptation Plans and subject to the approval by the Adaptation Fund Board, understands that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project/programme.	
 Yannick Glemarec Director, Environmental Finance, UNDP	
Date: February 8, 2012	Tel. and email: +1-212-906-5143 yannick.glemarec@undp.org
Project Contact Person: Johnson Nkem (LECRDS)	
Tel. And Email: +254731666335; Johnson.nkem@undp.org	

6. Each Party shall designate and communicate to the Secretariat the authority that will endorse on behalf of the national government the projects and programmes proposed by the implementing entities.

ANNEXES

ANNEX 1: UNDP Environmental Finance – Specialized Technical Services

The implementing entity fee will be utilized by UNDP to cover its indirect costs in the provision of general management support and specialized technical support services. The table below provides an indicative breakdown of the estimated costs of providing these services. If the national entity carrying out the project requests additional Implementation Support Services (ISS), an additional fee will apply in accordance with UNDP fee policy regarding ISS and would be charged directly to the project budget.

Category	**Indicative Services[31] Provided by UNDP**	**Estimated Cost of Providing Services[32]**
Identification, Sourcing and Screening of Ideas	Provide information on substantive issues in adaptation associated with the purpose of the Adaptation Fund (AF). Engage in upstream policy dialogue related to a potential application to the AF. Verify soundness and potential eligibility of identified idea for AF.	***US$ 30,000***
Feasibility Assessment / Due Diligence Review	Provide up-front guidance on converting general idea into a feasible project/programme. Source technical expertise in line with the scope of the project/programme. Verify technical reports and project conceptualization. Provide detailed screening against technical, financial, social and risk criteria and provide statement of likely eligibility against AF requirements. Determination of execution modality and local capacity assessment of the national executing entity. Assist in identifying technical partners. Validate partner technical abilities. Obtain clearances from AF.	***US$100,000***
Development &	Provide technical support, backstopping and troubleshooting	***US$154,563***

[31] This is an indicative list only. Actual services provided may vary and may include additional services not listed here. The level and volume of services provided varies according to need.

[32] The breakdown of estimated costs is indicative only.

Category	Indicative Services[31] Provided by UNDP	Estimated Cost of Providing Services[32]
Preparation	to convert the idea into a technically feasible and operationally viable project/programme. Source technical expertise in line with the scope of the project/programme needs. Verify technical reports and project conceptualization. Verify technical soundness, quality of preparation, and match with AF expectations. Negotiate and obtain clearances by AF. Respond to information requests, arrange revisions etc. (Note that UNDP Ghana CO and Ghana Environment Protection Agency provided counter-part funding towards travel and workshop cost via the Africa Adaptation Programme. Total estimate cost is $10,000).	
Implementation	Technical support in preparing TORs and verifying expertise for technical positions. Provide technical and operational guidance project teams. Verification of technical validity / match with AF expectations of inception report. Provide technical information as needed to facilitate implementation of the project activities. Provide advisory services as required. Provide technical support, participation as necessary during project activities. Provide troubleshooting support if needed. Provide support and oversight missions as necessary. Provide technical monitoring, progress monitoring, validation and quality assurance throughout. Allocate and monitor Annual Spending Limits based on agreed work plans. Receipt, allocation and reporting to the AFB of financial resources.	***US$ 348,755***

Category	Indicative Services[31] Provided by UNDP	Estimated Cost of Providing Services[32]
	Oversight and monitoring of AF funds. Return unspent funds to AF.	
Evaluation and Reporting	Provide technical support in preparing TOR and verify expertise for technical positions involving evaluation and reporting. Participate in briefing / debriefing. Verify technical validity / match with AF expectations of all evaluation and other reports Undertake technical analysis, validate results, compile lessons. Disseminate technical findings	***US$ 60,000***
Total		***US$ 693, 318***

Annex 2. Total Programme Budget, Work Plan, Detailed Budget and Budget Notes

Award ID	00064155	Project ID:	00081025
Award Title			
Business Unit:	GHA10		
Project Title	Resilience to Climate Change		
PIMS Number:			
Implementing Partner	MIE: UNDP	Executing Entity	Ministry of Environment Science, and Technology

TOTAL BUDGET AND WORKPLAN													
	YR 1				YR2				YR3				Total budget (USD)
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
COMPONENT 1: WATER RESOURCE MANAGEMENT AND PLANNING UNDER CLIMATE CHANGE													
OUTCOME 1: Outcome 1: Improved management and planning of water resources taking into account the climate change impacts on surface and groundwater sources													
Output 1.1. Output 1.1: White Volta management plan reviewed and updated to take into account climate change impacts	90,000	90,000											180,000
Output 1.2: Water management plans that takes into account climate change impacts are established for the Black Volta and for three sub-basins in the White Volta			285,000	285,000									570,000
SUBTOTAL				750,000				0				0	750,000
COMPONENT 2: COMMUNITY LEVEL IMPLEMENTATION OF CLIMATE RESILIENT WATER RESOURCE MANAGEMENT ACTIVITIES													
OUTCOME 2: Climate resilient management of water resources by at least 15 communities in northern Ghana													
Output 2.1 Community water supply and management plans developed in 15 communities to incorporate climate change-related risks					200,000	200,000			50,000				450,000

Output 2.2: Water supply increased for multiple uses and users especially during period of shortages due to climate impacts e.g. droughts, heat stress etc.							400,000	400,000	310,000				1,110,000
Output 2.3: Small scale irrigation techniques installed in 6 districts to improve the productivity of agriculture under climate change risks							400,000	400,000	229,025				1,029,025
Output 2.4. Measures for water conservation under climate change e.g. dugout wells etc. and mechanisms for quality control put in place in at least 10 districts							400,000	360,000					760,000
Output 2.5: Flood management and protection measures against loss of lives and properties are implemented in flood prone communities							300,000	300,000	100,000	100,000			800,000
SUBTOTAL				0				3,360,000				789,025	4,149,025
COMPONENT 3: DIVERSIFICATION OF LIVELIHOODS OF RURAL COMMUNITIES UNDER CLIMATE CHANGE													
OUTCOME 3: Enhanced diversification of livelihoods of communities under climate change in northern Ghana													
Output 3.1. Improve infrastructure (e.g. canals, pipes etc.) for water distribution for CCA and use in agricultural systems installed in 6 districts							500,000	300,000	200,000				1,000,000
Output 3.2: Dry-season gardening activities by women improved for CCA								100,000	150,000				250,000
Output 3.3: Tree nurseries and wood lots for climate change risks management e.g. for rehabilitating floodplains, hillsides, watersheds etc. established and managed by communities									75,000	75,000			150,000
Output 3.4: Community based fish farming for livelihood diversification under climate change is established in 5 districts									125,000	125,000			250,000
SUBTOTAL				0				900,000				750,000	1,650,000
COMPONENT 4: KNOWLEDGE, INSTITUTIONAL CAPACITY AND COORDINATION UNDER CLIMATE CHANGE													
OUTCOME 4: Improved knowledge and institutional capacity under climate change, for coordination, management of water resources and diversification of livelihoods of communities in northern Ghana													
Output 4.1. Regional Climate Change Adaptation Monitoring Committee (as envisioned by the National Climate Change Adaptation Strategy) established in three target regions				83,333				83,333				83,333	250,000

Output 4.2 Learning platforms and systems for integrating climate change-related risks into their management of water resources and livelihood activities in northern Ghana institutionalized					62,500		62,500		62,500		62,500		250,000
Output 4.3. Best practices for adaptation and lessons learned from the implemented actions and related policy processes are recorded and disseminated through appropriate mechanisms				120,000				140,000				160,000	420,000
SUBTOTAL				203,333				348,333				368,333	920,000
Total by year				953,333				4,608,333				1,907,358	7,449,025
Total Project Implementation Cost													7,449,025
Execution Cost (9.5%)													707,657
Total Project Cost													**8,156,682**
Programme Cycle Management Fee charged by the Implementing Entity (8.5%)													693,318
GRAND TOTAL													8,850,000

Detailed Budget

Outcome	Implementation	Fund ID	Donor Name	Atlas Budgetary Code	ATLAS Budget Description	Amount (USD) Yr 1	Amount (USD) Yr 2	Amount (USD) Yr 3	Total USD
OUTCOME 1 Improved management planning of water resources taking into account the climate change impacts on surface and groundwater sources	UNDP-NEX	62040	AF	71200	International Consultants	45,000			45,000
	UNDP-NEX	62040	AF	71300	Local Consultants	220,000			220,000
	UNDP-NEX	62040	AF	71600	Travel	85,000			85,000
	UNDP-NEX	62040	AF	71400	Service Contracts-Individuals	100,000			100,000
	UNDP-NEX	62040	AF	72100	Service Contracts - Companies	160,000			160,000
	UNDP-NEX	62040	AF	72200	Equipment	0			0
	UNDP-NEX	62040	AF	73100	Premises	70,000			70,000
	UNDP-NEX	62040	AF	74200	Promotional Materials	70,000			70,000
Total Outcome 1						**750,000**			**750,000**
Outcome 2: Climate resilient management of water resources by communities in Northern Ghana	UNDP-NEX	62040	AF	71200	International Consultants		55,000	16,000	71,000
	UNDP-NEX	62040	AF	71300	Local Consultants		300,000	80,000	380,000
	UNDP-NEX	62040	AF	71600	Travel		200,000	65,000	265,000
	UNDP-NEX	62040	AF	71400	Service Contracts-Individuals		11,000	20,000	31,000
	UNDP-NEX	62040	AF	72100	Service Contracts - Companies		850,000	280,000	1,130,000
	UNDP-NEX	62040	AF	72200	Equipment		1,800,000	260,000	2,060,000
	UNDP-NEX	62040	AF	73100	Premises		80,000	38,000	118,000
	UNDP-NEX	62040	AF	74200	Promotional Materials		64,000	30,025	94,025
Total Outcome 2							3,360,000	789,025	4,149,025
Outcome 3: Enhanced climate resilience of	UNDP-NEX	62040	AF	71200	International Consultants				
	UNDP-NEX	62040	AF	71300	Local Consultants		40,000	40,000	80,000

livelihoods of communities in northern Ghana	UNDP-NEX	62040	AF	71600	Travel		50,000	50,000	100,000
	UNDP-NEX	62040	AF	71400	Service Contracts-Individuals				
	UNDP-NEX	62040	AF	72100	Service Contracts - Companies		150,000	150,000	300,000
	UNDP-NEX	62040	AF	72200	Equipment		600,000	480,000	1.080,000
	UNDP-NEX	62040	AF	73100	Premises		40,000	20,000	60,000
	UNDP-NEX	62040	AF	74200	Promotional Materials		20,000	10,000	30,000
Total Outcome 3							900,000	750,000	1,650,000
Outcome 4: Improved knowledge and institutional capacity for coordination, management of water resources and diversification of livelihoods of communities in northern Ghana	UNDP-NEX	62040	AF	71200	International Consultants	20,000	20,000	30,000	70,000
	UNDP-NEX	62040	AF	71300	Local Consultants	40,000	50,000	50,000	140,000
	UNDP-NEX	62040	AF	71600	Travel	30,000	60,000	60,000	150,000
	UNDP-NEX	62040	AF	71400	Service Contracts-Individuals	20,000	20,000	20,000	60,000
	UNDP-NEX	62040	AF	72100	Service Contracts - Companies	50,000	50,000	50,000	150,000
	UNDP-NEX	62040	AF	72200	Equipment				0
	UNDP-NEX	62040	AF	73100	Premises	23,334	48,333	48,333	119,999
	UNDP-NEX	62040	AF	74200	Promotional Materials	20,000	100,000	110,000	230,000
Total Outcome 4						203,334	348,333	368,333	920,000

Budget Notes

Outcome	Atlas Budgetary Code	ATLAS Budget Description	Total USD 3 Years	Description of Expenditure
OUTCOME 1 Improved management planning of water resources taking into account the climate change impacts on surface and groundwater sources	71200	International Consultants	45,000	Water resource management advisor
	71300	Local Consultants	220,000	Water resource planners, authors of plans, workshop facilitators, fieldwork teams
	71600	Travel	85,000	Travel costs for stakeholder consultations, field visits, workshops
	71400	Service Contracts-Individuals	100,000	National water resource management planning advisor
	72100	Service Contracts - Companies	160,000	GIS mapping, publishers, surveying
	72200	Equipment		
	73100	Premises	70,000	Premises for workshops, meetings
	74200	Promotional Materials	70,000	Workshop materials, knowledge materials
Outcome 2: Climate resilient management of water resources by communities in Northern Ghana	71200	International Consultants	71,000	Water resource management advisor
	71300	Local Consultants	380,000	Engineering consultants, forestry consultants, hydrogeologists, hydrologists, facilitators
	71600	Travel	265,000	Travel costs for stakeholder consultations, field visits, workshops
	71400	Service Contracts-Individuals	31,000	National water management infrastructure advisor, irrigation advisor
	72100	Service Contracts - Companies	1,130,000	Delivery organisations for activities, e.g. CSO organisations
	72200	Equipment	2,060,000	Water management infrastructure
	73100	Premises	118,000	Premises for workshops, meetings
	74200	Promotional Materials	94,025	Workshop materials, knowledge materials
Outcome 3: Enhanced climate resilience of livelihoods of	71200	International Consultants		
	71300	Local Consultants	80,000	Livelihoods advisors, facilitators
	71600	Travel	100,000	Travel costs for stakeholder consultations, field visits, workshops

communities in northern Ghana	71400	Service Contracts- Individuals		
	72100	Service Contracts - Companies	300,000	Delivery organisations for activities, e.g. CSO organisations
	72200	Equipment	1.080,000	Infrastructure for livelihood activities
	73100	Premises	60,000	Premises for workshops, meetings
	74200	Promotional Materials	30,000	Workshop materials, knowledge materials
Outcome 4: Improved knowledge and institutional capacity for coordination, management of water resources and diversification of livelihoods of communities in northern Ghana	71200	International Consultants	70,000	Knowledge management advisor, Institutional capacity advisor
	71300	Local Consultants	140,000	Facilitators, developers of knowledge materials, trainers
	71600	Travel	150,000	Travel costs for stakeholder consultations, field visits, workshops
	71400	Service Contracts- Individuals	60,000	Communications specialist
	72100	Service Contracts - Companies	150,000	Delivery organisations for activities, e.g. CSO organisations
	72200	Equipment		
	73100	Premises	119,999	Premises for workshops, meetings
	74200	Promotional Materials	230,000	Workshop materials, knowledge materials

Annex 3. Programme Implementation Schedule / Gantt Chart

Implementation schedule:
Milestones: ▲

Award ID: 00064155
Project ID: 00081025

Particulars	Schedule											
YEARS	Year 1				Year 2				Year3			
QUARTERS	1	2	3	4	1	2	3	4	1	2	3	4
PROGRAMME INCEPTION												
OUTCOME 1: Outcome 1: Improved management and planning of water resources taking into account the climate change impacts on surface and groundwater sources												
Output 1.1. Output 1.1: White Volta management plan reviewed and updated to take into account climate change impacts												
1.1.1. Identify gaps in current plans from climate perspective												
1.1.2. Develop downscaled climate change and hydrological scenarios for the White Volta building on stocktaking of existing work												
1.1.3. Conduct vulnerability assessment												
1.1.4. Revise the White Volta Plan using a participatory approach												
1.1.5. Train relevant institutions in producing, interpreting, and applying scenarios and vulnerability information												
Output 1.2: Water management plans that takes into account climate change impacts are established for the Black Volta and for three sub-basins in the White Volta												
1.2.1. Develop downscaled climate change and hydrological scenarios for the Black Volta and three sub-basins in the White Volta												
1.2.2. Conduct vulnerability assessment												
1.2.3. Develop water management plans participatory approach using outputs from 1.21. and 12.2 and incorporating lessons from 1.1.3.												
1.2.4. Train relevant institutions in producing, interpreting, and applying scenarios and vulnerability information												
OUTCOME 2: Climate resilient management of water resources by at least 15 communities in northern Ghana												
Output 2.1 Community water supply and management plans developed in 15 communities to incorporate climate change-related risks												
2.1.1. Community mobilization												
2.1.2. Develop plans using information from 1.2.1 and 1.2.2												
2.1.3. Put in place mechanisms to regularly update the plans												
Output 2.2: Water supply increased for multiple uses and users especially during period of shortages due to climate impacts e.g. droughts, heat stress etc.												
2.2.1. Identify appropriate practices and prioritize measures that will be implemented												
2.2.2. Train community members to implement prioritized measures												
2.2.3. Implementation of prioritized activities												
Output 2.3: Small scale irrigation techniques installed in 6 districts to improve the productivity of agriculture under climate change risks												
2.3.1. Assessment and identification of community requirements												
2.3.2. Construction work												
2.3.3. Establish mechanisms for maintenance (e.g. Water User Associations) as decided under output 2.1.2												
Output 2.4. Measures for water conservation under climate change e.g. dugout wells etc. and mechanisms for quality control put in place in at least 10 districts												
2.4.1. Assessment and identification of community requirements												
2.4.2 Construction work												

2.4.3 Establish mechanisms for maintenance (e.g. Water User Associations) as decided under output 2.1.2												
Output 2.5: Flood management and protection measures against loss of lives and properties are implemented in flood prone communities												
2.5.1. Assessment of gaps												
2.5.2 Identify appropriate management and protection measures												
2.5.3. Reliability testing and operation, simulation exercises												
OUTCOME 3: Enhanced diversification of livelihoods of communities under climate change in northern Ghana												
Output 3.1. Improve infrastructure (e.g. canals, pipes etc.) for water distribution for CCA and use in agricultural systems installed in 6 districts												
3.1.1.Assess community requirements and identify priority measures												
3.1.2. Implementation of appropriate measures												
3.1.3 Establish mechanisms for maintenance (e.g. Water User Associations) as decided under output 2.1.2												
Output 3.2: Dry-season gardening activities by women improved for CCA												
3.2.1. Assessment of needs, including market opportunities												
3.2.2. Training of women												
3.2.2. Establishment of gardens												
3.2.3 Provision of extension support, including market information												
Output 3.3: Tree nurseries and wood lots for climate change risks management e.g. for rehabilitating floodplains, hillsides, watersheds etc. established and managed by communities												
3.3.1. Identification of appropriate species and locations												
3.3.2. Establishment of nurseries												
3.3.3. Provision of extension support												
Output 3.4: Community based fish farming for livelihood diversification under climate change is established in 5 districts												
3.4.1. Assessment of feasibility												
3.4.2. Training for interested community members												
3.4.3 Establishment of fish farms where feasible												
OUTCOME 4: Improved knowledge and institutional capacity under climate change, for coordination, management of water resources and diversification of livelihoods of communities in northern Ghana												
Output 4.1. Regional Climate Change Adaptation Monitoring Committee (as envisioned by the National Climate Change Adaptation Strategy) established in three target regions												
4.1.1. Consultation with Regional Coordinating Councils												
4.1.2. Development of Terms of Reference and establish consensus on agreed structure												
4.1.3. Training for committee members												
4.1.4. Provision of support for initial meetings												
4.1.5. Establish mechanisms for linking regional committee with district and communities												
Output 4.2 Learning platforms and systems for integrating climate change-related risks into their management of water resources and livelihood activities in northern Ghana institutionalized												
4.2.1. Assess and identify appropriate learning platforms and systems taking into account already functional platforms and systems												
4.2.2. Network with NGOs and relevant local/district/regional institutions												
4.2.3 Provide support for operationalizing platforms and systems (e.g. regular climate forums)												
Output 4.3. Best practices for adaptation and lessons learned from the implemented actions and related policy processes are recorded and disseminated through appropriate mechanisms												
4.3.1. Documentation of project activities and discussion of lessons learned on a periodic basis and establish link with 4.2.3.												
4.3.2. Develop information, education, and communication documents/materials describing lessons learned and best practices developed and disseminated												
4.3.3. Advocacy at different levels and technical support for education and communication of lessons learned and for awareness raising												
PROGRAMME EXECUTION												

5.1. Programme Management Unit established and operational												
5.1.1. Programme staff recruited												
5.1.2. Office furniture, equipment, vehicle, and stationary procured												
5.2. Programme monitoring and evaluation												
Inception report												
Quarterly reports												
Six monthly technical monitoring												
Annual Audits												
Mid Term Evaluation												
Final Programme Evaluation												
Programme Terminal Report												

ANNEX 4: DISBURSEMENT SCHEDULE

	Upon Agreement signature	One Year after Project Start[a/]	Year 2	Total
Scheduled Date	Jun-12	Jun-13	Jun-14	
Project Funds	$1,169,219	$4,844,219	$2,143,244	$8,156,682
Implementing Entity Fee	$336,957	$247,055	$109,305	$693,318
TOTAL	$1,506,176	$5,091,274	$2,252,549	$8,850,000

Annex 5. List of Participants of the Stakeholders Consultation Workshops

Attendance Sheet for a Technical Workshop on Ghana's Project Proposal to the Adaptation Fund
19 November 2011
College of Physicians and Surgeons, Accra

	NAME	INSTITUTION/ADDRESS	E-MAIL	PHONE #	SIGNATURE
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11	NGUYEN DUC HOANG	WFP	NGUYEN DUC.HOANG@WFP.ORG	0264313772	[signature]
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Attendance Sheet for a Technical Workshop on Ghana's Project Proposal to the Adaptation Fund
19 November 2011
College of Physicians and Surgeons, Accra

	NAME	INSTITUTION/ADDRESS	E-MAIL	PHONE #	SIGNATURE
1	Winfred Nelson	AAP/EPA			[signature]
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4	George Awudi	FoE - GH	geobrigkwa@yahoo.com	0277432014	[signature]
5	Edem Senanu	Africa 2000 Network	kesenanu@yahoo.com	0244-367329	[signature]
6	K.Y Oppong-Boadi	EPA	kopponboadi@yahoo.com	020-818435	[signature]
7					

Attendance Sheet - AF Mission to Tamale – 6th-8th December 2011

Meeting Date and Time: 7/12/11 2PM
Meeting Location: WV TAMALE

	NAME	ADDRESS	PHONE #	ORGANISATION	SIGN
1	Yakubu Caleb	Box 31 ER, Tamale	0243654424	WVG-Savelugu	
2	Sampson Tetteh	WV-GRWP PMB, Tamale	0622288465	WV-GRWP	
3	David Nuno	WV-GRWP PMB. TAMALE	0208162483	WV-GRWP	
4	S.J. KARBO	WV-GRWP PMB Tamale	020 1333 578	WVGH-GRWP	
5	James Asedem	Savelugu Ops Base Box 31 ER, Tamale	0244748912	WV Savelugu	
6	Bram Milla	UNDP-ACCRA	024 904 5881	UNDP	
7	KARETF RAFISURA	UNDP - ACCRA		UNDP	
8					
9					

					GN
1	David Kanlan	P.O. BOX TL 2183 Kanlan2009@yahoo.co	0244857133	CSLD	
2	Daasch Mary		0246456805	CSLD	
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4	Abdul-R. Awal	Box 2183	0207144143	CSLD	
5	Solomon K. Bortiam	P.O. Box TL 1183	0244479184	OIC-Northern Ghana Program	
6	Alex Bokuma	UNDP - TAMALE	0244348199	UNDP	
7	Nambo David	IDC - Tamale	0247108908	IDC	
8	Thomas N. Mengane	IDC Box 42 - Tendi	0242801542	IDC	
9	Bram Milla	UNDP - ACCRA	024 904 5881	UNDP	
10.	KARETF RAFISURA	UNDP - ACCRA		UNDP	

Attendance Sheet - AF Mission to Tamale – 6th-8th December 2011

Meeting Date and Time: 7 DECEMBER 2011, 9AM
Meeting Location: RCC OFFICE

	NAME	ADDRESS	PHONE #	ORGANISATION	SIGN
1	ABU ADAMS	P. O. Box 100 Tamale	0208977093	NADMO	
2	BAHEJA ABU	P. O. Box 100 Tamale	0245242063	NADMO	
3	Abu Iddrisu	P.O. Box 620 Tamale	0243635902	EPA	
4	Mumbei Abukari	P. O. Box 620 TL	0244570426	EPA	
5	Alex Bekuma	UNDP- REC TLE	0244343195	UNDP	
6	Adam Tanko	NADMO Reg.	0243807068	NADMO	
7	KAREPE MAPISURA	UNDP ACCRA		UNDP	
8	BRAM MILGER	UNDP, ACCRA	024 304 5881	UNDP	
9	George Issaka	Comm. Dev. Box 57, Tamale	0249305940	Comm. Dev	
10	Williams Alagura	Dept. of Comm. Dev. Box 57, Tamale	0372022623 0244845045	DoCD	

Attendance Sheet - AF Mission to Tamale – 6th-8th December 2011

Meeting Date and Time: 6/12/11 11AM
Meeting Location: CWSA

	NAME	ADDRESS	PHONE #	ORGANISATION	SIGN
1	JEREMIAH ATENGDEM	CWSA /TRIPLE-S BOX 810, TAMALE	0244512816	CWSA/TRIPLE-S	
2	JOSEPH TEI-LABI	C·W·S·A BOX 810, TAMALE	0246547277	CWSA	
3	AHMED ENURA	CWSA, TAMALE	0244713170	CWSA	
4	ALEX BOKUMA	UNDP-TAMALE	0245380808	UNDP-TLE	
5	Steve Anankum	CWSA Tamale	0244744249	CWSA	
6	Moses B Bagbila	CWSA Tamale	0208395369	CWSA	
7	ACHIAMAH PRA	MOFA Tamale	0244444227	MOFA BOX 14 TLE	
8	Alhaj Bawah PS M. TAMALE	✓	0244154898	✓	
9	Fusayah A. Tamm	✓	0243565311	✓	
10	Paul Bangmyel	CWSA TL	0241127612	CWSA	
11	Bram Mille	UNDP ACCRA	024 504 5881	UNDP	
12	KARLPF KAFISURA	UNDP ACCRA		UNDP	

ANNEX 6. LIST OF ACRONYMS

AAP	Africa Adaptation Programme
AF	Adaptation Fund
ALP	Adaptation Learning Programme for Africa
CBO	Community Based Organizations
CCA	Climate Change Adaptation
CII	Country Implementing Initiative
DANIDA	Danish Development Agency
DA	District Assembly
DFID	UK Department for International Development
EPA	Environmental Protection Agency
GDP	Gross Domestic Product
GEF	Global Environment Facility
GSGDA	Ghana Shared Growth and Development Agenda
GLSS	Ghana Living Standard Survey
GoG	Government of Ghana
GWI	Global Water Initiative
GPRS	Growth and Poverty Reduction Strategy
IDRC	International Development Research Centre
IFAD	International Fund for Agricultural Development
IP	Implementing Partner
IWRM	Integrated Water Resource Management
MDGs	Millennium Development Goals
MEST	Ministry of Environment, Science and Technology
MOFA	Ministry of Food and Agriculture
MOFEP	Ministry of Finance and Economic Planning
NCCAS	National Climate Change Adaptation Strategy
NCCC	National Climate Change Committee
NDPC	National Development Planning Commission
NEPAD	New Partnership for African Development
NEP	National Environmental Policy
NTFP	Non-Timber Forest Products
REDD	Reducing Emissions from Deforestation and Forest Degradation
RP	Responsible Partner
SADA	Savannah Development Authority
SCCF	Special Climate Change Fund
SEA	Strategic Environment Assessment
UNFCCC	United Nations Framework Convention on Climate Change
WFP	World Food Programme
WRC	Water Resources Commission
WUA	Water Users Association
VCA	Vulnerability and Capacity Assessments

Annex 7. Alignment of Programme Objectives with the AF Results Framework

Any project or programme funded through the Adaptation Fund (AF) must align with the Fund's results framework and directly contribute to the Fund's overall objective and outcomes outlined. Not every project/programme outcome will align directly with the Fund's framework but at least one outcome and output indicator from the Adaptation Fund's Strategic Results Framework must be included at the project design stage.

There is currently, no place within the project document where an explicit link to the AF's results framework is delineated. As such, the secretariat is requesting project proponents to fill out the table below to directly link, where relevant, project objectives and outcomes to the Fund level outcome and outputs.

Project Objective(s)[33]	**Project Objective Indicator(s)**	**Fund Outcome**	**Fund Outcome Indicator**
To enhance the resilience and the adaptive capacity of rural livelihoods to climate risks on water resources in the northern region of Ghana.	Number of communities with the adaptive capacity to climate risks	**Outcome 2:** Strengthened institutional capacity to reduce risks associated with climate-induced socioeconomic and environmental losses	2.1. No. and type of targeted institutions with increased capacity to minimize exposure to climate variability risks
To enhance the resilience and the adaptive capacity of rural livelihoods to climate risks on water resources in the northern region of Ghana.	Number of communities with the adaptive capacity to climate risks	**Outcome 3:** Strengthened awareness and ownership of adaptation and climate risk reduction processes at local level	3.1. Percentage of targeted population aware of predicted adverse impacts of climate change, and of appropriate responses
To enhance the resilience and the adaptive capacity of rural livelihoods to climate risks on water resources in the northern region of Ghana.	Number of communities with the adaptive capacity to climate risks	**Outcome 4:** Increased adaptive capacity within relevant development and natural resource sectors	4.2. Physical infrastructure improved to withstand climate change and variability-induced stress
To enhance the resilience and the adaptive capacity of rural livelihoods to climate risks on water resources in the northern region of Ghana.	Number of communities with the adaptive capacity to climate risks	**Outcome 6:** Diversified and strengthened livelihoods and sources of income for vulnerable people in targeted areas	6.1 Percentage of households and communities having more secure (increased) access to livelihood assets
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**
Outcome 4: Improved knowledge and institutional capacity under climate change, for	Number of participating institutions	***Output 2.1***: Strengthened capacity of national and regional centres and networks to respond rapidly to extreme	2.1.1. No. of staff trained to respond to, and mitigate impacts of, climate-related events

[33] The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

coordination, management of water resources and diversification of livelihoods of communities in northern Ghana		weather events	
Outcome 2: Climate resilient management of water resources by at least 15 communities in northern Ghana	Percentage of population with improved water management practices resilient to climate change impacts in the targeted regions.	***Output 3***: Targeted population groups participating in adaptation and risk reduction awareness activities	3.1.1 No. and type of risk reduction actions or strategies introduced at local level
Outcome 2: Climate resilient management of water resources by at least 15 communities in northern Ghana	Percentage of population with improved water management practices resilient to climate change impacts in the targeted regions.	***Output 4:*** Vulnerable physical, natural, and social assets strengthened in response to climate change impacts, including variability	4.1.2. No. of physical assets strengthened or constructed to withstand conditions resulting from climate variability and change (by asset types)
Outcome 3: Enhanced diversification of livelihoods under climate change by communities in northern Ghana.	Number of communities with livelihoods diversified to provide resilience to climate change impacts	***Output 6:*** Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	6.1.2. Type of income sources for households generated under climate change scenario