



ADAPTATION FUND

**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



PROJECT/PROGRAMME PROPOSAL

PART I: PROJECT/PROGRAMME INFORMATION

PROJECT/PROGRAMME CATEGORY:	REGULAR PROJECT
COUNTRY/IES:	GHANA
TITLE OF PROJECT/PROGRAMME:	INCREASED 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, TECHNOLOGY AND INNOVATION OF GHANA
AMOUNT OF FINANCING REQUESTED:	8,293,972.19 (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 km² and 8,520 km² of water. Ghana has extensive water bodies including the Lakes Volta and Bosomtwe with a surface area of 3,275m². There are other seasonally flooded lakes occupying over 23,350km². 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 the country. The three major river systems are the Volta River System, the South Western River System and the Coastal River System. The entire Volta River Basin of 174,886 km² covers 70% of the country’s land area and includes the whole interior savannah zone. Within Ghana the Volta River Basin comprise of the White and Red Volta Basin (hereafter referred to as the White Volta), the Black Volta Basin and the Oti Basin. 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 m³ with 37 billion m³ originating from within the country and 16.2 billion m³ 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 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.

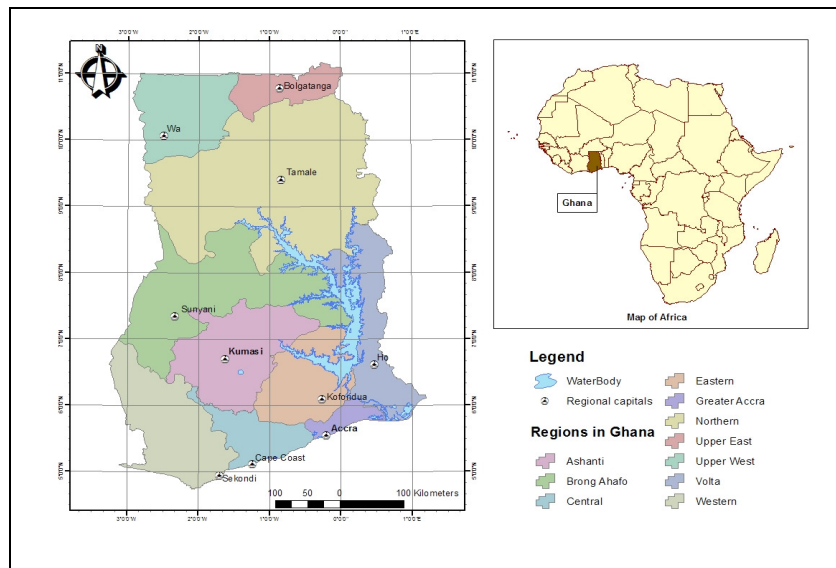


Figure 1 Map of Africa showing the location of Ghana

- *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 at about 56%. 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 rainfed, 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 contributed about 35.3% to Ghana’s GDP between 2001-10. Both extensive cropping and increase in demand for biomass has contributed to some land degradation.

Climate Change and Variability in Ghana

- *Current climate variability*

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

¹Ghana Shared Growth and Development Agenda 2010-2013

temperature) and atmospheric (e.g. Inter-Tropical Convergence Zone²) circulation leading to important rainfall deficits, dry spells and climate variability.

In Ghana, temperatures throughout the country are generally high and models predict 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 increases 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 1100mm 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 UNFCCC³ assessed the predicted climate change for the six eco-climatic zones shown in Figure 2 and discussed below:

²Climate Change Adaptation.A Primer for Water Conservation, Flood Risk Reduction and Irrigation Strategy for Northern Ghana.WRC. 2011.

³Ghana's Second National Communication to the UNFCCC. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.

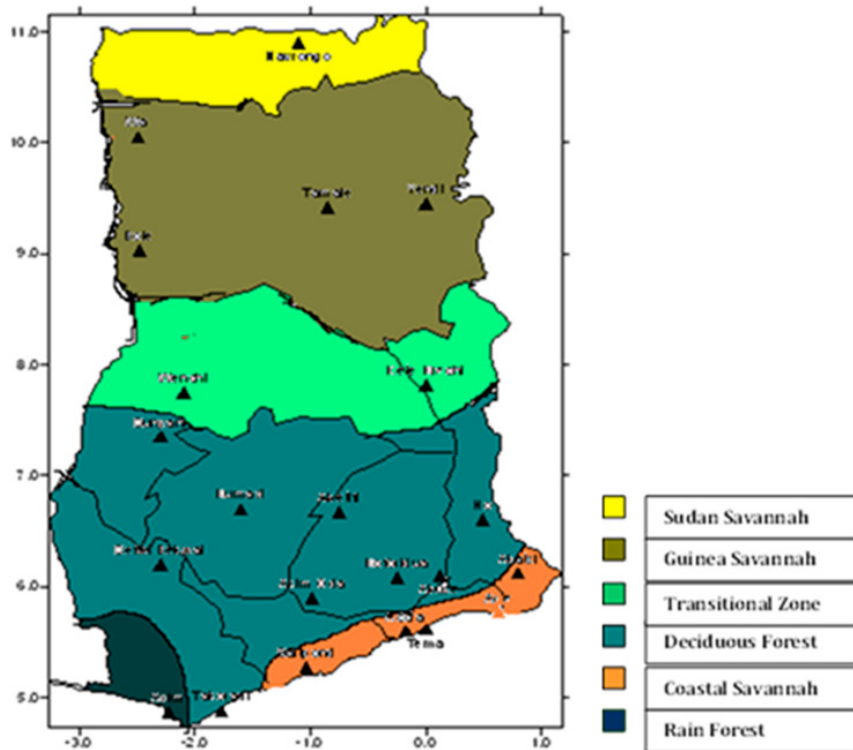


Figure 2: Areas on which climate change scenarios were developed

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:

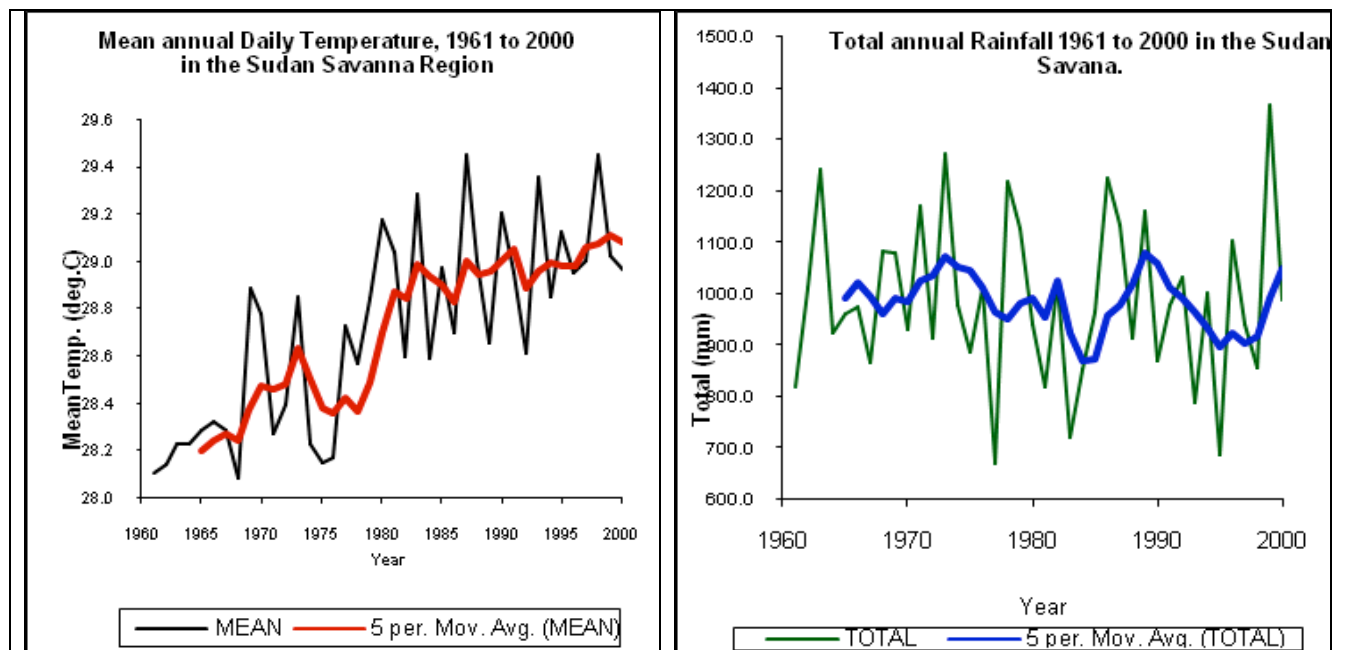


Figure 3.1 Mean Annual Daily Temperature and Total Annual Rainfall Amount: Sudan Savannah zone

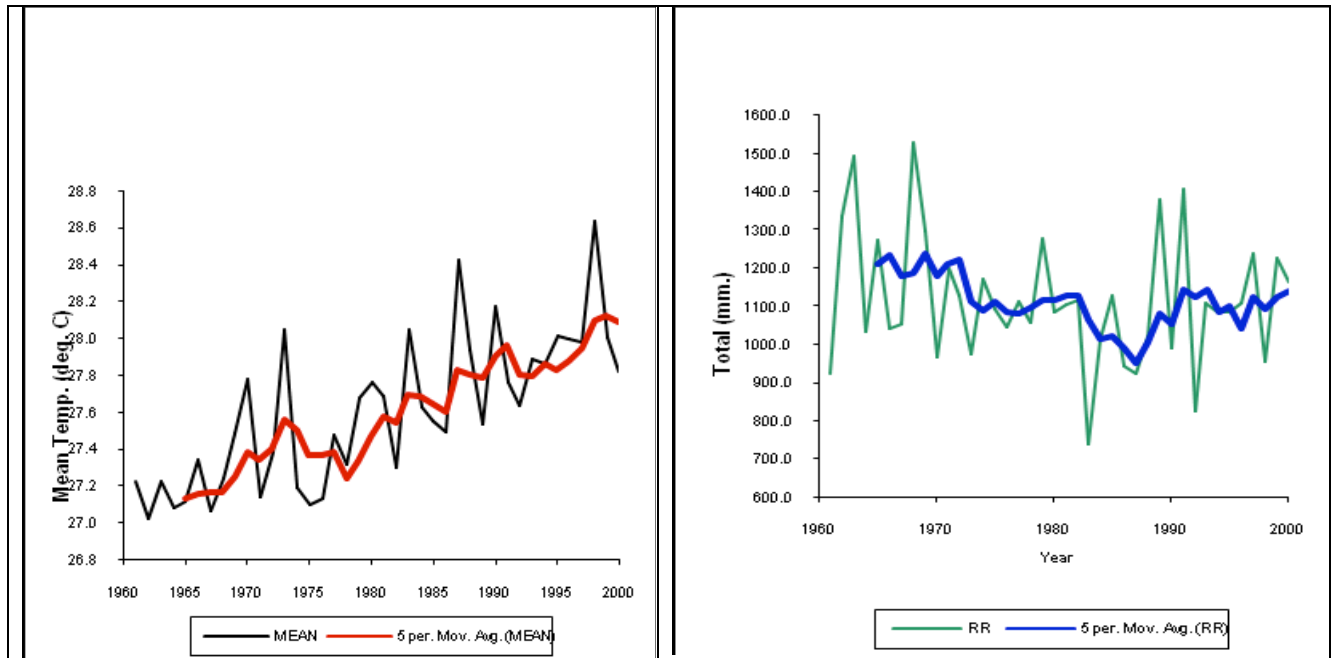


Figure 3.2 Mean Annual Daily Temperature and Total Annual Rainfall Amount: Guinea Savannah Zone

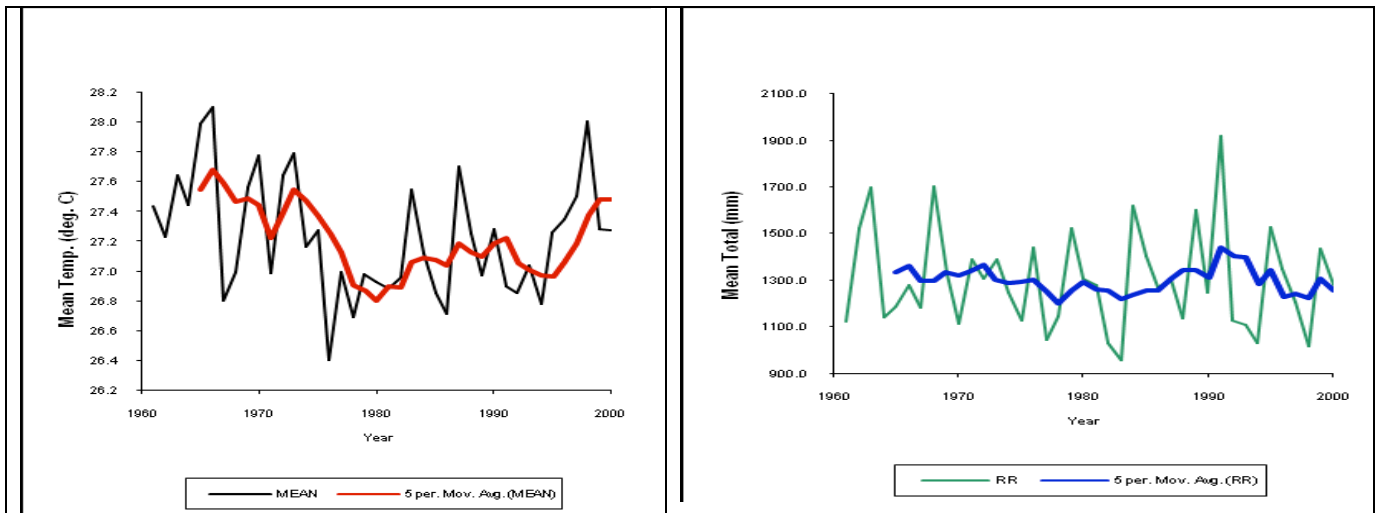


Figure 3.3 Mean Annual Daily Temperature and Total Annual Rainfall Amount: Transitional Zone

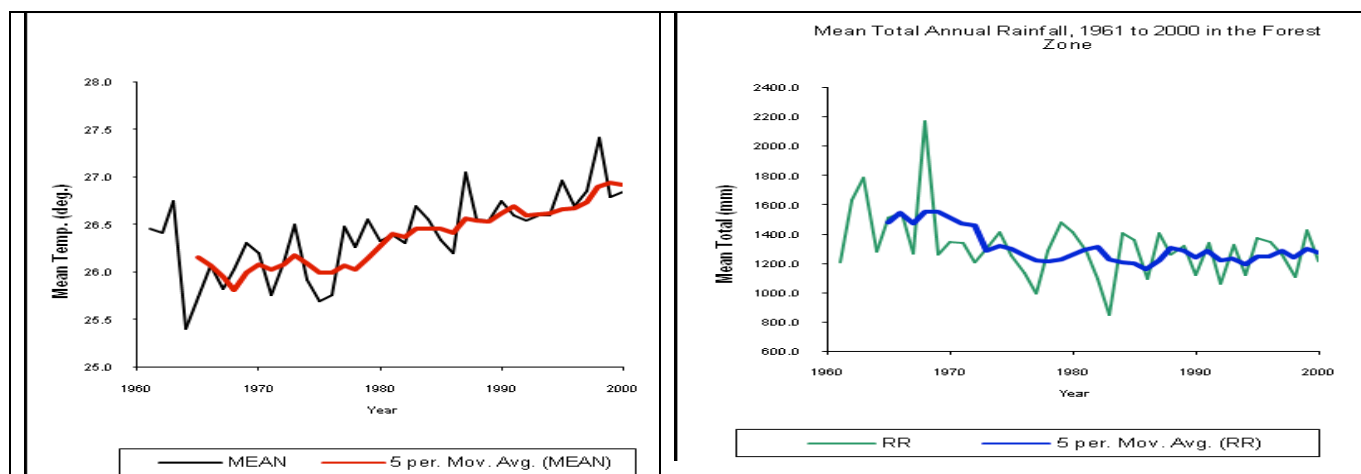


Figure 3.4 Mean Annual Daily Temperature and Total Annual Rainfall Amount: Forest Zone

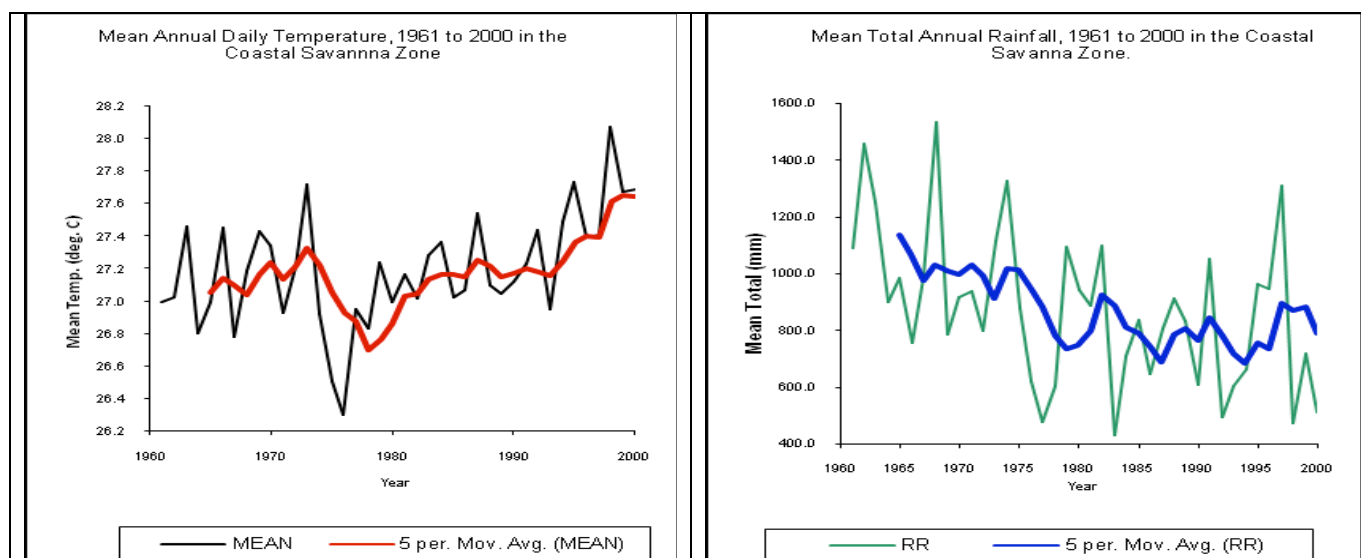


Figure 3.5 Mean Annual Daily Temperature and Total Annual Rainfall Amount: Coastal Savanna Zone

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 temperature (%) for the ecological zones

Year	Sudan	Guinea	Transitional	Deciduous Rainforest	Rainforest	Coastal Savanna
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 savanna 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 in other African countries, the life of ‘the poor’ is a life of vulnerability, which reflects the deeper problem of insecurity⁴. The poor depend heavily on environmental goods and services. Their livelihoods are punctuated by dependence on agriculture, fisheries and forestry (which revolve on the use of land and water resources), and on the capacity of ecosystems to provide the services vital for environmental 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 conflicts 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 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 (WFP) 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, 15% in Upper East, and 10% in Northern region. This is the equivalent of approximately 453,000 people.

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

Water is recognized as a crosscutting resource underlying the National Growth and Poverty Reduction Strategy (GPRS 11) of Ghana⁵ and the National Water Policy⁶ 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 m³ (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 to the challenges 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 a substantial 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, as this 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 threat 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 research¹⁰ 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 erratic rainfall 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 erratic rainfall patterns and increased frequency of high intensity rainfall events. The Government of Ghana (GoG), using resources from the Adaptation Fund will therefore address climate change-induced

⁵Growth and Poverty Reduction Strategy II. National Development Planning Commission. 2005.

⁶National Water Policy. Ministry of Water Resources, Works and Housing. 2007.

⁷ Ghana's Second National Communication to the UNFCCC. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.

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 a 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 fuel wood, 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 Ghana⁸ with the north harboring significantly higher levels of poverty than the south.

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



Figure 4.The three northern regions of Ghana.

Building on local consultations of community groups, civil society, local government institutions, NGOs etc. in the three northern regions, the programme will target the following ten districts. The selection is based on an assessment of district vulnerability (see Annex 5 for details):

- | | |
|-------------------|-------------------|
| 1. Savelugu | Northern Region |
| 2. Bole | Northern Region |
| 3. Zabzagu-Tatale | Northern Region |
| 4. Bawku | Upper East Region |
| 5. Bongo | Upper East Region |
| 6. Builsa | Upper East Region |
| 7. Bawku West | Upper East Region |
| 8. Lawra | Upper West Region |
| 9. Nadowli | Upper West Region |
| 10. Sissala East | Upper West Region |

- *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 those reliant on 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. Notwithstanding 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) 4¹⁰, 40% of the Ghanaian population has an income below the upper poverty line, while about 27% of the population has an income 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 and this constitutes an important factor in the adaptive capacity to climate change¹¹. According to the Ghana Living Standards Survey Report (GLSS 5) of 2008, the three northern regions (Upper West, Northern and Upper East) have the highest household sizes (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 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 particular¹².

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 km², 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

⁹Draft National Climate Change Adaptation Strategy. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.

¹⁰Ghana Living Standards Survey Round 4. Ghana Statistical Service. 1998.

¹¹ Ghana Living Standards Survey Report (GLSS 5) 2008

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

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 hardpan. 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 fertilizers, 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-utilized resources to support an intensified agriculture modernization 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 crops¹³. 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. Seedling cultivation for reforestation efforts presents another potential area for livelihood diversification.

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 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 km²) of Ghana's total land area prone to desertification, 33% (~78,718km²) is in the northern regions, which tends 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

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

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. The GoG, using support from the AF will assist existing efforts supporting communities to rehabilitate and de-silt small dams and dugouts infrastructure, to improve availability of water for agricultural and domestic use. Re-afforestation programmes 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 the Water Resources Commission¹⁵ (WRC) 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 regions 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. Using resources from the AF, the GoG will implement a programme of livelihood diversification from the traditional ones (particularly rain-fed agriculture) and that are capable of creating independent and profitable sources of incomes for the local communities. 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 demonstrate the low turnover of capacity development through formal educational programmes which constitute an important factor in the adaptive capacity to climate change¹⁶. According to the 2008 Ghana Living Standards Survey Report (GLSS 5), the three northern

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

¹⁵Climate Change Adaptation. A Primer for Water Conservation, Flood Risk Reduction and Irrigation Strategy for Northern Ghana.WRC. 2011.

¹⁶Ghana Living Standards Survey Report (GLSS 5) 2008

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*

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 following¹⁷:

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 derived 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, and underdeveloped, with production limited by ineffective commercial practices. Therefore, these small-scale activities will provide a boost to 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

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

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 such as food processing. 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 capacity to adapt are uneven, 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 required in response to the nature and context of the climatic vulnerability. The primary problem addressed by the GoG, using resources from the AF, and 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 established¹⁸, 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 investigation¹⁹ 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 remain a significant challenge in the northern regions of Ghana. Natural disasters such as floods, droughts, wildfires and famine have characterized the northern regions of Ghana for decades and now becoming more frequent and intense especially floods 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 and include the following key elements:

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

Although the GoG 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.

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.

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 and 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. Importantly, the GoG will also use AF resources to develop community level water management plans, which take into consideration future climate change and linked to the higher level management plans at the catchment and sub-catchment levels. In order to increase the resilience of communities against the adverse impacts of climate change and variability through water resources management, concerted efforts will be made by the GoG 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. 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 WRC²⁰, 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. The AF resources will enable the GoG to implement long-term water resource planning, which is an effective means of increasing resilience to climate change impacts.

- 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 numbers of communities that benefit from reliable community water supplies in northern Ghana. 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 also a weak knowledge base and capacity for effective water capture, management and conservation in addressing climate-induced shortages in water supply. Management planning and implementation is required to expand the number of

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

beneficiaries and to enhance climate resilient management of water resources in communities in northern Ghana.

The establishment of community supply and management plans drawing from diverse sources of water supply in addressing shortages under climate change is crucial and AF resources will enable the GoG to achieve this in a large number of communities across northern Ghana. Importantly, this will require financial support for the operationalization of community plans, such as an improvement of infrastructure for water harvesting, storage and distribution.

Mainstreaming adaptation into water management planning of communities will help those 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 enable the GoG to draw on and implement diverse options for adaptation of water management strategies as highlighted by the WRC²¹.

Following the predominance of smallholders' community activities, proper coordination systems will be put in place for the water management planning to improve on their cost effectiveness and reduction in transaction costs. This will thus, improve on the competitiveness of agricultural products in the market following post-harvest and other climate-risk sharing measures and the 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).

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

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 communities vulnerable to climate change, with 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 rainfed 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 tree seedling nurseries. These adaptation solutions will have a particular focus on supporting livelihood options for women, who are very often most vulnerable to the impacts of climate change.

- *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 that are more favorable 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 northern 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 of local communities and local, regional and national institutions in addressing climate change will also provide sustainability and the required ownership of the programme.

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 that will be carried out with AF resources.

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 clearing of tree in riparian zones but enforcement remains a challenge. The AF resources will enable the GoG to enforce such regulations by providing livelihood incentives to communities to reforest/afforest. Community sensitization in the course of carrying out the activities will reinforce the value of ecosystem services for enhancing livelihoods and for disaster risk reduction. In addition, in the course of carrying out soil suitability analysis for the various project interventions, the project will contribute information regarding soil suitability within the target communities. This information will help authorities plan land use better and would be an instrumental tool to prevent indiscriminate land destruction.

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 instigated 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 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, Technology and Innovation (MESTI) 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 low. 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 GoG will implement the Programme that 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. The Programme will achieve this through the GoG with the full involvement and ownership by the local communities, in the adaptation activities, 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 weak coordination 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 (VBA) 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 the GoG 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 as market gardening, local brick construction etc.

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

Poor rural communities and local organizations currently lack incentives and preparedness to manage and provide better oversight to the management of 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. Community consultations, undertaken in support of the development of this proposal, have revealed that water resources are also often major sources of conflicts between communities, and farmers and nomadic herdsman.

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 example, 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 livelihoods 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 Ghana²². 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 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

²²Ghana Shared Growth and Development Agenda 2010-2013.

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, the GoG 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 for the development of the north 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 and other capacity development programmes 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 by communities and national institutions in the region, with an emphasis on using concrete demonstration actions that enable a ‘learning-by-doing’ process. This is crucial for the sustainability of the implemented actions.

■ 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.

The programme is designed to support the GoG kick-start the implementation of the national priorities for climate change adaptation outlined in the National Climate Change Adaptation Strategy (NCCAS) of 2011²³ as well as those highlighted in the 2nd National Communication²⁴. 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 commendable that Ghana developed a National Climate Change Adaptation Strategy. Out of the ten priorities listed in the National Climate Change Adaptation Strategy, the GOG, with the support of the Adaptation Fund resources, 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 regions²⁵. 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 have also been developed to directly and explicitly contribute towards priority areas in the NCCAS, such as:

- Priority 1 (Early Warning Systems): 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. The AAP, also supported strategic policy dialogue and capacity development approaches aimed at mainstreaming CC and DRR in district and National level development planning. Beside, The Community Resilience through Early Warning System Project (CREW) project which is funded by the Government of Norway and being implemented by UNDP is designed in a way that it aligns with the Hyogo Framework of Action and the Ghana Plan of Action for DRR and CCA, and

²³Draft National Climate Change Adaptation Strategy. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.

²⁴Ghana's Second National Communication to the UNFCCC. Environmental Protection Agency & Ministry of Environment, Science and Technology. 2011.

²⁵Climate Change Adaptation. A Primer for Water Conservation, Flood Risk Reduction and Irrigation Strategy for Northern Ghana. WRC. 2011.

leads to tangible results in both the national and community levels. Through the implementation of hazard mapping, early warning, and vulnerability assessment and reduction, the project aims to achieve 1) a reduction of economic and human losses and damages from priority disasters, and 2) establishment of effective early warning and communication for priority hazards to reduce disaster risks in the 10 pilot sites by 2016.

- **Priority 8 (Health):** 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.

The Programme will also seek to support the implementation of the National Climate Change Policy (NCCP). The NCCP provides strategic direction and coordinates issues of climate change in Ghana. To address the Climate Change adaptation issues in Ghana, natural resources management, agriculture and food security, and disaster preparedness and response have been identified as part of the broad thematic areas of the NCCP.

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 three components, each with the following outcomes that will be delivered by the programme:

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

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 basin level management and planning of water resources taking into account the climate change impacts on surface and groundwater sources	Output 1.1: Climate change projections generated for the White Volta, Black Volta and Oti basins	117,000.00
		Output 1.2: White Volta management plan reviewed and updated to take into account climate change impacts	59,000
		Output 1.3: Water management plans that takes into account climate change impacts are developed and adopted for the Black Volta and for five sub-basins in the White Volta and the Oti basins	74,000
		Output 1.4: Regional Climate Change Adaptation Monitoring Committee (as envisioned by the National Climate Change Adaptation Strategy) established in the three target regions	114,000
Total Component 1			364,000
2. Community Level Implementation of climate resilient water resource management activities	Outcome 2: Climate resilient management of water resources by 50 communities in northern Ghana	Output 2.1: Community water supply and management plans developed for 10 districts to incorporate climate change-related risks	217,041.25
		Output 2.2: Water supply increased for multiple uses and users in 50 communities during period of shortages under climate impacts e.g. droughts, heat stress etc.	2,600,641.25
		Output 2.3: Small scale irrigation systems installed in 50 communities and water users associations to manage irrigation systems established and/or strengthened to improve efficiency and effectiveness of water usage under conditions of climate-induced water pressures	1,079,250.00

		Output 2.4: Measures for water conservation under climate impacts e.g. catchment/river bank re-afforestation schemes implemented in 25 communities	422,041.25
		Output 2.5: Learning platforms and systems for integrating climate change-related risks into community management of water resources and livelihood activities in northern Ghana institutionalized in 10 districts	177,025.00
Total Component 2			4,495,998.75
3. Diversification of Livelihoods of Rural Communities under climate change	Outcome 3: Enhanced diversification of livelihoods under climate change by 50 communities 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 10 districts	551,541.25
		Output 3.2: Dry-season gardening activities, agricultural processing schemes (shea butter or honey) by women, and bee keeping practices improved for climate change adaptation in 50 communities	546,541.25
		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 40 communities	656,541.25
		Output 3.4: Fish farms are established and supported in 20 communities	440,291.25
		Output 3.5: Best practices for adaptation and lessons learned from the implemented actions and related policy processes are recorded and disseminated to all 38 districts in northern Ghana through appropriate mechanisms	56,541.25
Total Component 3			2,251,456.25
	6. Programme Implementation – Total Costs		7,111,455
	7. Project/Programme Execution cost		532,759.00
	8. Total Project/Programme Cost		7,644,214.00
	9. Programme Cycle Management Fee charged by the Implementing Entity (8.5%)		649,758.19
	Amount of Financing Requested		8,293,972.19

 **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 2015
Approval of Project Proposal by the AF Board	June 2013
Start of Programme Implementation	April 2015
Mid-term Review (if planned)	April 2017
Project/Programme Closing	April 2019
Terminal Evaluation	April 2019



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 managing expected climate change risks and uncertainties in the northern regions of Ghana. The components constitute a series of interlinked projects. The linkages between the components constitute the consolidation of institutional planning and management of water resources, followed by enhancing community level organization 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. The target districts have been identified as a result of local community consultations. The participants of community consultation also proposed a set of criteria to guide selection of the target communities for project interventions. The project proponent adopts the proposed criteria with minor modification:

- 1) Poverty levels – communities with more than 50% of the households considered poor (based on household income and other measures of deprivation) will be given higher priority.
- 2) Population - communities with a population of at least 600 people will be given priority
- 3) Community’s commitment to implement the project as indicated by their commitment to co-finance some of the activities (e.g. counter-part labor)
- 4) Availability of natural capital (e.g. land for woodlots, groundwater potential for boreholes) to implement the activities described in the proposal
- 5) Capacity to address gender dimensions of adaptation interventions. This will be determined by the presence of women’s groups and/or women leaders in the community.
- 6) Consistency between proposed project interventions and community’s traditional and religious beliefs. This will be determined by screening each intervention against traditional and indigenous beliefs (based on existing documentation/earlier studies)

Additional criteria may be added during the inception workshop to fully capture other issues that may increase the vulnerability of different groups in the community such as gender, youths, elders etc. The inception workshop will bring together all key stakeholders, including organizations 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 50 (minimum) communities that will pilot the programme. This multiple consultative approach undertaken with communities with a particular emphasis placed on obtaining the views of women and identifying pilot communities for programme implementation provides a better cost 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 a severe and frequent pattern of drought/flood events as was experienced in the northern regions in 2007, 2010, and 2012. To date, contingency planning of water resources taking full account of the need for climate change adaptation, has not yet taken place at any significant scale, meaning that there has been inadequate consideration of how to reduce climate change 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 within the framework of 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 considers the implications of climate variability and climate change in the decision-making framework. Planning for 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. The institutional leadership for this component lies with the Water Resources Commission. This will involve:

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

Output 1.1: Climate projections generated for the White Volta, Black Volta and Oti basins

Presently there is no climate change projection data to enable long-term water management planning of the White Volta, Black Volta and Oti Basins that takes proper account of the impacts of climate change on the river basins and the continuous supply of water resources. This output is therefore crucial for the generation of climate change projections for the basins and sub-basins being addressed under this programme. The projections will be developed by a participatory approach involving technical resource persons from government institutions (such as the Ghana Meteorological Service and the National Disaster Management Organisation) and academia and expert guidance that will be mobilized through this programme. This will have long-term benefits beyond the programme because there will be an increasing need to produce climate projections for Ghana, and the AF resources will therefore assist the GoG to address this need. The capacities developed by GoG supported by AF financing through this plan will be maintained thereafter by domestic budgetary resources that finance these institutions. WRC has demonstrated its commitment to eventually mainstream project activities within its own budget as evidenced by the funding committed for the implementation of the White Volta Management plan since 2009.

Output 1.2: White Volta management plan reviewed and updated to take into account climate change impacts

Ghana's Water Resources Commission has previously developed 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" and the link of this plan to sub-basins and community level planning requires strengthening. 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 access to existing or new analysis of climate change impacts on water resources based on a range of climate projections generated by Output 1.1. The AF financed programme will draw on technical modeling capability that is beginning to emerge 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 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 well in the Black Volta under component 1.2 as cost-effective measures.

Output 1.3: Water management plans that take into account climate change impacts are developed and adopted by the GoG for the Black Volta and for five sub-basins in the White Volta and the Oti basins

There is currently no management plan for either the Black Volta or the Oti basin. 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, which is essential to enable increased resilience to climate change, is hindered. The GoG will, using the same approach for the White Volta, develop plans for the Black Volta and Oti. 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 target 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, 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. Despite the lack of a prescriptive and common framework for inter-state water resource management at present, the Government of Ghana, through the Water Resources Commission (WRC) will continuously dialogue with the Volta Basin Authority at both strategic and technical levels throughout the whole duration of the project. The VBA Council of Minister responsible for water resources will be briefed and updated about the project on a regular basis. The VBA Committee of Experts will be closely engaged in the course of developing the climate projections (Output 1.1).

The project will feed into the ongoing process of developing policies, legislation, and institutional strengthening. If this programme gets implemented in 2013 as anticipated, programme outputs will have a critical role in providing feedback into the ongoing VBA dialogue on the Water Charter and formulation of the Master Plan for Development and Sustainable Water Management in the Basin.

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 the laws, protocols and agreements 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."

Output 1.4: 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 a need to coordinate the implementation of the strategy at the regional level. The National Climate Change Adaptation Strategy stipulates the establishment of Regional Climate Change Adaptation Monitoring Committees (RCCAMC) under the leadership of the Regional Coordination Council. The Adaptation Fund will enable the programme to support the GoG with the establishment of these committees initially to serve the programme objectives but with a wider view of supporting the implementation of the NCCAS. Because the composition and mandate of the Committee will have implications beyond the project, one of the programme's first activities is to initiate a national multi-stakeholder process that would develop and agree on the terms of reference of the Committee considering the existing coordination committees at the regional level. The Committees 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 up-scaling of the activities within Components 1, 2 and 3. The Committees will meet at least twice a year and include representation by women.

The AF-supported Programme will advocate that the RCCAMC will be mandated to:

- Monitor the progress of and link the AF programme with the other adaptation initiatives within the region to ensure that the programme contributes to the overall development objectives of the region
- Serve as a platform for multi-sectoral management and coordination of climate change and related policies, programmes, and projects in the region
- Provide a platform for a long-term and sustained process of understanding adaptation, synergies, gaps, and the required adjustments in existing interventions to ensure that they are all integrated and contribute to broader climate change and development planning and delivery at the regional level
- Provide feedback and inputs to national policies

The RCCAMC is necessary for the sustainability of the entire Programme. This Programme will implement activities to assess and strengthen the capacity of RCCAMC and other 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 training programmes across the region targeting local governments and institutions. The programme will provide substantial materials and opportunities for capacity development.

Component 2: Community Level Implementation of Climate Resilient Water Resource Management Activities

Capitalizing on Component 1 that improves the water management planning of water, under Component 2 the GoG will focus 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 Government's 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 risk management. 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 to assume a central role in supporting community management of water and sanitation facilities, and in maintaining the integrity of aquatic systems

Outcome 2: Climate resilient management of water resources by 50 communities in northern Ghana

Output 2.1 Community water supply and management plans developed for 10 districts 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. Under this output, therefore, the GoG will work with 50 communities, from across the ten target districts, to develop community level water management plans. 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. These community level plans will be integrated with those basin and sub-basin plans developed and strengthened by the GoG under Component 1.

A review of existing community structures/institutions that are capable to develop and implement water supply management plans will be conducted for each community to ensure that the optimal institutional arrangement is adopted. For example, in communities where the EPA is implementing the Ghana Environmental Management Project (GEMP), community environment committees are already in place, and these are likely to provide an effective institutional mechanism for community water management planning. In other communities, well-established water and sanitation committees could play this role. Importantly, a target will be set for a 50% or more representation by women on committees that lead the planning process and a participatory methodology will be used for the plan making process that targets high levels of engagement amongst particularly vulnerable groups.

Options for integrating water resources management in communities will be identified and tested and assessed for implementation. This will require monitoring and reviewing these options in their effectiveness. A strong emphasis will be placed on interventions that 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 quantity and quality, as well as resilience under climate change. The process of developing the plan and forging institutional arrangements 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 initiatives, such as those implemented by the Global Water Initiative project. For example, a key success of Global Water Initiative projects has been regular meetings of those community institutions that have led to water management planning and implementation. Following this success, the GoG will hold bi-annual information sharing and learning events, to which representatives from all 50 communities will be invited.

Using resources from the AF, the GoG will subsequently support the implementation of the community water management plans by the provision of infrastructure and other physical interventions, together with training and technical support. These interventions are detailed under Outputs 2.3 to 2.5 below. Communities will be visited on a regular basis by GoG staff from agencies such as MoFA, EPA, and Community Water and Sanitation Department, as well as technical experts recruited under the AF programme. These visits will assist with ongoing monitoring of management plan implementation and continue to provide fresh impetus and motivation to the water management efforts of communities.

The community management plans will address long-term sustainability of the measures implemented under the plan, and in particular the establishment of a mechanism to ensure long-term maintenance of

infrastructure. The exact nature of such mechanisms will be determined by communities, on a community-by-community basis, but in all cases, communities will be required to establish maintenance funds, either through making a charge for use of water resources, or through use part of the funds generated by livelihood diversification activities supported under Component 3. This approach has been tried and proven to work in the northern regions of Ghana.²⁶

Output 2.2: Water supply increased for multiple uses and users in 50 communities 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 require 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 reduce siltation in the watershed, e.g. grass and tree planting, etc. will be promoted. These interventions have been identified by communities and other stakeholders as those which are most effective, will provide water throughout the year including at times of drought and, are also those which will directly contribute towards the livelihood diversification activities supported under Component 3.

Boreholes

The GoG will implement an extensive programme of borehole provision, with an allowance made for two hand-pumped boreholes to be provided in support of each of the 50 community water management plans, with each borehole providing water for approximately 300 people. Boreholes provide an excellent source of water, which can be managed carefully to ensure quality. While hand-pumped boreholes require labour to draw water, and also draw less water than mechanized boreholes, this option is considered to be more robust and require less long-term maintenance. Boreholes can reach deeper aquifers than wells and as such are more flexible in where they can be located successfully, particular because in northern Ghana, aquifers have been located between 10 and 60 metres with an average of 27m. Programmes of borehole provision have previously been implemented by organizations such as World Vision and CARE International, and the detailed expertise of such organizations, such as in drilling techniques to suit different hydro-geological conditions, will be utilised by the GoG.

New or Rehabilitated Dugouts and Dams

Dugouts, which capture and store rainwater, and dams, which capture and store flood waters, have been identified by communities as being essential in maintaining water supply, particularly providing supply which satisfies multiple uses, such as for dry seasoning gardening (see Component 3) and a water supply for livestock. Dams also provide an effective flood water management function, assisting with reducing risks associated with uncontrolled flood waters. Combined with boreholes, dugouts/dams are able to address the majority of water supply needs by communities. There are a large number of both dugouts and dams across northern Ghana, which have considerably reduced in effectiveness due to siltation and structural disrepair. Using AF resources, the GoG will therefore support implementation of community water management plans via a programme of both new dugouts and dams, and rehabilitation of existing dugouts and dams. A total of 50 new or rehabilitated dugouts/dams will be provided. The number of beneficiaries for each dugout/dam will vary according to the size of the dugout/dam, with WFP reporting 2,000 beneficiaries to 15,000, as 2 to 5 communities can often derive benefits from one dugout/dam.

²⁶Global Water Initiative (June 2012). Case Study 3: Multiple Water Use Systems under GWI-Ghana Project.

Rainwater Harvesting for Community Buildings

Rainwater harvesting, from the roofs of community buildings, will provide water for human consumption without large labour costs, at important locations such as schools. Systems incorporating water capture from roofs and piped connections to storage tanks will be used by the GoG, with an allowance made for the installation of 1 harvesting system in support of each community water management plan.

Output 2.3 Small-scale irrigation systems installed in 50 communities to improve the productivity of agriculture under climate change risks

Using the available AF funds, the GoG will undertake activities for the installation of small-scale irrigation techniques in at least 50 communities to improve the productivity of agriculture and remove on the reliance on rain as the only means of irrigating crops, thereby extending growing seasons and the range of crops that can be grown. This 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' associations (WUA) in target communities where they do not exist as yet with the mandate of carrying out user fee collection and making 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 through leadership and organizational development trainings and learning visits to communities with well-functioning WUAs.

Output 2.4: Measures for water conservation under climate impacts e.g. catchment/river bank re-afforestation schemes implemented in 25 communities

Deforestation in catchments and along riverbanks has led to reduced capacity of the land in many communities to retain flood waters within bank, retention of water and also to increased soil erosion. Under Output 2.5 the GoG will implement a programme of re-afforestation, targeting particularly those communities that border water courses, with a target of re-afforestation in support of 25 community water management plans. Each re-afforestation scheme will target approximately three hectares of land, and will plant cash-crop trees where possible. There are a number of related projects currently being implemented in northern Ghana, such as a river bank tree planting project in West Mamprusi District (Northern Region) being implemented by the EPA under the AAP. This particular project has shown the importance of obtaining a local supply of seedlings, an issue which will be addressed by the GoG in the utilization of AF funds, by linking this output with Output 3.3, which will develop community wood lots

and tree nurseries.

Achieving sustainable management of water resources for reliability in supply requires measures for water capture, conservation and quality control. This is crucial to ensure equitable 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: Learning platforms and systems for integrating climate change-related risks into community management of water resources and livelihood activities in northern Ghana institutionalized in 10 districts.

It is vital that the lessons learnt from implementing Component 2 are recorded and disseminated widely, in particular how community level planning and implementation links to higher level planning (Component 1) and livelihood diversification (Component 3). GoG will use communications experts to produce lessons learnt documentation and this will be disseminated to key stakeholders, particularly District Assemblies, across northern Ghana. 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 programmes will therefore carry-out activities to build up institutional capacities and individual skills of the local communities. There will be activities aimed 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.

There will be training of selected communities in constructing and/or refurbishing of drainage canals/ditches. There will be a training activity for channelling water (e.g. using road designs) with culverts for storage in reservoirs. Finally, training for the rehabilitation of water catchments using afforestation techniques in selected communities will be carried out.

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 rain-fed agricultural production, into other activities that improve their resilience to climate risks.

Outcome 3: Enhanced diversification of livelihoods under climate change by 50 communities, in northern Ghana

Assisting with the diversification of the livelihoods base into sectors that are not dependent completely on rain-fed 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 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. Communities, especially women will be supported 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 enhance 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 five 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. During the proposal development a number of different livelihood options were also considered, such as raising small ruminants, crafts and guinea fowl 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: Improved infrastructure (e.g. canals, pipes etc.) for water distribution for climate change adaptation (CCA) and use in agricultural systems installed in 10 districts.

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 through training, regular visits, demonstration farms, and other approaches as applicable. 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, agricultural processing schemes (shea butter or honey) by women, and bee keeping practices improved for climate change adaptation in 50 communities

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.

- *Dry season gardening schemes for women*

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 GoG will provide small-scale infrastructure

support, such as watering cans, pumps and pipes, to facilitate dry season gardening by women in 50 communities. Dry-season gardening, led by women, was strongly supported by communities during community consultation. This activity will be linked to increased water supply and storage, particularly dugouts and small-scale dams. Dry-season gardening will provide women with access to income sources during the dry-season but also importantly access to more and more diverse sources of food. Each scheme will be targeted to directly benefit at least 20 women.

- *Women led agricultural product processing schemes (shea butter or honey etc.)*

In particular response to community consultation responses, the GoG will establish and support schemes for processing of agricultural products, with schemes led by women. 40 community schemes are targeted, with the number of direct beneficiaries from each scheme likely to be in the order of 30 women. Shea butter processing is an industry with a largely untapped potential in northern Ghana and is an industry, which requires a source of water, thereby benefitting from increased availability of water achieved by the GoG in beneficiary communities under Component 2 of this Programme. Honey processing will also be developed in a number of communities in which beekeeping is promoted, as part of the establishment of wood lots.

The activities that will be implemented to achieve this will also include training of women in how to increase yields from market gardens, to successfully market their products and also on business management. 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 to demonstrate the efficacy of community-scale water adaptation approaches that enhance the profitability of market gardening commonly practiced by women who often lack access to major resources and land for other cash crop production.

Borrowing from the experience of implementing the UNDP-GEF Small Grants Programme in Ghana and by some local NGOs/local affiliates of international NGOs in Ghana, at least 3 options of funding modality to community beneficiaries were evaluated vis-à-vis the following considerations: accountability, effectiveness, sustainability, and suitability to local context and existing capacities, stakeholder preference and swiftness of the delivery of interventions. The element of swiftness is particularly important because the adaptation needs identified in the Programme proposal are considered urgent and immediate and should not be impeded by lengthy start-ups. The best funding option would be providing grants to communities using NGO support as per the Small Grant Program model^{[1][1]}. The resources would be administered by local NGO partners that have a long-standing presence in the target district. The Ministry of Environment, Science, and Technology

As the Implementing Partner, the Ministry of Environment, Science, and Technology will initiate a competitive tender process of selecting NGOs that have the capacity to manage funds in the target communities that would be appropriate to the needs and capacities of the target community. NGOs participating in this will be assessed according to the following criteria:

- (1) Presence in the community where it proposed to manage the funds and relevant experience
- (2) Financial capacity – financial management and reporting, accounting system, operational procedures, fund oversight, disbursement, financial reporting and other internal control framework
- (3) Technical capacity – ability to implement and monitor a project
- (4) Managerial and administrative capacity – ability to plan, coordinate, and monitor activities
- (5) Proposed approach to managing the fund and working with communities and district assemblies

^{[1][1]} The various consultations during the project preparation show a strong preference for this option. Indeed, the people consulted, including community representatives had pointed out several success stories in the successful use of this modality by NGOs working in the target areas.

This set of criteria is only indicative at this stage and more criteria may be added in consultation with target communities. UN agencies, including the UNDP in Ghana, have a set of tested tools and methodologies to carry out the micro-assessment of NGOs. MESTI will use these tools and methodologies with appropriate modifications. By virtue of its programmatic and budget oversight role (please refer to the Implementation Arrangement) under the National Implementation Modality, UNDP will vet the whole selection process to ensure competitiveness and transparency in the whole process.

The NGO grantees act as the custodian of the funds and administer grants directly to the beneficiaries according to a number of installments that will be defined during the project inception phase. There is robust capacity to implement this modality as local NGOs and local affiliates of international NGOs are already using this modality to implement livelihood projects in the northern regions of Ghana. NGOs are responsible for disbursement and financial reporting. Oversight over NGO activities will be done by MESTI, the Implementing Partner. Again by virtue of its programmatic and technical oversight role and consistent with its fiduciary responsibility to the donor, UNDP will ensure proper financial reporting and overall accountability in the whole process.

The process of channelling funds from Grantees NGOs to communities will be done as following:

- 1) Community-based organization or individuals will develop and tailor proposals for alternative income generating activities such as dry-season gardening, agricultural products processing schemes (shea butter or honey), etc... These proposals will be assessed and selected based on a set of criteria that will be developed by the MESTI and approved by the AF Program Steering Committee. Indeed, the AF project will create a National Steering Committee (NSC) comprised by MESTI, UNDP and other key institutions such as Ministry of Agriculture, NGOs, CSOs and CBOs. The selection criteria will include the climate change vulnerability of the proponent and other socio economic indicators such as below poverty line, high risk to food security. The NSC will be responsible for the review, selection and approval of proposals and for ensuring their technical and substantive quality, their resilience to climate change.
- 2) AF grants will be channelled from Grantees NGOs to community-based organizations, and individuals and the maximum grant amount per project will be US\$50,000. MESTI, along with the National Steering Committee, will lead this process and will provide financial oversight on Grantees NGOs allocation of the grants to the communities.
- 3) In addition, MESTI with the guidance of the Steering Committee will ensure that each community is assisted by qualified technical personnel from *government extension agencies, NGOs* and/or Community Based extension agent to ensure that all environmental, social and technical issues that may arise are squarely addressed. This will be important to guarantee that project activities are in full compliance with AF requirements, do not lead to maladaptation or other undesirable consequences, i.e. that activities aggravate inequality, cause negative environmental impacts or create dependency on technical solutions requiring resources and capacities beyond the reach of community participants. In its review of community proposals, the Steering Committee will determine the necessity of further design or development of specific risk mitigation measures to avoid maladaptive outcomes. On the Steering Committee UNDP will ensure that due diligence is observed.
- 4) The AF Project Coordinator will work closely with the communities to identify viable projects for funding, provide assistance in project design, monitor project implementation, lead participatory evaluation of the projects and help synthesize lessons learned and other knowledge for policy inputs.
- 5) The *National Steering Committee* will oversee the development of the portfolio of community-based projects, ensuring its alignment with AF requirements and that lessons learned are discussed and evaluated. Information collected from project M&E will be centralized in a database and shared with communities, organizations and government institutions for policy and program discussions.
- 6) The selection process will give priority to women individuals or women based organizations.

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 40 communities.

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.

In Ghana, ponds and woodlots may be established by either a community or an individual depending on the objective or the problem that they seek to address. Under the AF Programme, investments will be directed towards community-managed ponds/woodlots to ensure equity and to benefit as many people as possible. But experience from forestry projects in Ghana suggest that while traditionally community-managed interventions are fundamentally built on existing practices and customs; they may not necessarily support efforts in reducing deforestation, addressing other drivers of climate change and enhancing land use planning. The Programme will therefore develop community bylaws and customary rights in collaboration with the communities involved to govern the Programme interventions, including ponds and woodlots. These bylaws should exclude unsustainable practices and include climate change mitigation and adaptation measures as well as climate-smart agriculture mechanisms.

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: Fish farms are established and supported in 20 communities

Improving the availability of water in catchment and river systems allows for the establishment of fishery resources. The GoG will establish and support 20 community fish farms. Community consultation has revealed that some communities believe this to be an excellent source of alternative livelihood and, based on the community response during consultation, it considered that an allowance for 20 fish farms will

respond both to demand and the availability of suitable sites within the communities supported. Fish farms of the scale to be supported under this output could benefit upwards of 1000 people.

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 and field demonstration 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 be 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.

Output 3.5: Best practices for adaptation and lesson learned from the implemented actions and related policy processes are recorded and disseminated to all 38 districts in northern Ghana 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 have proven that bringing together community participants on a regular basis is an effective mechanism 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 those who cannot read and write, and those that communicate only in local languages, etc.

District-based and community-based agricultural extension agents will be engaged on an ongoing basis to deliver technical assistance to communities in relation to livelihood diversification activities through proven approaches, such as community training, regular visits, and field demonstration. Investing in the training of extension workers, as well as giving them the opportunity to acquire hands-on experience, will help build a pool of a new cadre of extension workers who are capable of appreciating and operationalizing livelihood adaptation to climate change. These new breed of extension workers will then be in a position to extend similar support to other communities that are not directly targeted under this programme. The modality of engaging agricultural extension service to deliver/support activities under this Programme is explained in more detail under the Implementation Arrangement section (p.72-74).

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. The share of agriculture to GDP has declined from 36.5% between 1993-2000 to about 35.3% between 2001-2010. But despite this decrease, agriculture remains

critical from the point of view of poverty reduction and job creation. Most of the agriculture practiced is on a subsistence basis with yields per hectare lower than the Sub-Saharan Africa average and is 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. The potential irrigable land is estimated at about 350,000 hectares, of which only 10,000 hectares are under irrigation at present.²⁷

²⁷Growth and Poverty Reduction Strategy (GPRS II) 2005

Programme benefits:

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 showcase in the Ghana where climate concerns are taken into account and lessons learned will be replicated to other river basins of the country that share similarity with the selected basins. There is already great interest among the CSOs currently running the Global Water Initiative (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 organizations 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 summarizes 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 4 Years)	Baseline
Social Benefits		
<p>a) Vulnerable Households</p> <p>b) Communities</p>	<ul style="list-style-type: none"> • Improved food production by about 40 % for over 3000 farmers (or 12,000households) in the northern regions • Improvement of child nutrition for about12,000 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 get more strategically involved, their role is identified and reinforced 	<p>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.</p> <p>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.</p> <p>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.</p>

c) Local Government Institutions and National Government		
Economic Benefits		
<p>a) Vulnerable Households</p> <p>b) Communities</p>	<ul style="list-style-type: none"> • 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 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 	<p>Highly depleted cereal production;</p> <p>Highly depleted forests and pastures</p> <p>Highly depleted fish population</p>

<p>c) Local Government Institutions and National Government</p>	<p>the programme area, with associated economic and environmental benefits.</p> <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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. • 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 	<p>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.</p> <p>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.</p> <p>Social conflict between different resources users such as between pastoralists and sedentary farmers will increase.</p> <p>Erosion and siltation of the water ways and channels</p> <p>Highly depleted fish population</p>

	<p>regeneration. Increase in crop plant coverage and density will also contribute on carbon sequestration from agricultural activities.</p> <ul style="list-style-type: none"> • 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 	
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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 to achieve 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 main principle of the programme is to develop practical climate change adaptation experiences and capacities to ensure that the water resources in the northern regions of Ghana and the dependent economic activities can be made climate resilient to the increase of the frequency and intensity of the droughts and other climate risks over the next 25-50 years.

The proposed programme is considered as a **key catalytic investment** to set the course of action in the right direction. There is high agreement by all national and regional scale analyses of vulnerability by various sources including government commissioned reports and independent scholarly research 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. Decreasing annual rainfall and increasingly erratic rainfall patterns, due to climate change, are adversely affecting rural livelihoods in northern Ghana especially agricultural and pastoral practices. Neglecting water resources and dependent livelihoods vulnerability and bringing ad hoc responses to site-specific problems will have dramatic impacts on the livelihoods of the northern region livelihoods. Agriculture is predominantly rain-fed with only 4 per cent of irrigation potential developed nationally. More than 80 percent of the population of northern Ghana depends on unimodal rain fed agriculture for their food, income and livelihoods. 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.) to satisfy their water needs. 82.3% of household directly depends on wood as a source of cooking fuel. Therefore, incidents of droughts and floods have devastating 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; an alarming situation that needs attention.

The proposed programme budget will support the acquisition of the best technical expertise to help implement, with the full involvement of water resources management and agricultural stakeholders, adaptation measures and supporting capacity development that will guide all future water resources management and agriculture adaptation in Ghana. All Government staff involvement in the programme will be an “in-kind” contribution of GoG. The budget will support the design and construction of infrastructure (boreholes, mini dams, dugouts, rainwater harvesting facilities) to improve the water supply and access in the context of climate changes for more than 30,000 people. The AF programme will also support the design and construction of small-scale irrigation infrastructures in 50 communities (to improve the productivity of agriculture and minimize the reliance on rain as the only means of irrigating crops, thereby extending growing seasons, the range of crops that can be grown and the opportunities for the diversification of livelihoods. Additionally, the programme will support the enhancement of the diversification of livelihoods away from climate-sensitive practices such as rainfed agricultural production, into other activities that improve their resilience to climate risks for 50 communities in northern Ghana. The programme budget will also support development of the enabling environment for addressing the climate risks for the water resources and the depending economic activities Climate projections generation for the White Volta, Black Volta and Oti basins; ii) integration of climate changes in the existing water course management plans and development of new climate resilient water courses management plans; iii) Regional Climate Change Adaptation Monitoring Committee established in the three target regions; iv) district level community water supply and management plans developed to incorporate climate change-related risks. Furthermore, the budget will support the dissemination and management of lessons learned from the programme, so that all Ghanaians acquire a better understanding of climate change issues in the northern regions and guidance on what practical solutions will suit each specific area. This three-pillar approach (implementation of water supply improvement measures; development of the enabling environment and diversification of livelihoods option) is essential to the full replication of the adaptation measures at all vulnerable sites in Ghana in the future. Not addressing any one of the pillars would reduce the effectiveness of the whole programme investment. **The programme structure, with approximately 94% on technical solutions and 6% on enabling environment is believed to be the most effective and balanced way of realigning and initiating the climate change adaptation process in the three northern regions of Ghana, with a priority given to actual interventions that reduce communities and economic activities vulnerability in this part of the country.**

For the development of the enabling environment (generation of climate forecast, integration of climate risk planning into the water management planning of the White Volta and five of its sub-basins, the Black Volta and the Oti basin, and the set up of regional climate change adaptation committee,) and information dissemination and management, there are no reasonable alternatives to the approaches suggested in the programme, as the programme is designed to address all Government instruments that will contribute to address the full range of stakeholders involved in water resources and agriculture management in the northern regions of Ghana. 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, unsustainable water use by farming and grazing that currently characterize the water catchments. This is critical in safeguarding sustainability of community livelihoods and economic development activities of the Basin in the face of climate change. Investing 6% of the project resources (e.g. \$470,900+346,650+56,775) constitutes a cost-effective investment considering the economic role of this region. Indeed, the basin in Ghana has produced in 2000, 78% of the total national output of yams, 31% of cassava, 40% of maize, and 69% of rice. Additionally, data show that animal husbandry in the Upper-East, Upper-West, Northern and Volta, which fall exclusively in the Volta basin in Ghana, accounted in 2000 for 83.5%, 57.7%, 64.1%, and 68.8% of cattle, sheep, goats, and pigs, respectively. Thus, the AF programme is aiming to safeguard this potential in the context of climate change. And the cost effectiveness of this investment is strengthened by the enormous economic potential of the region. Total agricultural land is 6.1 million hectares of which

cultivated land area between 2001 and 2007 was 1.54 million hectares. Northern Ghana has a wealth of under-utilized resources to support an intensified agriculture modernization programme. These include a network of river basins with highly fertile valleys. These areas can become major agricultural production zones for different crops.²⁸With 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. Seedling cultivation for reforestation efforts presents another potential area for livelihood diversification.

For the improvement of the water supply and management, cost-effectiveness has also guided the selection of the options retained in this programme. During the proposal development, several potential options to improve the water management, supply and access in the context of droughts, heat stress intensity and frequency and other climate risks have been considered.

With an investment of \$2,000,000, the Programme will support the building of 100 operational boreholes, and dugouts, mini-dams benefitting at least 30,000 people (50% of whom should be women and 3,000 of whom should be farmers) and rainwater harvesting systems in place, providing water supplies to 50 community facilities, the implementation of measures for water conservation under climate impacts e.g. catchment/river bank re-afforestation schemes implemented in 25 communities. If we consider that this investment will help to satisfy the water needs for the agricultural exploitation of over 3,000 farms, 40 community tree nurseries and wood lots, 50 dry season gardening farms for 1000 women with each an average farm of 2.7 ha, this will lead to a cost per ha of \$240. In comparison, the considered alternatives will lead to the following costs: the external catchments using contour ridging (\$52 to \$202/ha); permeable rock dams (\$250 to 325 /ha);flood harvesting using bunds (\$100/ha);rock and roof catchment systems (\$67 /m³).²⁹If we integrate the fact that these investments will also allow the 30,000 beneficiaries to satisfy their domestic water needs estimating by the UN to 50 liter/day/person³⁰, we can see that these investments are more cost effective than the alternatives. Then with a cost of \$147 /ha, this investment will contribute to improve the food production by about 40% for over 3000 farmers (or 12,000 households), the improvement of child nutrition for about 12,000 households, increase in productivity (yield/ha) of production systems following improvement in the effectiveness and efficiency of resource-utilization and the stabilization of food supply through increased and regular flow of water for food production.

The cost-effectiveness analysis of these options will be improved as more data become available during project implementation before the building of these technologies. Indeed, the term “cost-effective” for technologies improving water access and management, in the context of climate changes, means optimum value for money invested over the long term. Water augmentation options are meant to function for a lifespan of 20 to 50 years or more. Thus, the lowest cost of m³ of water is not always the most cost-effective, particularly if construction quality is compromised to save money. Cheap drilling or poor construction quality can lead to premature failure of the well or contamination of the water supply. Water augmentation infrastructures that are subsequently abandoned by the users after few years of operation are clearly not cost-effective. Cost-effectiveness of such technologies entails the distance between the home and the source, the protection of the source from pollutions and contamination, the cost of the

²⁸SADA Strategy and Workplan 2010-2030. Savannah Accelerated Development Authority. 2010.

²⁹This figures have been drawn from the following document: UNEP/DTIE: Sourcebook of Alternative Technologies for Freshwater Augmentation in Africa: <http://www.unep.or.jp/ietc/publications/techpublications/techpub-8a/index.asp#1>

³⁰The Institute Water for Africa : <http://www.water-for-africa.org/en/water-consumption.html>.

maintenance of the infrastructures and all these costs are difficult to apprehend without an evaluation of all the option and the environment in which they will be build and they will operate. Thus, the costs effectiveness of the options will be guaranteed during the Programme implementation by ensuring that the building of the freshwater augmentation infrastructures will take in account the expectations and principles of cost-effectiveness to allow an economical and sustainable access to safe water. For example, the Rural Water Supply Network (RWSN) has developed guidelines and codes of practice³¹, which provide a basis for the realization of economical and sustainable access to fresh waters integrating all these criteria spelled out above. The project implementation will furthermore make profit of the study assessment of the borehole drilling sector in Ghana that was undertaken by the RWSN in 2010.

Concerning the small scale irrigation systems, the alternatives that have been considered are the medium and large scale irrigation systems. The cost-effectiveness of the large and medium scale irrigation systems is limited by the (i) the small size of farms in the targeted areas that constrains their development or undermines their viability (this is linked to population growth and family break-ups, compared to the limited pace of irrigation land development; (ii) the limited availability of water to fulfill the requirements of large development Programme that could ensure their economic profitability, and (iii) the need of a organization with the required institutional and managerial capacity.

The AF programme will invest \$1,050,000 with the objective of satisfying the irrigation needs for the exploitation of up to 3,000 farms, 40 community tree nurseries and wood lots, 50 dry season gardening farms for 1000 women with each an average land of 2.7 ha. This will represent a total of 8,343 ha for a cost of \$125.8/ha. The alternatives of the irrigations technologies considered by the AF programme are the large and medium scale run-off-river diversion and gravity-fed systems, river pumping-based and gravity-fed systems, lake pumping-based sprinkler irrigation systems, river pumping-based sprinkler irrigation systems, that are widely used in the northern regions of Ghana. The costs of medium-scale irrigation systems in Northern Ghana (Ashaiman, Afife, Ve, Aveyima and Weija) has been evaluated between \$5,000 and \$14,000/ha.³² According to a report made by the AfDB, the investment costs of large scale irrigation system are ranging from \$1,000 to \$10,000 per hectare. Even if these figures include the costs of the infrastructures to divert and pump the water from the river and lake and some other facilities, it appears clearly that the option selected by the programme are more cost-effective. Furthermore, the costs of the operation of small-scale irrigation systems are cheaper than large or medium-scale schemes. According to Ofusu (2011)³³, farmers irrigating from the large scale scheme are charged US\$56/ha for irrigating a tomato crop, US\$42/ha for rice and US\$28/ha for vegetables while at some small reservoirs water is charged per bed (US\$0.2/bed size of 1m x50m), at others farmers are charged per plot (US\$1/plot area of 0.05 ha), and the rest are charged a general fee irrespective of farm size cultivated (US\$2/farmer/season). These water levies are used for the maintenance of canals and organizational activities and are reviewed upwards almost every year by the Water User Associations (WUAs). Another criterion that plays in favor of the cost effectiveness of the small-scale irrigation systems is in the fact that it is managed and controlled by farmers who are the users. There is general agreement that the success of small-scale systems is also due to the fact that they are self-managed and dedicated to the felt needs of local communities.

³¹These guidelines and codes of practices among which certain are the culmination of desk and field works in several countries financed by UNICEF, USAID and other international organizations have been officially endorsed by the German Federal Institute for Geosciences and Natural Resources (BGR). They are available at the address: <http://www.rwsn.ch/documentation>

³²International Food Policy Research Institute (IFPRI) /Ghana Strategy Support Program (GSSP): Irrigation Development in Ghana: Past experiences, emerging opportunities, and future directions. GSSP Working Paper No. 0027. March 2011

³³Eric ANTWI OFOSU (2011): Sustainable Irrigation Development in the White Volta sub-basin. Thesis Dissertation. UNESCO-IHE Institute for Water Education

A study made by Ofusu (2011) has found that the average profits for the 2007/2008 irrigation season were for small reservoirs US\$420/farmer, permanent shallow wells US\$225/farmer, large reservoir irrigation US\$470/farmer, riverine water US\$1,050/farmer, temporal shallow wells US\$420/farmer and riverine alluvial dugouts US\$620/farmer for farms sizes ranging from 0.005 to 1 ha. In considering an average size farm of 0,5 ha, the average profit margins has varied during from 450 / ha to 2100 /ha. In considering the lowest profit of US\$225/farmer for the permanent shallow wells and under the hypothesis of right use of appropriate inputs, the AF Programme investment of \$1,191,650 will generate a profit of \$3,037,500. In the same study, Osufu (2011) has concluded that the large reservoir irrigation farmer in the Northern Region of Ghana has the lowest profit margin amongst all the irrigation technologies. The temporal and permanent shallow wells have the highest profit margins making the two technologies the most economically viable irrigation technologies. Interestingly, despite the relatively large farm plots of the large reservoir irrigation scheme, the profit made per farmer is almost equal to that of the temporal shallow well farmers. Thus unless the productivity of the large irrigation scheme is improved the users are not better off than those using more expensive technologies on comparatively smaller plots.

Furthermore, the cost effectiveness of small-scale irrigation systems will be improved during the project implementation. The implementing agency will review the small-scale irrigation techniques already being used and known to work well in northern Ghana 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.

Concerning the livelihoods alternatives interventions, an investment of US\$2,693,636 will allow to establish 20 community fish farms, benefitting at least 10,000 people (50% of whom should be women), 40 community tree nurseries and wood lots, incorporating bee keeping, 50 dry season gardening schemes for women established, directly benefitting at least 1,000 women, 40 community level women led agricultural product (shea butter or honey) processing schemes established, directly benefitting at least 1,200 women and their families. This investment compared to the 12,000 direct beneficiaries will lead to an investment cost of US\$224 per direct beneficiary. With such investment, this programme will contribute to the increasing of job opportunities and the increase in income in 12,000 households through increased agricultural productivity (vegetable growing), and commercialization of woody and non woody products (honey, shea butter) and fish and other freshwater foods. The alternative to the proposed approach is to do nothing, in which case the 12,000 beneficiaries and their families will see their livelihoods deteriorated.

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. Additionally, the project will have direct environmental benefits (better conservation of natural resources and environmental services) as described in the section related to the project benefits. This will contribute to strengthen the cost-effectiveness of the project interventions.

Furthermore, the cost-effectiveness of the Programme will be reflected at the operational level through the following approaches:

- Throughout the Programme, AF resources will be aligned with the financing and delivery of programme outputs that have competitive procurement components to ensure best value for money. In this regard, the programme will apply best practices identified by other, ongoing climate change

adaptation projects in the country and the Volta transboundary region (Ghana, Togo, Mali, Burkina Faso, Benin, and Ivory Coast). UNDP procurement procedures will be followed.

- This Programme will utilize existing government structures and processes for implementation. By building on existing government and institutional structures, the Programme will also harness in-kind support and contributions from offices at the national, provincial, district and local levels (office space, staff time, communications, etc.)
- Through the existing network of stakeholders, the results framework of the Programme, will be able to utilize existing baseline surveys of line agencies and harness existing delivery mechanisms such as the UNDP/GEF Ghana Small Grants Programme, if applicable. This will further expand the reach and replicability of outputs.
- The bulk of the Programme's funds will be directed to community-level activities and hence brings opportunities for local procurement of goods and services with it.

Table 2. Cost effectiveness of the proposed measures

Objective	Project Cost (US\$)	Number of Beneficiaries	Losses Averted/ Benefits Generated	Alternatives to Project Approach and Cost (US\$)
Water supply (Hand pump boreholes, mini dams and dugouts, rainwater harvest)	2,341,650	Up to 30,000	100 operational boreholes, benefitting at least 30,000 people (50% of whom should be women) and Rainwater harvesting systems in place, providing water supplies to 50 community facilities. We consider that this investment will help to satisfy the water needs for the exploitation of the agricultural land of 3,000 farms, 40 community tree nurseries and wood lots, 50 dry season gardening farms for 1000 women with an average land of 2.7 ha each. This will lead to a total of 8,343ha for a cost of \$280 /ha. If we integrate the fact that these investments will also allow the 30,000 beneficiaries to satisfy their domestic water needs estimating by the UN to 50 Liter /day / person, we can see that these investments are more cost effective than the considered alternatives.	The other alternatives considered for improving water access in the context of climate change are the external catchments using contour ridging (\$52 to \$202/ha), permeable rock dams,(\$250 to 325 /ha) Flood harvesting using bunds (\$100/ha), rock and roof catchment systems,(\$67 /m3),
Small scale irrigation systems	1,191,650	5,000	We consider that this investment will help to satisfy the irrigation needs for the exploitation of up to 3,000 farms, 40 community tree nurseries and wood lots, 50 dry season gardening farms for 1000 women with each an average land of 2.7 ha. This will represent a total of 6,750 ha for a cost of 8,343 ha \$142.8/ha.	The alternative of the small-scale system are the medium and large scale systems. Medium scale Irrigation schemes in the Northern region of Ghana cost between \$5,000 and \$14,000/ha. The average large scale irrigation scheme in Africa ranges from \$1,000 to \$10,000. Even if these figures include the cost of infrastructures to divert and pump the water from the

Objective	Project Cost (US\$)	Number of Beneficiaries	Losses Averted/ Benefits Generated	Alternatives to Project Approach and Cost (US\$)
				river and lake and some other facilities, it appears clearly that the small scale scheme option retained by the AF programme is more cost effective.
Livelihood alternatives Interventions	2,524,750	12,000	<p>An investment of US\$2,524,750 for the benefit of 12,000 people will lead to an investment of US\$210 per beneficiary.</p> <p>This will have the following benefits:</p> <ul style="list-style-type: none"> -20 community fish farms established, benefitting at least 10,000 people (50% of whom should be women) -40 community tree nurseries and wood lots, incorporating bee keeping, established -50 dry season gardening schemes for women established, directly benefitting at least 1,000 women -40 community level women led agricultural product (shea butter or honey) processing schemes established, directly benefitting at least 1,200 women 	The alternative to the proposed approach is to do nothing, in which case the 12,000 beneficiaries and their families will see their livelihoods deteriorated.

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 programmes 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 enable the GoG to 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 GoG programme, with AF support, is directly contributing to the realization of the GSGDA and targeting the most vulnerable region highlighted in all national documents.

The proposed Programme also supports regional strategies. The programme is aligned to the strategies of the Savannah Development Authority³² (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's 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 realization 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 priorities, which have been provided in Table 5 below.

Table 5. National Priorities for Climate Change Adaptation in Ghana

No.	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 Programme directly contributes to the realization of numbers 2, 6 and to some extent number 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 that do not have the significant environmental impacts associated with large infrastructure development. 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 Water Resources Commission (WRC), such as borehole construction. Where applicable, the local regulations will be also 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 WRC 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, Technology and Innovation (MESTI), 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.

The activities implemented by the GoG under the AF programme will not 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 (e.g. construction of boreholes) to be implemented are covered by the Regulations depending on their scale.

Consultations with experts and community representatives did not raise any concerns with respect to the programme's potential environmental and social impacts that require changes in the design of the project. But while a formal EIA will not be required and necessary for the proposed interventions, a project-specific environmental and social screening tool will be developed based on UNDP's project-level environmental and social screening procedure, which is now a part of UNDP's Programme Operations and Policy Procedure in order to put in place a redundant system for screening potential impacts and mechanisms for addressing them. Potential impacts will be managed through an Environmental and Social Management Plan, which will identify necessary mitigation measures in close consultation with communities. The implementation will be monitored in a participatory way as part of the Programme's M&E.

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 centers 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.

In Ghana there is no omnibus land tenure arrangement that cuts across the country and communities. The criteria to use in selecting land for community woodlots or fishponds will therefore depend on the land tenure system in the target community, i.e. whether it is a stool land, family land or individual land. Before setting aside land for project interventions (e.g. fish farm, wood lot, the Programme will consider all factors including but not limited to:

- Clarifying type of ownership/stewardship
- Cost-benefit analysis
- Benefit Sharing Agreement (BSA) between the project and the stewards/owners of the land. The BSA is an important tool used to pre-empt payment of compensation or loss of ownership due to project interventions.

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

To align with 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 MESTI 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.

There are two projects with the most direct link to the proposed AF programme, namely the recently-completed “Climate Change Adaptation through Integrated Water Resources Management (IWRM) in the three Northern Regions of Ghana” which was funded by the Danish International Development Agency (DANIDA) and implemented by Ghana’s WRC and the Global Water Initiative (GWI). GWI is being implemented by a consortium of NGOs (Catholic Relief Service and CARE). The proposed programme has been developed in close consultation with the WRC and the NGOs implementing the GWI. Their inputs and suggestions have been incorporated in designing the interventions as follows:

- The proposed programme design takes forward the lessons learned from the WRC project, particularly with respect to selecting proven adaptation measures in Ghana’s northern regions. The benefit of pursuing a diverse set of water management strategies for adaptation - water conservation, water harvesting, and storage – within one intervention package has been proven by the WRC project and is the crux of this proposal. In addition, the WRC project demonstrates the importance of strengthening existing adaptation strategies, notably dry season farming, as an effective way of enabling communities to buffer themselves from climate risks. The development of training modules under this project will build on the WRC (2011) primer, “Climate Change Adaptation: A Primer for Water Conservation, Flood Risk Reduction and Irrigation Strategy for Northern Ghana.” The interventions related to water resources management, conservation, and storage proposed by this programme are those that were tested and recommended as a result of the DANIDA-funded project.
- The proposed project incorporates the lessons learned from the GWI project, particularly with respect to the suitability of specific technologies in northern regions and the importance of

designing multi-purpose water systems over single planning use planning and design approach.³⁴ The project also demonstrated the importance of developing sub-basin water management plans. The NGOs implementing the project found out that boreholes work really well in satisfying the multiple water needs of communities. Using solar power to pump out water was proven effective in communities with no electricity.

MESTI and EPA colleagues who were directly involved in implementing the Africa Adaptation Programme (AAP) in Ghana are also involved in developing this proposal with UNDP support. The AAP experience demonstrated clearly that livelihood adaptation cannot be done in isolation but be approached in a comprehensive way. For example, AAP support to planting mango trees in a drought-prone district in the northern region had a solid business case but was not very successful. From this experience, it was realized that that support to livelihood activities that depend on water should also provide complementary support to ensure access to adequate and continuous water supply. Hence the design of the Programme features a very strong coupling between livelihood diversification and water resources management interventions.

Moreover, from AAP implementation experience, it was realized that the best modality of working with the districts is through an MOA between the Implementing Partner (at the national level) and the District Assembly with clear milestones that are associated with funds transfer. This arrangement is superior to the conventional way of transferring project money (i.e. through grants) because it fosters ownership by making the District Assembly an equal partner in the Programme and jointly accountable to the quality of the programme outputs. It also increases the likelihood that the Programme will be mainstreamed into the district's own work plan and budget (rather than an additional work burden) because mainstreaming can be made a requirement for disbursement as a trigger.

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 may 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	\$2.6 Million GEF/Special Climate Change	IFAD, MOFA, EPA	Project Preparation Grant Phase as of November	No results available from this project as yet. However, IFAD will be consulted during the AF Programme inception phase.

³⁴ GWI (June 2012). Case Study on 3 Multiple Water Use Projects under GWI-Ghana Project

Agriculture	Fund		2011	
4. Sustainable energy and water supply for the University of Accra	€ 1,356,425 German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (International Climate Initiative)	Valley View University	2008-2009	Techniques for storing rainwater storage and choosing vegetation that is appropriate for new climate conditions have been considered when identifying the 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 addition AAP has supported a number of district assembly led CCA projects, including one in West Mamprusi and one in Sissala East. The lessons learnt from these projects have informed the overall design of the proposal, particularly the importance of coupling of livelihood and water resources management interventions.
6. Climate Change Adaptation and Development Initiative (CC-DARE)	Ministry of Foreign Affairs – Denmark	UNDP, UNEP, MESTI	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 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 lessons learnt and 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	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

approach				AF programme will take place, so that they inform one another. In addition representatives from the UNU have undertaken research into comparative vulnerability of districts in northern Ghana and this research has been used to inform district selection.
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, including the development of the three components and specific interventions. CARE International has 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; 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) and approaches that have proved successful in regularly bringing communities together to share information and experiences.
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 following this successful model, 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. Community vulnerability information obtained in developing the Joint Programme has been used in development of this AF proposal.
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.
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 benefit under the AF project.
16. Promoting of Appliance Energy Efficiency and Transformation of the Refrigerating Appliances Market in Ghana. (Under West Africa Energy Programme: 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 (GEF 4)	Ministry of Roads, IBDRD/World Bank	2007-2008	Indirect link

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, Components 2 and 3 include dedicated outputs relating to the documentation and dissemination of knowledge generated by the programme. Lessons learnt will be disseminated in particular to GoG institutions, to ensure that the GoG takes full advantage of AF funding and is able to replicate its successes on a wider basis after completion of the programme. The knowledge management approach will be 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.

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 knowledge management materials on climate change resilient water management and livelihood diversification activities. Existing awareness materials on IWRM will be adopted. Key findings 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 of Environment Science and Technology (MESTI) coordinated consultation with all major stakeholders during the Programme conceptualization and design phase as part of its mandates and as the key governmental counterpart 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 log frame (outcomes, outputs, activities, indicators etc.) of the programme. Given the fact that Ghana has completed a national climate change adaptation strategy, it was necessary to first approach the key stakeholders individually prior at the conceptualization stage of the proposal. The following stakeholders were consulted in July, August and September 2011:

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

The draft proposal was then presented to a wide range of stakeholders (national/regional and district scales and from the government and civil society sectors) at a national workshop in November 2011 and their inputs to comprehensive log frame and activities were used to further develop the Programme design and the elaboration of the Programme Document (attendance list of meeting in Annex 7). The following organizations/agencies were represented:

- Ministry of Environment, Science, Technology and Innovation (MESTI)
- 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 organizations responsible for 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. Attendance lists of meetings are provided in Annex 7. A rapid local climate change adaptation capacity assessment was also undertaken during the

mission to assess the existing capacity in the regions. This mission was targeted to ensure consultation was undertaken with organizations 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 organizations 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 in 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 in building water infrastructures in communities.

In March 2012 MESTI and the EPA convened a consultation meeting with community representatives from the three northern regions. Two community representatives each from a total of 15 districts. The community representatives were given the opportunity to comment on the proposed programme, and to provide detailed feedback in particular on the range of water management and livelihood diversification activities that should be supported using the AF resources. A detailed report of the consultation meeting is provided in Annex 6. The key points discussed during the meeting were as follows:

- Participants endorsed the proposal in general.
- An emphasis on livelihoods was lauded by participants, who identified a strong link between an inability to manage climate impacts on livelihoods and environmental degradation.
- Communities emphasized the need to pay particular attention to gender roles.
- Processing activities for women were recommended by participants, and this livelihood activity was consequently specifically included in this proposal.

- Planting of cash-crop trees was recommended by participants, and this livelihood activity was consequently specifically included in this proposal.
- Participants identified the importance of linking dry-season gardening to a source of water.
- Participants were presented with a range of water management and livelihood options. Those which were particularly positively supported by participants (boreholes, dugouts, rainwater harvesting, fish farms, wood lots, dry-season gardening, bee-keeping and product processing) were consequently included within this proposal. Neither bee-keeping nor product processing had been included within previous drafts of this proposal as specific livelihood activities to be supported, and as such the community consultation strongly influenced Component 3 in particular.
- Participants were asked to identify factors that should be used in selection of programme target areas. A large range of factors were identified, but in particular the extent of vulnerability to flooding and drought was emphasized. These two factors were consequently used as the key factors in identifying target districts for the programme.
- With respect to implementation arrangements, the participants stressed the importance of identifying governance structures and systems in a specific target community. It has been pointed out that in some communities development interventions in the past have created associations and committees to complement the district statutory bodies (e.g. environment management committees, water user associations). The participants upheld the important role of EPA as MESTI's embodiment in the region, recommended that the management structure of the project at the local level should consider the existing community structures, but at the same time recognize that in some communities, the existing structures may not be necessarily the most supportive structure for delivering adaptation. The management structure at the community level could vary from one community to another.

Since the community consultation meeting, this proposal has been developed in considerably greater detail and it is the results of the community consultation which have been the most important elements in guiding this detailed proposal development.

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 springs, unsustainable use of groundwater causing increased water stress and scarcity of potable water. While many development projects conducted by NGOs, INGOs 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 and have not effectively linked basin level management planning to community level interventions, resulting in a piecemeal and uncoordinated response. As a result there has not been optimization in harnessing the investment so far.

Currently an Integrated Water Management Plan is in existence for the White Volta, with its development led by WRC. However, the development of this plan did not take account of the impacts of climate change on water resources, nor did it establish mechanisms and processes to tier management planning

from the basin to the community level. In addition, the White Volta Plan has not been operationalised to date, meaning that management of water resources within this basin continues to be uncoordinated. The situation in the Black Volta and Oti basins is even less well developed with respect to water resource management planning, in that management plans have not been developed for these basins. To date climate projections, at a useable downscaled level, have not been produced for any of these three basins, which means that any efforts to address climate change impacts in water resource management planning would be unable to be founded on a robust understanding of what these impacts would be. Capacity within Ghana to understand the impacts of climate change is currently limited, as is capacity to undertake effective and utilizable water resource management planning.

Additionality (with AF resources)

With the AF resources, the GoG will integrate the underlying principles of integrated water resource management with a robust understanding of projected impacts of climate change, to produce effective management plans for the White Volta, Black Volta and Oti basins. The plans will be developed via a collaborative and participative process, with key stakeholder organizations, particularly within GoG, playing a key role in the development process. This will ensure that the plan making processes obtains the necessary level of GoG ownership, and importantly will result in a significant increase in capacity in relation to understanding the impact of climate change on water resources and in water resource management planning. The GoG will ensure that AF resources are focused on the development of management plans which can be effectively implemented, taking account of resource availability, and also which can be readily used to inform management planning and implementation at the community level, thereby contributing significantly to Component 2. AF resources, in the form of technical expertise, will assist the GoG in implementing the management plans, thereby providing an important kick-start to this implementation process.

Transboundary cooperation is both necessary and beneficial in adapting to climate change. Following the shared nature of the White Volta, Black Volta and Oti basins, using the AF resources, the GoG will follow an approach whereby 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.

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 AF 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.

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

Baseline (without AF Resources)

Currently, community involvement in the planning management activities, particularly by women, is very limited which exacerbates their vulnerability to climate change impacts. 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 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.

Communities in northern Ghana currently face significant constraints in implementing water management measures that build resilience to climate change impacts. There is insufficient capacity, within communities themselves and within the GoG to support communities, to identify appropriate measures and implement and maintain these. Even where infrastructure is in place, such as dugouts, lack of resources and effective community organizations, result in insufficient maintenance. In the case of dugouts, many community level dugouts are silted up in northern Ghana. In addition, lack of resources within the GoG and communities prevents the implementation of measures, including installation of infrastructure.

Additionality (with AF resources)

Using AF resources, the GoG will implement extensive training of GoG institutions, particularly district assemblies, enabling long-term support to be provided to communities in the planning and implementation of climate resilient water management measures. This will be an essential element, both in implementing the proposed AF programme, but also wider support to communities across Ghana.

50 communities, across 10 districts in northern Ghana, will initially be supported in the development of community level water management plans. Essential to this process will be the establishment of appropriate community level institutions, with a target of at least 50% representation by women in these institutions. The GoG will convene regular meetings of representatives from these 50 communities, enabling sharing of experiences and assisting in maintaining momentum in implementation of the community level plans, which will enable long-term adaptive management of water resources within these communities.

Crucially, using resources from the AF, the GoG will implement an extensive programme of water management infrastructure in the 50 communities. This will primarily comprise boreholes, dugouts/dams, rainwater harvesting, small-scale irrigation and catchment re-afforestation. These measures will provide communities with the capacity to manage their water resources at a community level, greatly assisting in their ability to adapt to climate change impacts, including increasing prevalence of droughts and flooding. Mechanisms will be developed via community level institutions to ensure continued maintenance and management of these measures beyond the lifetime of the proposed AF programme.

Lessons learnt from the development and operationalisation of community level water management plans will be documented and disseminated to key stakeholders across all 38 districts in northern Ghana. This will establish a situation whereby the GoG has the necessary capacity to support community led climate resilient water management activities across all of northern Ghana.

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

Baseline (without AF Resources)

Currently, rural communities in northern Ghana are largely reliant on unimodal rainfed agriculture as a source of livelihood. This is already vulnerable to drought and flood events, both of which are predicted to become more prevalent with climate change. Communities do have the capacity to diversify their livelihood base, due to limited capacity within the GoG support networks, limited capacity within communities themselves and limited resources available to implement diversification activities.

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 increases in precipitation could contribute to increase yields, this often results in 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.³⁵ 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)

Using AF resources, the GoG will implement extensive training of GoG institutions, particularly extension officers, enabling long-term support to be provided to communities in the planning and implementation of climate resilient livelihood diversification. As with training under Component 2 relating to water resource management, this will be an essential element, both in implementing the proposed AF programme, but also in providing wider GoG support to communities across Ghana.

50 communities, across 10 districts in northern Ghana, will benefit from training in issues such as business skills and marketing. These skills are essential and will result in communities that are better able to maximize opportunities that all livelihood activities present, increasing their resilience to climate change impacts on the traditional livelihood activity of rain fed agriculture.

Using resources from the AF the GoG will implement an extensive programme of livelihood diversification activities in the 50 communities. This will primarily comprise dry season gardening for women, community based fish farms, community based woodlots/tree nurseries and agricultural product processing facilities. The measures will considerably diversify livelihoods, moving communities away from a reliance on one prime source of climate vulnerable livelihood. Importantly, the livelihood activities supported by the GoG will build on the water management support provided under Component 2, thereby offering an integrated programme of response.

Lessons learnt from the development and operationalisation of community level water management plans, and will be disseminated to key stakeholders across all 38 districts in northern Ghana. This will establish a situation whereby the GoG has the necessary capacity to support community led livelihood diversification activities across all of northern Ghana.

I. Describe how the sustainability of the project/programme outcomes has been taken into account when designing the project.

³⁵UNFCCC 2011. Water and climate change impacts and adaptation strategies

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.

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

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

Financial sustainability: This programme will channel support to communities with a focus on assisting community economic groups (e.g. management committee for fish farms, management committee for woodlots) or water user groups become independent and self-sustaining. In the context of the programme, this would mean that the groups would continue to operate beyond the period of programme grant.

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 MESTI 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).

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, demonstrating the feasibility of this technology. As demonstrated by existing water facilities powered by solar energy, the solar panels will be also useful in providing security lights in the water facility. The sustainability of a solar-powered system is dependent on the existence of technical and financial capacity of the community to maintain the system. Some communities in the northern regions have solar engineers who were trained (in India) to do repair and maintenance. Funds for repair and maintenance come from farmers who register and participate in the dry season gardening using the solar pump irrigation system. The user fees are kept in

the bank. However, the GoG recognizes the fact that not all target communities would be in a position to immediately acquire the technical and financial resources to maintain solar-powered systems. Hence, under this Programme, an appraisal will be carried out first to determine the readiness of the community to maintain such system. Solar-powered systems will be installed only in community where its suitability and sustainability is proven. Otherwise, alternative options will be considered.

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.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project / programme implementation.

The management arrangement of this programme has been designed to facilitate extensive linkages at all levels – from national-level policymaking bodies to district-level operations down to the communities. In designing the implementation arrangement, the following key considerations were taken into account: 1) consistency with GoG governance structures and mandates of various agencies in order to foster mainstreaming and ownership; 2) accountability and transparency in fund flows to ensure cost-effectiveness; and 3) disbursement of funds in a timely manner to ensure programme delivery within the stipulated timeframe; and 4) mainstreaming and sustainability.

The Project will be implemented using UNDP’s National Implementation Modality (NIM), with The Ministry of Environment, Science, Technology and Innovation (MESTI) serving as the designated national executing agency (“Implementing Partner” or IP under the NIM) of the programme. MESTI will have the technical and administrative responsibility for achieving the expected outcomes/outputs as defined in this programme document. MESTI 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.

The Environmental Protection Agency (EPA) will serve as the primary “Responsible Party” (RP) that will act on behalf of MESTI to coordinate the project at the local level. EPA is in a good position to do this because it has offices at the regional level. The delivery of project at the community level will follow the channels of the current governance structure in Ghana. The implementation of community-level activities will be the responsibility of the District Assemblies through the appropriate decentralized agencies, primarily the Community Water and Sanitation Department, District Agriculture Development Unit, and Forestry Services Division, depending on the nature of the activity. All activities which are envisioned in this programme to be performed by the District Assemblies in connection with water resources management (e.g. supervision of community water infrastructure projects, selection of private contractors) are well within their mandate. Consistent with its mandate, the District Assemblies will be also responsible for coordinating the various decentralized agencies in connection with the implementation of the AF-funded programme.

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 support of achieving programme outcomes are outlined in Annex 1. UNDP's services will be provided by staff in the UNDP Country Office in Ghana, UNDP Africa Regional Centre in Pretoria as well as UNDP Headquarters (New York). The implementation arrangement recognizes the separation between implementing and execution services. UNDP complies with the decision of the 18th meeting of the AF Board as stipulated in paragraph 88 of the 18th Adaptation Fund Board Meeting.

Programme Steering Committee

The Programme Steering Committee (PSC) consists of high-level representatives from UNDP, MESTI, EPA, and key stakeholders from government agencies, civil society organizations, and other development partners. It will be chaired by MESTI and co-chaired by UNDP. In addition, the membership of the PSC includes the parent ministries of the decentralized agencies that will be involved in delivering the project outputs at the community level: Water Resources Commission, Community and Water Sanitation Agency, and Ministry of Food and Agriculture, and others.

Programme Executive Board

A Programme Executive Board (PEB), 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 the proposal is approved. The PEB will consist of designated senior-level representatives of agencies with direct stakes in the implementation of the programme (e.g. MESTI, EPA, UNDP, WRC, and Ministry of Local Government and Development). A complete list of PEB members and their designated alternates will be provided in the inception report.

National Programme Management and Coordination Unit

MESTI will appoint a National Programme Director (NPD), who will be designated over the course of the programme inception phase. The costs of the NPD will be borne by the Government of the Ghana as in-kind contribution to the programme. As a way of ensuring the integration of the AF programme into Ministry structure, the NPD will be senior government official (e.g. Chief Director or Director Level) nominated by the government. The following staff will support the NPD:

National Programme Manager/Coordinator (NPM/C): He/she will be a dedicated professional designated for the duration of the programme. The NPM/C'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.

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

Local implementation and coordination

The District Assemblies (DAs) in the target districts will be responsible for the delivery of project outputs at the community level through the relevant decentralized agencies, namely the Community Water and

Sanitation Department, District Agriculture Development Unit, Forestry Services Division of the Forestry Commission, and others. In order to execute the activities and transfer the resources required in carrying them out, MESTI and EPA will sign a Memorandum of Agreement with the District Assemblies in line with the established practice of the GoG in implementing projects at the community level. Based on insights from implementing UNDP/EPA/MESTI projects, such as the Africa Adaptation Programme (AAP) and Mainstreaming of Drylands Issues into District Medium-Term Development Plan, this arrangement is proven to foster stronger district ownership of the initiative, ensures accountability to the programme goals, unleashes local creativity, and mobilizes local counterpart for programme implementation. It also ensures that the project is mainstreamed within district work plans, rather than seen as an additional responsibility that does not align with their district development plans.

In Ghana, the decentralized agencies report both to the District Assemblies and parent ministries at the national level. Under the AF programme, the decentralized agencies will be coordinated by the District Assemblies to deliver the programme outputs and to make sure that institutional capacity for local adaptation action is built and outlast the programme funded by the AF. In addition, the parent ministries will be involved to provide technical support to the District Assemblies. At the beginning of the programme, the capacity of the decentralized agencies will be assessed to determine capacity gaps and the needed capacity building support to execute the AF-funded programme. Based on the findings, the AF programme, in coordination with the parent ministries, will strengthen the areas that need to be built to achieve the objectives of the programme (e.g. technical capacity, agricultural extension, financial management and reporting). Central to the implementation of the AF programme, particularly components 2 and 3, is the involvement of district extension agents in providing technical assistance to the communities. Hence it is necessary to make sure that they have the necessary technical skills and number to implement the activities.

Agricultural extension services (AES) in Ghana is the responsibility of the Department of Agricultural Extension Services (DAES) within the Ministry of Food and Agriculture (MOFA). Under Ghana's decentralization policy, AES is devolved to the District Assemblies through the District Agriculture Office. Agricultural extension agents (AEAs) are based in the districts and report to the District Director of Agriculture, who is in turn accountable to the District Assembly and to the Regional Director of Agriculture. This structure is designed to enable MOFA tailor context-specific responses to the needs of farmers and agricultural industry. Within this framework, the districts are empowered to plan and implement their own AES within the framework provided by the national policy. The source of technical training continues to be the technical agencies of MOFA even under the decentralized set-up.

Ideally, the AEAs visit groups of contact farmers every other week. Each AEA interacts with between 16 to 24 contract groups (with each group consisting of a minimum of 10 farmers) in a cropping season. Training and visit (T&V) continues to be the most dominant approach but participatory approaches, such as farm demonstrations and discussions with farmers groups are also employed.

The institutional arrangement and processes for AES in Ghana is relatively mature. However there are critical operational limitations on the ground that limits the effectiveness of AES to rural communities. Recent studies on AES in Ghana³⁶ show that the most critical limitation has to do with the lack of AES.

³⁶ Asombobillah, Robert. Harnessing the power of savings and lending communities to drive agroenterprise development in Ghana. US Catholic Relief Service, 2011; Asuming-Brempong, S., D. B. Sarpong, and F. Asante. Institutional Bottlenecks of Agricultural Sector Development: The Case of Research and Extension Provision in Ghana. Final Report. The OECD Development Centre, Paris, France; World Bank and the International Food Policy Research Institute (IFPRI) have provided funding for the research. Gender and Governance in Rural Services: Insights from India, Ghana, and Ethiopia. Washington, DC: The International Bank for Reconstruction and Development / The World Bank, 2010.

Statistics for the Upper West region – one of the target regions of the AF programme – show that there are 13 AEAs in the districts on average and the AE personnel to farmer ratio is 1:5,000. This is abysmally below the national standard of 1:300.³⁷ Statistics for the two other target regions are not available but it should not deviate too much from the Upper West figure. As a result of understaffing, a study (OECD study) shows that the frequency of farmer contact with extension staff per year is minimal and that many farmers were not served by extension services. A recent study by the World Bank and IFRPI (2010)³⁸ comparing access to extension services in India, Ethiopia, and Ghana shows that access is lowest in Ghana. About 12 percent of the male-headed households received individual visits of agricultural extension officers, and 10–15 percent attended group meetings organized by agricultural extension officers, with some variation across the country's different agro-ecological zones.

In addition to an understaffed AES system, it has also been demonstrated that gender gap in access to extension services is very much pronounced in Ghana despite the predominance of women in agriculture. In the forest and savannah zones where some of the programme's target districts are located, the World Bank study found out that none of the sampled female-headed households received agricultural extension visits.

A programme of this size will not be able to rely on the government AES system alone. Fortunately, local NGOs are fast acquiring the capacity to run agricultural extension programmes oftentimes in collaboration with district assemblies, in the context of implementing their livelihood programmes. The strategy of this Programme would be to supplement government AES with capacities existing in other sectors to deliver AES by creating a pool of community-based extension workers. This strategy has been proven to work based on the experiences of local NGOs and UNDP-GEF Small Grants Programme in Ghana.

A pool of community-based extension agents consisting of interested community members, target beneficiary groups, and staff of local NGOs will be formed. The district AEAs will supervise these community-based extension agents. The district AEAs will periodically conduct field monitoring visits (e.g. on a quarterly basis or depending on the capacity of community-based workers to uptake new information) to ensure that the advisory services/support provided by the community-based extension workers conform to national standards. In between the field monitoring visits, consultations between the district AE officers and the community-based extension workers will be conducted by mobile telephones. Early experiences of the health sector in Ghana in using mobile teleconsultation to increase access to primary health care have yielded positive results. The same method will be promoted in this Programme.

The capacity of the AEAs in target districts/communities will be established through assessment of their skills as well as an assessment of the capacities of target communities to assimilate technical support. The Programme will conduct an assessment of functional, technical and other critical needs in support of delivering Components 2 and 3 of this project. The first level of trainees will be the district AEAs through MOFA who will then in turn train the community-based AEAs. It is expected that capacity needs will vary significantly across communities but the common skills that will be developed under this Programme would be agronomic practices that are appropriate under changing climate conditions, community mobilization, climate risk management in agriculture (e.g. water conservation techniques, etc.). The required resources for capacity building activities of extension agents is already budgeted (refer to ATLAS code 72101 in the budget table or Service Contracts (Companies)). The training programme will be integrated into the existing training programme for AEAs of MOFA. The budget for local consultants who will carry out the training is also provided.

³⁷ Asombobillah, Robert, Ibid.

³⁸ World Bank and IFPRI, Ibid.

In Ghana, female AEAs proved more effective in reaching women farmers.³⁹ To help ensure that women participating in this Programme will have increased access to AES, the Programme will take every step to ensure that the pool of community-based AEs will include women members. The design of the training programme and subsequent implementation activities will be designed in such a way that women will be able to participate. For example, training activities will be scheduled in a way at a time most suitable to both women and men members. There is a sufficient institutional and policy backing to do this. MOFA has a dedicated directorate that helps to institutionalize attention to gender in the public AES.

The formation of community-based AES as a Programme approach is cost-effective and sustainable since it builds capacities, transfers technology and empowers the local people to address their needs in a manner consistent with the Government of Ghana's decentralization policy. Experience from ongoing community-based projects show that there is significant interest on the part of community members to become community-based extension workers because of the opportunity to acquire new skills. Some community-based extension workers were even able to charge some fees for services that they perform for other community members (e.g. veterinary care). As part of its sustainability strategy, the Programme will assess the feasibility of privatizing the adaptation advisory service. For this purpose, the project will carry out a study to assess the willingness of communities to pay such services, how much, and on what conditions would they be willing to pay. Using the results of this study, the Programme will support the community-based AES to organize themselves as private extension service providers and help them to develop a business plan.

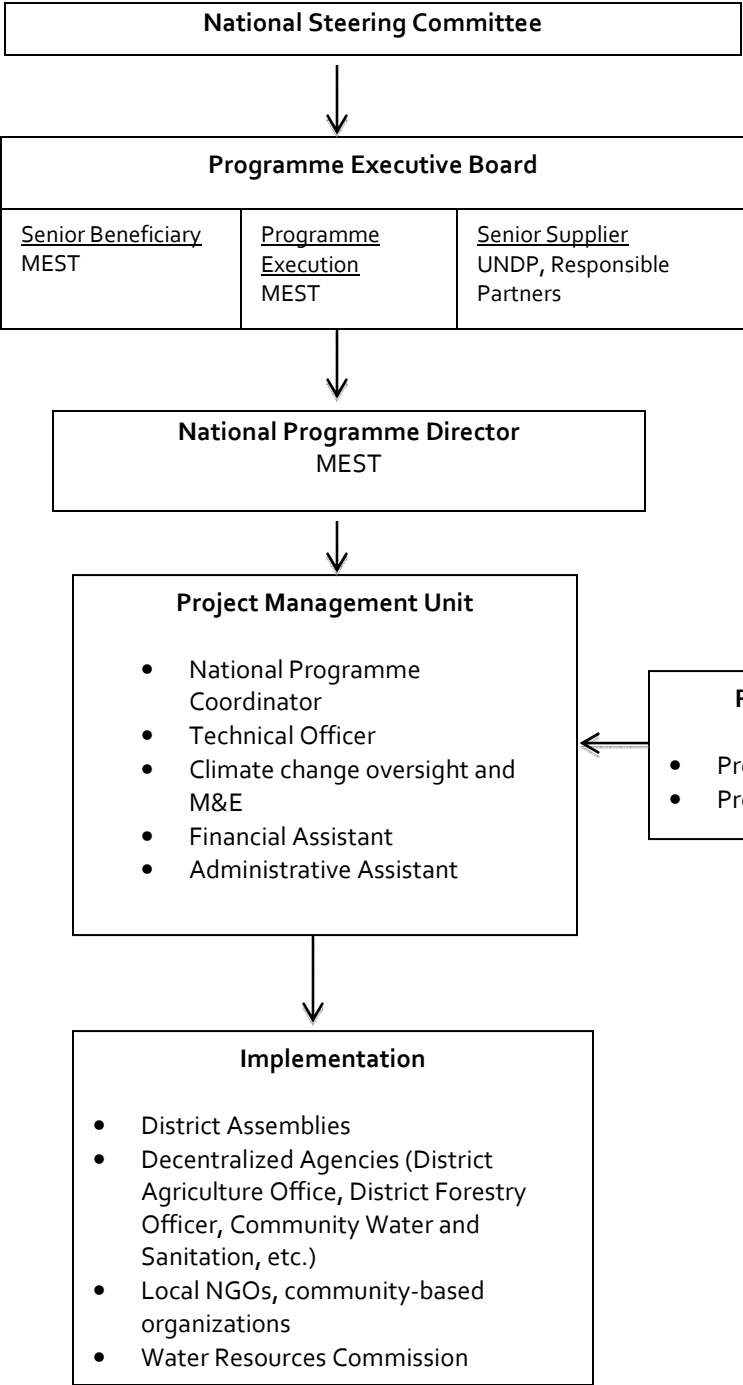
The EPA regional offices in the three regions covered under the AF Programme will be responsible for coordinating the District Assemblies in each of the region to make sure that they learn from each other's experiences in implementing the programme. Also critical to the coordinating function of the EPA regional office is to ensure that the AF-funded programme is able to take advantage of economies of scale to the extent possible during implementation. This is particularly crucial in cases where the districts could get a better price (e.g. civil works) if they bargain collectively. The EPA regional offices will also engage with the Regional Climate Change Adaptation Monitoring Committee (to be formed under output 1.4) to give feedback on programme implementation.

Programme assurance

UNDP will be the Implementing Entity for this project. A designated Programme Officer will be assigned in the Country Office in Ghana to provide financial and technical oversight. As the Implementing Entity, UNDP will ensure compliance with Decision B.18/30 of the Adaptation Fund Board by respecting the separation of implementing and execution services. Execution services will not be charged to the project budget.

Project audit will follow UNDP Finance Regulations and Rules and applicable audit policies. The organigram of the programme is as follows:

³⁹ World Bank and IFPRI, Ibid



Programme Execution

Cost Item	Year 1	Year 2	Year 3	Year 4	TOTAL
1. National Programme Manager/Coordinator	29,000.00	29,000.00	29,000.00	29,000.00	116,000.00
2. Technical Officer	20,400.00	22,000.00	22,000.00	22,000.00	86,400.00
3. Finance and Administrative Assistant	16,000.00	16,000.00	16,000.00	16,000.00	64,000.00
4. Climate change oversight and M&E specialist	36,000.00	36,000.00	36,000.00	36,000.00	144,000.00
7. Office Furniture	10,000.00	-	-	-	10,000.00
8. Computers/IT equipment	10,500.00	1,000.00	100.00	759.00	12,359.00
9. Stationary and supplies	3,000.00	2,000.00	2,000.00	2,000.00	9,000.00
10. Vehicle	21,000.00	-	-	-	21,000.00
11. Monitoring, Evaluation, and Audit (see Section C for breakdown of cost)	23,000.00	10,000.00	17,000.00	20,000.00	70,000.00
TOTAL	168,900.00	116,000.00	122,100.00	125,759.00	532,759.00

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		Develop detail inception work plan to guide inception phase	
Insecurity in the area – terrorist attacks or regular banditry – may jeopardize the implementation and follow-up of the programme	Medium	<ul style="list-style-type: none"> ➤ The programme 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 	MESTI and UNDP
A poor understanding of the objectives by the programme team	Low	<ul style="list-style-type: none"> ➤ A strong involvement of leaders, particularly in implementing agencies and key stakeholders ➤ Support of national experts ➤ Adapted trainings 	MESTI

Low mobilization of the target group caused by a poor understanding of climate change issues	Low	<ul style="list-style-type: none"> ➤ Increased collaboration with the target communities ➤ A participatory approach ➤ Sensitization to the effects of climate change 	MESTI
Lack of capacity to meet financial, and in particular resource commitments by partners in programme implementation	Medium	<ul style="list-style-type: none"> ➤ 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 	MESTI
Lack of sufficiently qualified partners	Low	<ul style="list-style-type: none"> ➤ Capacity-building ➤ Screening and evaluation of partners ➤ Collaboration with communities at a decentralized level 	MESTI

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

The proposed programme activities will help the country to create management plans for the Black Volta, White Volta and Oti river basins, and mainstream these into the works of Volta Region Authority and other relevant institutions. These plans will also inform local plans in 50 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) and Component 3 (livelihood diversification activities). 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 be 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. An assessment of baseline situation and indicators at households levels at the beginning of the project completed through households surveys at mid-term and project termination will allow the monitoring and assessment of project impacts in livelihoods and confirm the cost effectiveness of the options included for this project. Baseline data will be obtained from the Multiple Indicator Cluster Survey (UNICEF/Ghana Statistical Service), World Food Programme’s Comprehensive Food Security and Vulnerability Analysis

and from the Ghana Environmental Management Project (CIDA/MESTI). In terms of data collection, these initiatives have extensive coverage in the northern regions of Ghana in spatial and temporal terms. Moreover, the NGOs that have projects in the area collect household income, demography, and economic activities data. GoG will be able to obtain these data. In communities that implement projects funded by UNDP/GEF Small Grants Programme, UNDP will be able to obtain the data. In target communities where baseline data do not exist, they will be collected as part of the Programme's own baseline setting under the M&E component.

The costs associated with implementing the M&E system are detailed below.

Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding programme team staff time</i>	Time frame
Initiation Workshop and Report	<ul style="list-style-type: none"> ▪ Programme Manager ▪ UNDP CO 	Indicative cost: 5,000	Within first two months of programme start up
Measurement of Means of Verification of programme results.	<ul style="list-style-type: none"> ▪ 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 <i>output and implementation</i>	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Programme manager and team ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG 	None	Annually
Periodic status/ progress reports	<ul style="list-style-type: none"> ▪ Programme manager and team 	None	Quarterly
Mid-term Evaluation	<ul style="list-style-type: none"> ▪ Programme manager and team ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team) 	Indicative cost: 10,000	At the mid-point of programme implementation.
Final Evaluation	<ul style="list-style-type: none"> ▪ 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	<ul style="list-style-type: none"> ▪ Programme manager and team ▪ UNDP CO ▪ local consultant 	5,000	At least three months before the end of the programme
Audit	<ul style="list-style-type: none"> ▪ UNDP CO ▪ Programme manager and team 	16,000	
Visits to field sites	<ul style="list-style-type: none"> ▪ UNDP CO 	9,000	Yearly

Type of M&E activity	Responsible Parties	Budget US\$ <i>Excluding programme team staff time</i>	Time frame
	<ul style="list-style-type: none"> ▪ UNDP RCU (as appropriate) ▪ Government representatives 		
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.

Indicator	Baseline	Target	Sources of verification
Outcome 1: Improved management and planning of water resources taking into account climate change impacts on surface and groundwater sources			
Existence of downscaled climate projections	No downscaled climate projections are in place	Downscaled climate projections available for the White Volta, Black Volta and Oti Basins	Programme progress and technical reports
Revised White Volta management plan	Current plan does not address climate change impacts nor link clearly to community level	Revised White Volta Plan completed and adopted at inter-ministerial level	Programme progress and technical reports
Management plans in the Black Volta and five sub-basins in the White Volta and the Oti basins at ministerial level	No plans are in place	Black Volta and 5 sub-basin plans in the White Volta and the Oti Basins adopted at inter-ministerial level	Programme progress and technical reports
Three regional Climate Change Adaptation Monitoring Committees	There is no committee in place	Regional Climate Change Adaptation Monitoring Committees established in the three target regions	Programme progress and technical reports
Outcome 2: Climate resilient management of water resources by 50 communities in northern Ghana			

Indicator	Baseline	Target	Sources of verification
Number of communities in which management plans have been developed and are being implemented	Management plans are not in place. Lack of coherent and planned water management activities in communities.	50 community water management plans implemented by community institutions with at least 50% representation by women in place by end of programme year 2.	Programme progress and technical reports
Number of operational boreholes, dugouts/dams and rainwater harvesting systems	Communities have limited infrastructure in place for supply and storage of water	100 operational boreholes, benefitting at least 30,000 people (50% of whom should be women) Rainwater harvesting systems in place, providing water supplies to 50 community facilities	Programme progress and technical reports
Number of operational community scale irrigation systems installed	Very few communities have effective irrigation systems in place	50 operational irrigation systems, benefitting at least 2,500 farmers	Programme progress and technical reports
Outcome 3: Enhanced diversification of livelihoods under climate change by 50 communities, located within 5 districts, in northern Ghana			
Number of operational community fish farms established	Few communities benefit from community fish farms	20 community fish farms established, benefitting at least 10,000 people(50% of whom should be women)	Programme progress and technical reports
Number of tree nurseries/wood lots established	Few communities benefit from community managed tree nurseries and wood lots, nor from bee keeping activities	40 community tree nurseries and wood lots, incorporating bee keeping, established	Programme progress and technical reports
Number of dry season gardening schemes for women established	Few communities benefit from effective dry season gardening	50 dry season gardening schemes for women established, directly benefitting at least 1,000 women	Programme progress and technical reports
Number of women led agricultural product processing schemes established	Few communities benefit from agricultural product processing	40 community level women led agricultural product (shea butter or honey) processing schemes established, directly benefitting at least 1,200 women	Programme progress and technical reports
Household income	More than 50% of the households in the target communities have	At least 50% of the households in the target communities increase their	Monitoring reports


Indicator	Baseline	Target	Sources of verification
	income levels below the poverty line	income by 30% by the end of the project	

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

A. RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT⁴⁰ *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:*

Mr. Akwasi Opong-Fosu (MP) Minister, Minister of Environment, Science & Technology of Ghana	Date: 13 January 2015
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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.	
	
Adriana Dinu Executive Coordinator, UNDP/GEF	
Date: 30 January 2015	Tel. and email: +1-212-906-5143 adriana.dinu@undp.org
Project Contact Person: Henry Rene Diouf	
Tel. And Email: +251 912503321; henry.rene.diouf@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.

Category	Services Provided by UNDP	Estimated Cost of Providing Services ⁴¹
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 & Preparation	Provide technical support, backstopping and troubleshooting to convert the idea into a technically feasible and operationally viable project/programme.	US\$154,563

⁴¹The breakdown of estimated costs is indicative only.

Category	Services Provided by UNDP	Estimated Cost of Providing Services ⁴¹
	<p>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.</p> <p><i>Respond to information requests, arrange revisions etc.</i></p> <p><i>(Note that UNDP Ghana CO and Ghana Environment Protection Agency provided counter-part funding towards travel and workshop cost via the Africa Adaptation Programme and UNDP core funds. Total estimated funding is \$25,000).</i></p>	
<u>Implementation</u>	<p>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. Oversight and monitoring of AF funds. Return unspent funds to AF.</p>	US\$ 348,755

Category	Services Provided by UNDP	Estimated Cost of Providing Services⁴¹
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, and compile lessons. Disseminate technical findings	<i>US\$ 60,000</i>
Total		<i>US\$ 693, 318</i>

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

Award ID	64155	Project ID:	81025				
Award Title							
Business Unit:	GHA10						
Project Title	Increased Resilience to Climate Change in Northern Ghana						
PIMS Number:							
Implementing Partner	MIE: UNDP	Executing Entity	Ministry of Environment Science, and Technology				
ATLAS Budget Code	ATLAS Budget Desc.	Description of Expenditure/Budget Notes	Total Cost	USD Yr 1	USD Yr 2	USD Yr 3	USD Yr 4
1. Water resource management and planning under climate change							
Outcome 1: Improved basin level management and planning of water resources by the Government of Ghana, taking into account the climate change impacts on surface and groundwater sources							
<i>Output 1.1: Climate change projections generated for the White Volta, Black Volta and Oti basins</i>							
71200	Intl Consultant	International climate scientist: 100 days x \$500 per day	50 000.00	50 000.00	-	-	-
73100	Local Consultant	2 national climate scientists: 3 months x \$2500/month	15 000.00	15 000.00	-	-	-
71601	Travel	Travel costs for workshops and training on generation, interpretation, and application of climate change projections for hydrological modeling	20 000.00	20 000.00	-	-	-
73102	Premises	Premises for workshops and meetings	7 000.00	7 000.00	-	-	-
72200	Equipment	Purchase of models and data	25 000.00	25 000.00	-	-	-
Sub-total Output 1.1.			117 000.00	117 000.00	-	-	-
<i>Output 1.2: White Volta management plan reviewed and updated to take into account climate change impacts</i>							
71200	Intl Consultant	International water resource management expert: 50 days*\$500 per day	25 000.00	25 000.00	-	-	-
73100	Local consultant	10% of national water resource planning & management expert: \$2,500/month (ongoing support for implementation of plan)	9 000.00	-	3 000.00	3 000.00	3 000.00
71601	Travel	Travel costs for workshops and meetings	20 000.00	20 000.00	-	-	-
73102	Premises	Premises for workshops	5 000.00	5 000.00	-	-	-
Sub-total Output 1.2.			59 000.00	50 000.00	3 000.00	3 000.00	3 000.00

				000.00			
Output 1.3: Water management plans that take into account climate change impacts are developed and adopted for the Black Volta and for five sub-basins in the White Volta and the Oti Basins							
71200	Intl Consultant	International water resource management expert: 50 days x \$500 per day	25 000.00	25 000.00	-	-	-
73100	Local consultant	10% of national water resource planning & management expert: \$2,500/month (ongoing support for implementation of plan)	9 000.00	-	3 000.00	3 000.00	3 000.00
71601	Travel	Travel costs for workshops and meetings	30 000.00	30 000.00	-	-	-
73102	Premises	Premises for workshops	10 000.00	10 000.00	-	-	-
	Sub-total Output 1.3.		74 000.00	65 000.00	3 000.00	3 000.00	3 000.00
Output 1.4: Regional Climate Change Adaptation Monitoring Committee (as envisioned by the National Climate Change Adaptation Strategy) established in the three target regions							
71601	Travel	Travel costs for bi-annual meetings: 3,000 x 2 meetings x 3 regions	72 000.00	18 000.00	18 000.00	18 000.00	18 000.00
73102	Premises	Premises for meetings: \$1000 x 2 meetings per year x 3 regions	24 000.00	6 000.00	6 000.00	6 000.00	6 000.00
73100	Local consultant	National consultant to design and deliver training for committee members: \$300 per day x 30 days x 2 trainings	18 000.00	18 000.00	-	-	-
	Sub-total Output 1.4.		114 000.00	42 000.00	24 000.00	24 000.00	24 000.00
TOTAL for Component 1			364 000.00	274 000.00	30 000.00	30 000.00	30 000.00
2. Community Level Implementation of Climate Resilient Water Resource Management Activities							
Outcome 2: Climate resilient management of water resources by at least 50 communities in northern Ghana							
Output 2.1: Community water supply and management plans developed for 10 districts to incorporate climate change-related risks							
71300	Local Consultant	20% of national water resource management expert: \$2,500/month	18 000.00	-	6 000.00	6 000.00	6 000.00
71300	Local Consultant	Local community planning specialist. 24 months x \$2,500	60 000.00	-	30 000.00	30 000.00	-
71300	Local Consultant	12.5% of regional field coordinator. 36 months x \$2,500/month	11 250.00	-	3 750.00	3 750.00	3 750.00
72100	Contractual services	Meeting organization and venue cost for GoG institutions. 6 training events @ \$10,000/event	60 000.00	0.00	30 000.00	20 000.00	10 000.00

71600	Travel	Community planning workshops: Travel support for extension workers and community members to attend workshops to develop community water supply and management plans @ \$1,000/community	50 000.00	-	50 000.00	-	-
71600	Travel	12.5% of the travel cost for regular monitoring visits by programme and government staff	17 791.25	-	5 375.00	5 912.50	6 503.75
	Sub-total Output 2.1.		217 041.25	-	125 125.00	65 662.50	26 253.75
Output 2.2: Water supply increased for multiple uses and users in 50 communities during period of shortages under climate impacts e.g. droughts, heat stress etc.							
71300	Local Consultant	20% of national water resource management expert @ \$2,500/month	18 000.00	-	6 000.00	6 000.00	6 000.00
71300	Local Consultant	12.5% of regional field coordinator: @2500/month x 36 months	11 250.00	-	3 750.00	3 750.00	3 750.00
72101	Service Contracts - Companies	Detailed design, implementation and community training for: 100 boreholes @ \$8,000/borehole. 50 dugouts/dams @ \$25,000/dugout/dam. 50 rainwater harvesting systems @ \$3,000/system.	2 553 600.00	-	300 000.00	1 703 600.00	550 000.00
71600	Travel	12.5% of the travel cost for regular monitoring visits	17 791.25	-	5 375.00	5 912.50	6 503.75
	Sub-total Output 2.2.		2 600 641.25	-	315 125.00	1 719 262.50	566 253.75
Output 2.3: Small scale irrigation systems installed in 50 communities and water users associations to manage irrigation systems established and/or strengthened to improve efficiency and effectiveness of water usage under conditions of climate-induced water pressures							
71300	Local Consultant	12.5% of regional field coordinator. 36 months x \$2,500/month.	11 250.00	-	3 750.00	3 750.00	3 750.00
71300	Local Consultant	20% of national water resource management expert x \$2,500/month	18 000.00	-	6 000.00	6 000.00	6 000.00
73200	Materials and goods	Detailed design, implementation and community training for: 50 sub-surface irrigation systems x \$21,000/system	1 050 000.00	-	150 000.00	500 000.00	400 000.00
	Sub-total Output 2.3		1 079 250.00	-	159 750.00	509 750.00	409 750.00
Output 2.4: Measures for water conservation under climate impacts e.g. catchment/river bank re-afforestation schemes implemented in 25 communities							
71300	Local Consultant	20% of national water resource management expert @ \$2,500/month	18 000.00	-	6 000.00	6 000.00	6 000.00
73200	Materials and goods	Detailed design, implementation, and community training for 25 re/afforestation schemes @ \$15,000/scheme	375 000.00	-	50 000.00	210 000.00	115 000.00
71300	Local Consultant	12.5% of regional field coordinator: 36 months @ \$2,500/month	11 250.00	-	3 750.00	3 750.00	3 750.00

71600	Travel	12.5% of the travel cost for regular monitoring visits	17 791.25	-	5 375.00	5 912.50	6 503.75
Sub-total output 2.4			422 041.25	-	65 125.00	225 662.50	131 253.75
Output 2.5: Learning platforms and systems for integrating climate change-related risks into community management of water resources and livelihood activities in northern Ghana institutionalized in 10 districts							
71600	Travel	Travel and workshop costs for training events for GoG institutions. 6 training events @ \$10,000/event	60 000.00	-	30 000.00	20 000.00	10 000.00
71600	Travel	Bi-annual all community workshops. Travel and workshop costs @ \$10,000/workshop.	60 000.00	-	20 000.00	20 000.00	20 000.00
71300	Local Consultant	10% of national water resource management expert @ \$2,500/month	9 000.00	-	3 000.00	3 000.00	3 000.00
71300	Local Consultant	Local communications consultant. 12 months @ \$2,500/month.	30 000.00	-	-	-	30 000.00
71300	Local Consultant	12.5% of regional field coordinator: 36 months @ \$2,500/month	11 250.00	-	3 750.00	3 750.00	3 750.00
74200	Promo materials	Printing	6 775.00	-	-	-	6 775.00
Sub-total Output 2.5			177 025.00	-	56 750.00	46 750.00	73 525.00
TOTALS for Component 2			4 495 998.75	-	721 875.00	2 567 087.50	1 207 036.25
3. Diversification of Livelihoods of Rural Communities under Climate Change							
Outcome 3: Enhanced diversification of livelihoods under climate change by at least 50 communities 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 10 districts							
71300	Local Consultant	12.5% of regional field coordinator. 36 months @ \$2,500/month	11 250.00	-	3 750.00	3 750.00	3 750.00
71300	Local Consultant	25% of national livelihoods expert: \$2,500/month	22 500.00	-	7 500.00	7 500.00	7 500.00
73200	Materials and goods	Detailed design, implementation and community training for: 50 water distribution schemes @ \$10,000/scheme	500 000.00	-	75 000.00	300 000.00	125 000.00
71600	Travel	12.5% of the travel cost for regular monitoring visits	17 791.25	-	5 375.00	5 912.50	6 503.75
Sub-total Output 3.1			551 541.25	-	91 625.00	317 162.50	142 753.75
Output 3.2: Dry-season gardening activities, agricultural processing schemes (shea butter or honey) by women, and bee keeping practices improved for climate change adaptation in 50 communities							
71300	Local Consultant	12.5% of regional field coordinator. 36 months @ \$2,500/month.	11 250.00	-	3 750.00	3 750.00	3 750.00
71300	Local Consultant	25% of national livelihoods expert @ \$2,500/month	22 500.00	-	7 500.00	7 500.00	7 500.00

73200	Materials and goods	Detailed design, implementation and community training for: 50 dry season gardening schemes @ \$2,500/scheme. 20 shea butter processing facilities @ \$9,500/facility. 20 honey processing facilities @ \$4,000/facility. 100 apiaries @ \$1000/apiary	495 000.00	-	75 000.00	275 000.00	145 000.00
71600	Travel	12.5% of the travel cost for regular monitoring visits	17 791.25	-	5 375.00	5 912.50	6 503.75
	Sub-total Output 3.2		546 541.25	-	91 625.00	292 162.50	162 753.75
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 40 communities							
71300	Local Consultant	12.5% of regional field coordinator: 36 months x \$2,500/month	11 250.00	-	3 750.00	3 750.00	3 750.00
71300	Local Consultant	25% of national livelihoods expert: \$2,500/month	22 500.00	-	7 500.00	7 500.00	7 500.00
73200	Materials and goods	Detailed design, implementation and community training for: 40 wood lots @ \$15,000/lot	605 000.00	-	110 000.00	350 000.00	145 000.00
71600	Travel	12.5% of the travel cost for regular monitoring visits	17 791.25	-	5 375.00	5 912.50	6 503.75
	Sub-total Output 3.3		656 541.25	-	126 625.00	367 162.50	162 753.75
Output 3.4: Fish farms are established and supported in 20 communities							
71300	Local Consultant	25% of national livelihoods expert: \$2,500/month	22 500.00	-	7 500.00	7 500.00	7 500.00
73200	Materials and goods	Detailed design, implementation and community training for: 20 community fish farms @ \$20,000/system	400 000.00	-	50 000.00	250 000.00	100 000.00
71600	Travel	12.5% of the travel cost for regular monitoring visits	17 791.25	-	5 375.00	5 912.50	6 503.75
	Sub-total Output 3.4		440 291.25	-	62 875.00	263 412.50	114 003.75
Output 3.5: Best practices on adaptation and lessons learned from the implemented actions and related policy processes are recorded and disseminated to all 38 districts in northern Ghana through appropriate mechanisms							
71300	Local Consultant	Local communications expert 4 months @ \$2,500/month	10 000.00	-	-	-	10 000.00
71600	Travel	Travel costs for workshops for community members	20 000.00	-	-	-	20 000.00
71600	Travel	12.5% of the travel cost for regular monitoring visits	17 791.25	-	5 375.00	5 912.50	6 503.75
74200	Promo materials	Printing, broadcasting	8 750.00	-	-	-	8 750.00

	Sub-total Output 3.5	56 541.25	-	5 375.00	5 912.50	45 253.75
TOTALS for Component 3		2 251 456.25	-	378 125.00	1 245 812.50	627 518.75
6.	Programme Implementation – Total Costs	7 111 455.00	274 000.00	1 130 000.00	3 842 900.00	1 864 555.00
7.	Project/Programme Execution cost	532 759.00	168 900.00	116 000.00	122 100.00	125 759.00
8.	Total Project/Programme Cost	7 644 214.00	442 900.00	1 246 000.00	3 965 000.00	1 990 314.00
9.	Programme Cycle Management Fee charged by the Implementing Entity (8.5%)	649 758.19				
	Amount of Financing Requested	8 293 972.19				

Annex 3. Programme Implementation Schedule / Gantt Chart

Award ID: 00064155

Project ID: 00081025

Particulars	Year 1				Year 2				Year 3				Year 4			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
PROGRAMME INCEPTION																
Outcome 1: Improved basin level management and planning of water resources by the Government of Ghana, taking into account the climate change impacts on surface and groundwater sources																
Output 1.1: Climate projections generated for the White Volta, Black Volta and Oti basins in Ghana																
1.1.1: Climate projections team formed comprising consultants and members of GoG institutions and academia																
1.1.2: Climate projections developed via collaborative and participatory process																
Output 1.2: White Volta management plan reviewed and updated to take into account climate change impacts																
1.2.1: Gap analysis of White Volta plan																
1.2.2: Revision of White Volta plan via a participatory approach																
1.2.3: Development of a template to be used for other plans (basin and community level plans)																
1.2.4: Develop implementation plan for adoption and operationalizing the plan																
Output 1.3: Water management plans that takes into account climate change impacts are developed for the Black Volta and for five sub-basins in the White Volta and Oti basins																
1.3.1: Development of management plans via participatory approaches																
1.3.2: Develop implementation plan for adoption and operationalizing the plans																
Output 1.4: Regional Climate Change Adaptation Monitoring Committee (as envisioned by the National Climate Change Adaptation Strategy) established in the three target regions																
1.4.1: High level validation workshops ensuring ministerial level adoption of the plans and the importance of integrating these into community level plans																
1.4.2: Ongoing technical support																
Outcome 2: Climate resilient management of water resources by at least 50 communities in northern Ghana																
Output 2.1: Community water supply and management plans developed for 10 districts to incorporate climate change risks																
2.1.1: Series of training workshops																
2.1.2: Community plans established via participatory approaches																
2.1.3: Communities are supported in the continued evolution and implementation of the plans by GoG and programme staff																
2.1.4: Bi-annual workshops for all communities																
Output 2.2: Water supply increased for multiples uses and users in 50 communities during period of shortages under climate impacts e.g. droughts, heat stress etc.																
2.3.1: Design and construction of water supply and storage infrastructure and training of communities in use and maintenance of this																

Output 3.5: Best practices for adaptation and lessons learned from the implemented actions and related policy processes are recorded and disseminated to all 38 districts in northern Ghana through appropriate mechanisms												
3.5.1: Identification and documentation of best practices												
3.5.2: Dissemination of best practices												
3.5.3: Production and printing of lessons learnt documentation												
Programme Execution												
Programme Management Unit Established and Operational												
Programme Staff Recruited												
Office facilities established												
PMU operational and supporting programme implementation												
Establish programme exit strategy												
Programme Monitoring and Evaluation												
Inception report												
Quarterly reporting												
Continuous monitoring of activities in the field												
Annual audits												
Mid-term evaluation												
Final programme evaluation												
Programme Technical Report												

ANNEX 4: DISBURSEMENT SCHEDULE

	Upon Agreement signature	1st disbursement (received at time of agreement)	One Year after Project Start	Year 3	Year 4	Total
Scheduled Date	April-15		April-16	April-17	April-18	
Project Funds		300,725.00	1,214,750.00	4,124,343.00	2,004,397.00	7,644,215.00
Implementing Entity Fee	259,903.28	15,337.00	61,952.00	210,341.00	102,224.00	649,757.28
Total	259,903.28	316,062.00	1,276,702.00	4,334,684.00	2,106,621.00	8,293,972.28

Annex 5. Selection of Target Districts based on Vulnerability Assessment

Following the recommendation made by stakeholders during the various consultation meetings, the level of vulnerability to drought and flood is the key consideration in selecting the target districts under this programme. In the absence of a comprehensive district-level vulnerability ranking, a simple method was developed to rank the vulnerability of districts within each of the three regions building on existing literature. The process consists of the following steps:

- 1) The districts within each region were ranked according to their vulnerability to drought using results of a recent study (Antwi-Agyei, 2011)⁴² that mapped the vulnerability of crop production to drought in Ghana using rainfall, yield, and socioeconomic data. The study provides a district-level breakdown for the three most vulnerable regions in the country (North, Upper East, and Upper West). This district-level analysis was then used to rank the drought vulnerability of the districts within the three regions. It is worth noting that the study's findings are consistent with earlier studies showing that the three regions in the northern part of Ghana are the most vulnerable to drought. The key limitation of the study is it does not include the 14 recently-created districts.
- 2) The next step involved ranking the districts according to their vulnerability to flood. This is not as straightforward as the drought vulnerability ranking because there is no academic literature to build on. Therefore a scoring system was developed to approximate vulnerability to flood. The districts were scored according to the number of times that they have been affected by the regional flooding events in 2007 and 2010 – the two most severe flooding in recently history. This record is available from the United Nations University (unpublished, 2010) based at the University of Ghana. Districts that have been affected by both events were assigned two points while districts that are affected by either event were assigned one point. In addition, OCHA's flood assessment during the 2010 flooding⁴³ was also incorporated in the ranking. Districts that were assessed as 'moderately severe' get an additional 1 point while districts that were assessed as 'very severe' get additional 2 points. Based on the total points, the districts were then ranked vis-à-vis other districts in each of the three regions.
- 3) Finally, the 'average rank' of each district vis-à-vis other districts in each of the three regions was calculated by combining the drought and flood ranking. The district with the lowest average rank is the most vulnerable. The three most vulnerable districts from each of the region are then selected to serve as the target districts

Initially, it was planned to do a correction to make sure that the target districts are sufficiently spread out across basins and ecological zones, thereby ensuring that AF funds provide optimized learning and knowledge. However at the end of the ranking process, it was realized that the selected districts are already sufficiently spread out in various locations and exhaustively cover all major sub-basins and ecological zones in the northern regions.

Another factor that was initially considered in district selection is the number of ongoing development projects in a particular district that is relevant to adaptation. A mapping of ongoing initiatives in the districts shows by a joint mission of UN agencies in the northern region (2012) shows that all districts in the northern regions are implementing projects that are relevant to the proposed programme under the Adaptation Fund (i.e. livelihood, agricultural improvement, sustainable land management, water resources management). Hence this factor can be safely assumed as a constant factor for all the districts.

District profiles

The key sources for this district profiling are as follows:

⁴²Antwi-Agyei, et al. March 2011. 'Mapping the vulnerability of crop production to drought in Ghana using rainfall, yield, and socioeconomic data.' Working Paper No. 55. Centre for Climate Change Economics and Policy.

⁴³ UN Office for the Coordination of Humanitarian Affairs. Ghana – Northern Floods Situation Report #1. 14th September 2010.

- 1) Africa Adaptation Programme (AAP) (2011). Mapping and Documenting Indigenous Knowledge in Climate Change Adaptation in Northern Ghana
- 2) Environmental Protection Agency (2010). Baseline Survey Report for the Ghana Environmental Management Project (GEMP)
- 3) Ghana Districts Website: www.ghanadistricts.com
- 4) UNDP/WFP/FAO/UNU (2012). Joint Mission Report on Climate Change Adaptation and Disaster Risk Reduction in Northern Ghana
- 5) Water Resources Commission (2011). Flood Disaster Preparedness/Contingency Plan.

District	Basin/Ecological Zone	Population	Area (km ²)	Climate-related risk and opportunities	Relevant ongoing projects
<i>Northern region</i>					
1. Savelugu	White Volta/Guinea Savannah woodland	88,059	2,011	Communities consider erratic rainfall one of the most important challenges to agriculture. Low level of rainfall (600 mm per year) can support only one cropping season. Affected by both 2007 and 2010 flooding; very high vulnerability of major crops to drought. Can support livestock farming and cultivation of crops that have relatively low water requirements (e.g. maize, sorghum, yam, etc).	GEMP
2. Bole	Black Volta/Guinea Savannah Woodland	126,532	9,631	Erratic rainfall and temperature extremes are the key climate-related problems. However climate condition is suitable for growing fruit-bearing trees.	
3. Zabzugu-Tatale	Oti/Guinea Savannah Woodland	77,496	2,365	There have been documented reports about the drying up of water bodies (including streams). Climate impacts exacerbated by land degradation, including erosion and siltation. Water supply from streams and dams not reliable. Land degradation blamed to long periods of rainfall deficit and bad land management practices (e.g. deforestation, overgrazing).	
<i>Upper East region</i>					
4. Bawku	White Volta/Sahel Savannah	307,907	2134	Highly variable rainfall; significant moisture losses due to evapotranspiration; highly susceptible to bush fires during the dry season	GEMP
5. Bawku West	Red Volta and White Volta/Transitional Sub-Saharan area (Sudan and Guinea Savanna)	80,575	917	Most pronounced disaster in the community is flooding which since 2002 has become a yearly phenomenon. The causes emanate from heavy rains coupled with the opening of the Bagri dam from Burkina Faso which results in the White Volta overflowing its banks. Limited	GEMP; Sustainable Land and Water Management Project; Alternative Livelihood Support for community; SHEA-Market

				availability of food towards the tail-end of the dry season.	
6. Builsa	White Volta/Savannah Woodland	75,376	1,946	The communities identified drought as the most important hazard that affects them followed by floods, bush burning, and desertification. Climate suitable for growing trees with high economic value (e.g. sheanut, dawadawa)	GEMP; Rice Sector Support Project (RSSP); Sustainable Land and Water Management Project; Farmers Agricultural Production and Marketing Project; Northern Rural Growth Project
7. Bongo	Red Volta	77,894	488	Lies within the meningitis belt of Africa. Most affected by meningitis during the 2010 outbreak.	GEMP; Promoting Sorghum Project; Sustainable Land and Water Management Project; Climate Change and Health
<i>Upper West region</i>					
8. Lawra	Black Volta/Guinea Savannah Zone	85,442	509	Prolonged dry season is the key challenge to agriculture. Climate condition can support vegetation for livestock production	Agriculture Sustainable Land Management Project; NRCP; Recovery and Livelihood Support Project, Afforestation, GEMP; Global Water Initiative
9. Nadowli	Black Volta/Guinea Savannah Woodland	81,874	2,594	Climate suitable for growing economic trees (e.g. mango, shea)	Agriculture Sustainable Land Management Project; NRCP; Recovery and Livelihood Support Project, Afforestation; GEMP; Global Water Initiative; Banking on Change
10. Sissala East	White Volta/Guinea Savannah Grassland	149,019	7,781	Experiencing annual flooding since 2007. Flooding attributed to heavy rains, swelling of Sissili River. Drought and rainstorms are also key risks.	Agriculture Sustainable Land Management Project; AGRA Soil Health Project; N2 Africa, RSSP, NRCP; Recovery and Livelihood Support Project, Afforestation, GEMP

The target districts



Annex 6. Community Consultation Report

Adaptation Fund Project Proposal Development Consultation Meeting with Community Representatives from Northern Regions

Minutes of Meeting

Date: 13 March 2012

Time: 9 AM to 4 PM

Venue: Bigiza Court Hotel, Tamale, Northern Region

A. Introduction

1. As the host and organizer of the consultation meeting, the Regional Director of the Environmental Protection Agency (EPA) in the Northern region served as the chair and primary facilitator of the meeting. He explained that the meeting is a part of a broader effort of The Ministry of Environment, Science, Technology and Innovation (MESTI) to elicit stakeholder inputs to the Ghana's project proposal to the Adaptation Fund "*Increase Resilience to Climate Change in Northern Ghana through the Management of Water Resources and Diversification of Livelihoods.*"
2. He reiterated the commitment of MESTI and EPA to make the project proposal development a participatory process. He encouraged participants to participate in the discussions and to share their ideas on how to adapt to climate change in their communities.
3. The participants introduced themselves. Majority of them are leaders of the local environmental committees in their respective communities. There were a total of 41 participants representing districts from Northern, Upper East, and Upper West regions. The list of participants is attached as Annex 7.
4. Representatives from MESTI, EPA Accra, EPA Tamale Regional Office and UNDP also introduced themselves. MESTI and UNDP also delivered their remarks and explained the background of the proposal and the agenda of the workshop. They encouraged the participants to share ideas and contribute to strengthening the proposal.

B. Discussion on Adaptation Fund Proposal

1. An officer from MESTI presented the draft project proposal with focus on the concrete activities that the government will carry out if the proposal is successful. She explained that the emphasis is on concrete activities that have been successfully tested in communities. She also explained how the proposal fits in with the Government of Ghana's National Climate Change Adaptation Strategy (NCCAS).
2. The presentation was followed by a general discussion on the draft proposal. The key issues that emerged from the discussion covered the process of proposal development, activities that the community representatives want to carry out to help them manage climate change impacts, and the principles of implementation that should be integrated into the proposal.
3. The participants asked MESTI and EPA about the process of developing the proposal. A senior official from MESTI explained that a series of meetings at national and regional levels have been carried out starting with a national consultation in Accra in October 2011. He also recalled that in December 2011, series of consultation meetings with government agencies and civil society representatives in the northern regions were carried out. The current meeting with community representatives is the key element of consultation. It was also explained that UNDP has been

requested by MESTI to assist in developing the proposal and serve as the Multilateral Implementing Entity for the Adaptation Fund.

4. The participants lauded the proposal's focus on livelihoods. They mentioned that in the three northern regions, there is a strong link between inability to manage climate impacts on livelihoods and environmental degradation. For example, if the government could support them to earn more money during the dry season when farming is not possible, cutting trees for charcoal could be minimized.
5. Participants suggested the inclusion of the following activities in the proposal:
 - Livestock and animal husbandry
 - Capacity building activities, including training for fire volunteer squads to fight bush fires (which are becoming a frequent event as conditions get drier) and for environmental protection volunteers.
 - Use of improved seed varieties to cope with shifts in climate patterns.
 - Enforcement of bylaws, particularly those governing the grazing areas. It was pointed out that chiefs, elders and district assemblies must make sure that bylaws are implemented.
 - Community-based fish farming was endorsed but particular attention should be given to different gender roles to make sure that the activity does not impose additional burden on women. The construction of fish farms is an arduous task and would be more suitable for men. However women will be capable of fish processing-related activities.
 - Processing activities were also recommended by women, particularly fish processing, shea butter extraction, and soap making.
 - Dry season gardening is highly recommended by women participants as it provides opportunities for women to generate additional income, which they can then roll over to start another income-generating activity. But to make it successful, the source of water (e.g. through a dug-out) must be secure even during the dry season.
 - Planting of trees with economic value, such as mango, cashew, and shea nut.
 - Creation of additional forest reserves
6. The participants welcomed the initiative to access funding from Adaptation Fund. However, they cautioned that implementation should be carried out properly and that the implementing agencies should learn from the weaknesses of earlier projects of similar nature. The following implementation principles were suggested:
 - Take into account cultural integration into the suggested interventions. The use of indigenous knowledge, particularly on crop selection, should be also integrated.
 - The implementing agencies should make sure that the activities are implemented on the ground as envisioned in the project document.
 - Dry season gardens should be established only in designated areas. Establishment of gardens should be monitored closely to make sure that they do not encroach buffer zones.
 - Establishment of wood lots should be supplemented by awareness raising and education so that the people could see the importance of planting trees. The nurseries need to be fenced to protect the seedlings.
 - Attention should be also given to non-climate problems that aggravate the impacts of adverse climate, such as growing population and its impacts on settlement pattern. This puts pressure on forests as people cut trees to build settlements.
 - With respect to implementation arrangements, the participants stressed the importance of identifying governance structures and systems in a specific target community. It has been

pointed out that in some communities, development interventions in the past have created associations and committees in addition to the statutory bodies (e.g. environment management committees, water user associations). The participants upheld the important role of EPA as MESTI's embodiment in the region, recommended that the management structure of the project at the local level should consider the existing community structures, but at the same time recognize that in some communities, the existing structures may not be necessarily the most supportive structure for delivering adaptation. The management structure at the community level would therefore vary from one community to another.

4. Group Discussions

The second part of the workshop was devoted to detailed discussions on the advantages and disadvantages of specific livelihoods and water resource management interventions. The participants formed groups according to the regions that they represent. Since there were several participants from the Northern region, they were split into two groups.

The group discussions were guided by a questionnaire that probes the advantages and disadvantages of proposed interventions under the proposal and whether or not the participants recommend the implementation of such measures in their communities. Finally the groups reported the results of their discussions at a plenary discussion. The results are summarized in the tables below.

Table 1: Community Water Management Activities: Responses by Region				
Water Management Technology	Is the technology successfully used in the communities in your district? How is it used	Advantages of this technology for the communities in your district	Disadvantages/ problems of this technology for the communities in your district	Would you recommend this technology for your community? If so, why?
WATER SUPPLY AND STORAGE				
Dugouts	Upper East: Yes	Will be useful for dry season gardening. Keeps animals at home. Reduces water shortage, safe, and can be used to grow fish.	Animals can fall into them if they are not fenced. Can easily get polluted.	Yes. Preferred choice over boreholes.
	Northern Group 1: Yes	Can be used as reserve irrigation and drinking water for animals during the dry season.	Can dry up very quickly if temperature is very high, animals may fall into dug-outs	Yes
	Northern Group 2: Yes			No
	Upper West: Not available	Can be used to support dry season gardening		Yes
Boreholes	Upper East: Yes	Good for supplying domestic water use, safe for drinking, can supply water all the time, does not easily get polluted.	Mobilizing the financial resources required for build a borehole is beyond the capacity of the community	Yes
	Northern Group 1: Yes	Reliable. Water is reliable, clean and hence prevents diseases.	Can be expensive to build. Some boreholes yield salty water and hence not palatable for human consumption	Yes
	Northern Group 2: Yes	Provides clean disease-free, clean water	Costly	Yes
	Upper West: Yes	Provides clean water. Reduces the burden on women.	Inadequate knowledge on maintenance	Yes
Rainwater harvesting	Northern Group 1. Yes. Used by households and schools	Good drinking water	Expensive	Yes
	Northern Group 2: Yes	Can be put close to houses. Can	Can cause diseases if not	Yes

Table 1: Community Water Management Activities: Responses by Region				
Water Management Technology	Is the technology successfully used in the communities in your district? How is it used	Advantages of this technology for the communities in your district	Disadvantages/ problems of this technology for the communities in your district	Would you recommend this technology for your community? If so, why?
		provide clean water if the facility is covered.	appropriately stored and covered	
Wells	Northern: Yes		Water can be contaminated	No
	Upper West: Yes		Requires significant physical labour to construct. Hygiene can be poor if the well is not protected	Yes
Contour bunds	Northern Group 1: Yes	Prevents erosion of topsoil	Can lead to waterlogging	Yes
	Northern Group 2: Yes	Leads to more available water in farms. Saves crops from wilting as it helps stores moisture.	Can lead to too much water	Yes
Small scale dams	Northern Group 2: Yes	Good for humans and animals. Can provide irrigation during the dry season. Easy to construct and can reliably provide water (unlike boreholes that might not hit water)	Water use can be difficult to control as it can be used for different purposes. Costly to build.	Yes.
Conservation tillage techniques	No responses			
IRRIGATION				
Pitcher irrigation	No responses			
Sub-surface pipe irrigation	No responses			
Shallow well irrigation	No responses			
MANAGEMENT OF FLOOD WATERS				

Table 1: Community Water Management Activities: Responses by Region				
Water Management Technology	Is the technology successfully used in the communities in your district? How is it used	Advantages of this technology for the communities in your district	Disadvantages/ problems of this technology for the communities in your district	Would you recommend this technology for your community? If so, why?
Flood water harvesting	No responses			
Drainage channels/ditches to manage flood waters	Northern Group 2: Yes	Saves crops	Takes time to build. Can lead to water loss.	Yes

Table 2: Livelihood Diversification Activities: Responses by Region				
Livelihood Activity	Is the livelihood activity successfully undertaken in the communities in your district? How is it used	Advantages of this activity for the communities in your district	Disadvantages/ problems of this activity for the communities in your district	Would you recommend this activity for your community? If so, why?
Community based fish farms	Upper West: No	Provides income. Helps in preservation of water bodies	Initial capital requirement could be high. Community has no technical know-how. Uses a lot of water.	Yes.
	Northern Group 2: Yes in a few places	Can provide food, income, and employment	Transportation to the market could be a challenge. Storage of fish would be a problem.	Yes – high income potential
Community based tree nurseries/ wood lots	Upper East: Yes. Used for shelter, medicine, windbreaks, protection of water bodies, and source of food for community.	Also added advantage of protecting the land. Source of additional income.	In terms of land allocation, farming trees would compete with other crops	Yes

Table 2: Livelihood Diversification Activities: Responses by Region				
Livelihood Activity	Is the livelihood activity successfully undertaken in the communities in your district? How is it used	Advantages of this activity for the communities in your district	Disadvantages/ problems of this activity for the communities in your district	Would you recommend this activity for your community? If so, why?
	Northern Group 1: Yes	Provides income and employment	Can fail if there's water shortage	Yes
	Northern Group 2: Yes	Reverses deforestation. Prevents bush burning.	Lack of materials to start.	Yes
	Upper West: Yes	Serves as good windbreaks. Provides extra sources of income.	Could compete with other uses of water. Capital requirement could be high.	Yes
Dry season gardening	Upper East: Yes.	Reduction of food shortage, reduction of unemployment and provide extra source of income, encourages year-round farming, and provides feeds for animals during the dry season.	Can potentially degrade land if you don't leave land fallow. Competes with other uses of water during the dry season. Could be sensitive to pest/disease attacks if there's rain in the dry season.	Yes. Both domestic and commercial scale would be useful.
	Northern: Yes	Provides supplementary source of income and employment	Can fail if there's water shortage	Yes
	Upper West: Yes – both domestic and commercial scale	Provides employment. Improved nutrition.	Inadequate knowledge on how to maintain the garden. Limited extension services to support community efforts.	Yes but stress on not encouraging the use of pesticides and chemicals.
Bee keeping	Upper East: Yes	Can provide medicine, food, and opportunities for income generation. Will provide incentive people to protect trees.	Bees can be dangerous to animals and humans. It needs a lot of attention and the establishment would be difficult to manage without support.	Yes
	Northern group 1: Yes	Provides income. Good medicinal value	Difficult to get resources to build the hives	Yes

Table 2: Livelihood Diversification Activities: Responses by Region				
Livelihood Activity	Is the livelihood activity successfully undertaken in the communities in your district? How is it used	Advantages of this activity for the communities in your district	Disadvantages/ problems of this activity for the communities in your district	Would you recommend this activity for your community? If so, why?
Shea butter processing	Upper West: Yes	Good medicinal value	Community has inadequate knowledge of processing. Lack of processing machinery. Lack of capital.	Yes
Rice processing	Northern Group 2: Yes	Provides additional income. Provides bedding materials for animals	Takes a lot of time	Yes
Small ruminants	Upper West: Yes	Manure can be used as fertilizer	Reliant on rainfall. Lack of capital.	

5. Community Selection Discussion

The final part of the meeting was devoted to a discussion on the factors that should guide the selection of project target areas. The organizers made it clear that the communities will not be decided in this meeting. The participants unanimously suggested that the extent of vulnerability to flooding and drought – they key climate risks in the northern regions - should be the key criterion that should guide the selection of target districts. Within each district, communities will then be chosen based on the following considerations:

For selecting target communities for community-based water management activities:

- Communities are very committed to do activities themselves already/seriousness of the community
- Interest of the people
- Population of the community
- Availability of resources (land, water) in the community to carry out the intervention
- Availability of markets for products
- Accessibility of community
- Severity of water problem
- Sustainability, i.e. how does the community propose to sustain the project once the project finance is gone

For selecting target communities for livelihood diversification activities:

- Availability of raw materials
- Viability of an activity in a particular community
- Level of resource degradation
- Suitability of the weather
- A group that is viable and not just formed because there is money
- Availability of markets
- Levels of poverty
- Availability of human resource/technical persons
- Consistency of proposed activity with customary beliefs
- Availability of similar projects at the community level
- Experience from past projects
- Religious interference
- Existence of local expert knowledge
- Peaceful and stable communities that can show potential to deliver the project
- Communities with high gender sensitivity
- Storage facilities
- Sustainability. i. e. how community does the community propose to sustain the project once project finance is gone

6. Closing

A senior official from MESTI closed the meeting. He explained the next steps of the process and thanked the participants for their active participation during the meeting.

Annex 7: Attendance sheet of stakeholder consultations

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	Romanus Gyamfi	CARE/ALP	Romanus.Gyamfi@concare.org	024 3533686	
2	SHOZO TAKEMOTO	UNDP	shozo.takemoto@undp.org	026 505 8425	
3	KAREFF RAFISURA	UNDP	kareff.rafisura@undp.org	—	
4	BRAM MILLER	UNDP	bram.millere@undp.org	024 904 5881	
5	Johnson Nken	UNAP Kenya	johmsn.nken@undp.org	—	
6	Nicholas K Iddi	MESI	nicholasiddi@yahoo.com	024865892	
7	SENA HUKPATI	EPA (AAP)	sena_hukpati@yahoo.com	0244384121	
8	Lydia Akwi	EPA(AAP)	lydiaakwi@yahoo.com	0241827508	
9	CHRISTINE YOUNG HATEL	WAC	CHRISTINEYOUNG@YAHOO.COM	0244-622283	
10	Alanna Maguire	WFP	alanna.maguire@wfp.org	0545652902	
11	NGUYEN DUC HOANG	WFP	NGUYEN DUC.HOANG@WFP.ORG	0264313772	
12	Romeo Adomah-Darteh	CIDA-PSU	romeo.darteh@psu-ghana.org	0263004820	
13	Emmanuel Obuobie	CSIR-WRI	Obuobie@yahoo.com	024441038	

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			
2	F.D. Ohemeng	GIDA	ohemengfd@yahoo.com	0274866570	
3	George Ortsin	GEF/SGP	georgeo@unops.org	0202164683	
4	Georgy Brudi	FOR - WL	geobriglw@Yahoo.com	0277432014	
5	Edem Laranu	Africa 2000 Netw.	kesaran@yahoo.com	0244-367 329	
6	K.Y Oppong-Boadi	EPA	Koppangboadi@yahoo.com	020-518 425	
7					

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

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

	NAME	ADDRESS	PHONE #	ORGANISATION	SIGN
1	Makubi Caleb	Box 31 ER, Tamale	0243645424	WV-Savelugu	
2	Sampson Tettey	KV-GRWP PMB, Tamale	0262288465	WV-GRWP	
3	David Nunu	WV-GRWP PMB TAMALE	0208162483	WV-GRWP	
4	S.J. KARBO	WV-GRWP PMB Tamale	020 1333 578	WVGR-GRWP	
5	James Acedem	Savelugu Ops Base Box 31 ER, Tamale	0244748912	WV Savelugu	
6	Bram Mills	UNDP-ACCRA	024 904 5881	UNDP	
7	KAREFF RAFISURA	UNDP-ACCRA		UNDP	
8					

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

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

	NAME	ADDRESS	PHONE #	ORGANISATION	SIGN
1	David Koulen	P.O. Box 71 2183 Kulani 2009 @ yehooah	0244887033	CSLD	
2	Daseh Mary		0246456805	CSLD	
3	Alhassan A. Nafsa	Box 2183 TL	0247732328	CSLD	
4	Abdul-R. Awad	Box 2183	0207144143	CSLD	
5	Sosonoh K. BARLITAM	P.O. Box TL 1183	02559979104	OIC - Northern Ghana Program	
6	Alex Bokuna	UNDP - TAMALE	0244343199	UNDP	
7	Namso David	IDC - Tamale	0247106908	IDC	
8	Thomas N. Mungoni	IDC - Tendi Box 42	0242801542	IDC	
9	Bram Mills	UNDP - ACCRA	024 904 5881	UNDP	
10	KAREFF RAFISURA	UNDP - ACCRA		UNDP	

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

1/2

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

	NAME	ADDRESS	PHONE #	ORGANISATION	SIGN
1	ABU ADAMS	P.O. Box 100 Tamale	0208977093	NADMO	
2	RAMJEH ABU	P.O. Box 100 Tamale	0245242063	NADMO	
3	Abu Iddrisu	P.O. Box 620 Tamale	0243635902	EPA	
4	Kumbi Abukari	P.O. Box 620 Tile	0244570426	EPA	
5	Alex Bokuma	UNDP- REC TILE	0244343995	UNDP	
6	Adam Tamin	NADMO Reg.	0243870168	NADMO	
7	KAREFF KAPISURA	UNDP ACCRA		UNDP	
8	BRAM MILCER	UNDP, ACCRA	024945881	UNDP	
9	George Issaka	Comm. Dev. Box 57, Tamale	0249305740	Comm. Dev	
10	Williams Alogana	Dept. of Comm. Dev. Box 57, Tamale	0272022623 0244845045	DoCD	

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

Meeting Date and Time: 6/12/11 ~~9:00~~ 11 AM
Meeting Location: CW SA

	NAME	ADDRESS	PHONE #	ORGANISATION	SIGN
1	JEREMIAH ATENGDEM	CWSA TRIPLE-S BOX 810, TAMALE	0244512816	CWSA TRIPLES	
2	JOSEPH TEI-LABI	C.W.S.A BOX 810, TAMALE	0246542277	CWSA	
3	AHMED EWUSA	CWSA, TAMALE	0244713170	CWSA	
4	ALEX BOKUMA	UNDP-TAMALE	0245380808	UNDP-TILE	
5	Steve Anankun	CWSA Tamale	024744249	CWSA	
6	Musa B. Bagbidi	CWSA Tamale	0208395369	CWSA	
7	ACUBAH PRA	MofA Tamale	0244000227	MofA Box 14 Tile	
8	Ahij. Bawah ps M. Yankuba	✓	0244154898	✓	
9	Fugayah A. Tamin	✓	0243565311	✓	
10	Paul Bangmyel	CWSA TR	0241127612	CWSA	
11	Bram Milc	UNDP ACCRA	024945881	UNDP	
12	KAREFF KAPISURA	UNDP ACCRA		UNDP	

Community Consultation Meeting – Tamale – 13th March 2012 (2 of 3)

	Name	Region	District	Community	Phone numbers
10	KAREPP LARISAMA	ACCRA			0261167529
11	I. C. Agyemah	EPA, Accra	Accra	Accra	0243004082
12	SAMUO MERCY JANE	UPPER WEST	LAWRA	TamGoth	0209250037
13	Tokulua Braimah	Northern	Gushiegu	Zantili	0204456641
14	Salifu Lukman	Northern	Gushiegu	Seelaa	0245037410
15	Adom Abdulai	Northern	Sagelu	Zaazi	027178588
16	Alhassan Alamba	Northern	Northern	Duayin	-
17	Mahamadu Hienobu	N/R	Tamale Dangbo	Dungu	024679530
18	Abdulai Abuyiri	U.E.R.	Garu-Tempne	Garu-Tempne	0245490167
19	Osman Zafari	N/R-EPA	Tamale Meho		0242924039
20	Nab A. Afulang	U.E.R.	BUILSA	SIVIENSI	0242623162
21	Joseph Akwadi	U.E.R.	✓	NIAGA	0249708681
22	Ahmed Badohani	Sissala West VNR	Sissala West	Myimati	0207936154
23	Bernard Besong	U.E.R.	Talensi / Mabdam	Yinduri	0547052931
24	Nicholas Iddi	NWEST		ACCRA	0248639270
25	Abariga Awudu	U.E.R.	Garu-Tempne	ZISANI	0245095384
26	Awini Alice	U.E.R.	Bawku West	Kobore	0245832763
27	Anselinga Elijah	U.E.R.	Bawku West	Kobore	024234708

Community Consultation Meeting – Tamale – 13th March 2012 (3 of 3)

	Name	Region	District	Community	Phone Number
28	BRAM MILLER	UNDP - ACRA			0245083881
29	Jabuni D. Abdul-Gafaru	Northern	Central Gonja	Wambong	0249228514
30	Alimani MUSAH	Northern	Central Gonja	Kablife	0246373666
31	Abukari Issahaku	Northern	Tolon Kumbungu	Nwodua	0245276139
32	Paul AISSAHAKU	Northern	Kumbungu	Nwodua	024348462
33	Daniel Tasi Bamefa	EPA/ACRA	TMA	Acra	0246114652
34	✓ ANBONI VIVIAN	MIR	TAMALE METRO	TAMALE	0243087162
35	✓ NIKMATI IDRISU	✓	✓	✓	0246733073
36	✓ ABIBA MUCAPPIHAR	✓	✓	✓	0243802787
37	Sulemana Issah	N/R	Savelugu	Ayamandu	0246733379
38	✓ Abu Iddrisu	MIR	Tamale	EPA/NR	0243635702
39	Yaw NAWAMU	N/R	Chereponi	Banjani	0245280525
40	Ijayibin Irene	N/R	Tamale	EPA/NR	0243675272
41	Harruna Ayisha	N/R	Tamale	EPE/NR	0547848381
42					
43					
44					

ANNEX 8. 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
MESTI	Ministry of Environment, Science, Technology and Innovation
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 9. 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)	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 2: Outcome 2: Climate resilient management of water resources by at least 50 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 50	Percentage of population with improved water management practices resilient to	Output 4: Vulnerable physical, natural, and social assets	4.1.2. No. of physical assets strengthened or constructed to

⁴⁴The AF utilized OECD/DAC terminology for its results framework. Project proponents may use different terminology but the overall principle should still apply

communities in northern Ghana	climate change impacts in the targeted regions.	strengthened in response to climate change impacts, including variability	withstand conditions resulting from climate variability and change (by asset types)
Outcome 3: Enhanced diversification of livelihoods under climate change by at least 50 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