PROPOSAL FOR A REGIONAL PROJECT

Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin

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EXECUTIVE SUMMARY

With a total population over 24 million living on the Volta Basin, integrated water resources management (IWRM) and any measures to reduce natural hazards related to extreme events, such as flood and drought, provide high benefits to support socio-economic and environmental development of the six West African riparian countries. The geographic setting of the Volta Basin, covering an area of about 400 000 km^2 and extending from semi-arid to sub-humid areas, is highly vulnerable to meteorological and hydrological events. Over the last 20 years, almost two million people have been affected by floods in the Volta basin. Key affected stakeholders are mainly people working in the agricultural sector as around 68% of the population in the basin is largely dependent on agriculture. Moreover, people affected by poverty tend to move to urban areas and, due to the lack of land-use planning and alternatives, mostly live in areas prone to risks such as valley and mountain slopes, particularly vulnerable to floods and landslides. Besides exposure to riverine floods along the river courses, high intense pluvial events cause localized floods particularly devastating in urban areas.

These socio-economic baseline issues are exacerbated by a climate that has undergone considerable change in recent decades and is expected to continue changing throughout the 21st century. Through various studies, climate predictions foresee a mean annual reduction of precipitation and an increase of temperature in the Volta Basin. This will modify the current distribution of water resources over the different climatic zones, therefore aggravating an already existing situation of conflict between the competing uses. Overall, dry seasons are expected to be longer and drier, while rainy seasons are going to be shorter but characterized by more intense precipitation events. Furthermore, the West African countries are also suffering from the deterioration of the ecosystem due to increasing pressure on the natural resources and climate variability.

The Flood and Drought Volta project will assist the six countries in **the implementation of coordinated and joint measures to improve** their existing management plans at regional, national and local level and to build on the lessons learned from the past and current projects related to **disaster risk reduction and climate adaptation**. The six riparian countries will therefore benefit not only from a **basin-wide transboundary management framework to ensure long-term environmental and economic development, as well as concrete solutions** to alleviate a potential increase of vulnerability and to build an effective network of actors.

Integrated water resources management, **risk maps and development of early warning systems will be implemented to increase resilience to floods and droughts** and ensure socio-economic sustainable development. Furthermore, at local scale, agricultural practices will be improved thanks to new knowledge and early warnings that will enable farmers to adapt their production methods.

To respond to the needs expressed in 2016 by a large number of stakeholders, the programme will include **the selection and implementation of appropriate End-to-End Early Warning Systems (EWS) for Floods and Drought allowing integration of short-term to seasonal indicators into the long-term management framework**. Future integration of modules covering additional natural and health hazards will be foreseen in the system to allow its upgrading towards a Multi Hazard Early Warning System. A series of pilot testing on the dissemination, use and feedback of the flood and drought Early Warning System will be conducted during the monsoon and dry season for selected target areas, which involve representatives of the major groups of beneficiaries. Ten pilot tests areas that could be studied during year 2 and 3 of the project have been identified.

The Volta project has the ambition to provide the first large scale and transboundary implementation of Integrated Flood and Drought Management strategies by empowering the National Meteorological and Hydrological Services (NMHS) and other competent authorities of the

six riparian countries with robust and innovative solutions for disaster risk reduction and climate adaptation, including green solutions and gender sensitive participatory approaches. The Early Warning System will be designed to reach the civil security services and other private and public stakeholders concerned by extreme events and the general public as well.

Increasing knowledge on the hydrological characteristics of the river system will contribute towards the understanding of their ecological processes. **The study of the impacts of extreme climatic events is also crucial for wetland ecosystem management and protection strategies.** Physical variables (discharge, sediment transport and temperature) are recognised as major processes governing the riverine biodiversity and productivity. The integrated approach for flood and drought management that will be fostered by the Volta project activities will provide a base for the interactions between operational hydro-meteorologists and ecologists. A forum will be created to **link physical and biological expertise related to the environmental flows and to push towards defining the ecosystem flow requirements thresholds that could be derived from the hydrometeorological data and implemented in the Early Warning System**.

The project will tackle climate adaptation issues, ensuring transversal solutions from governance to technical and decision making. It will develop the underlying capacity of national and regional institutions to maintain long-term sustainability and to scale up the results. It will support stakeholders at all levels by providing **policy and management guidance and by sharing scientific information, knowledge and best practices for Integrated Disaster Risk Reduction and Climate Adaptation**.

The Volta project is aligned with the Adaptation Fund objective to ***"reduce vulnerability and increase adaptive capacity of communities to respond to the impacts of climate change at local, national and regional level".*** Implementing climate adaptation strategies and improving the management of water resources is recognised by the six riparian countries as one of the major challenges facing national services and the transboundary Volta Basin Authority.

The World Meteorological Organization (WMO), as Implementing and Executing Entity, will be involved at several levels into the programme activities and supervision, allowing to benefit from its international as well local presence. At the regional transboundary level, two Executing Entities, will fulfil the coordination and relationships with the institutions and stakeholders on the basin

- The Volta Basin Authority (VBA) will be the focal point for data sharing and dissemination through its Observatory, and for transboundary coordination and links with the national structures
- The Global Water Partnership West Africa (GWP-WAF) through its Country Water Partnerships (CWP) will foster the integration of communities and local stakeholders, while connecting with national policy makers.

The long-term sustainability of the project achievements will be dependent on the VBA receiving the meteorological, hydrological and climatological data and related products from the National Meteorological and Hydrological Services (NMHSs) of Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, and Togo. Several NMHSs and other agencies in charge of environmental protection have already provided support letters to ensure the long-term transfer of information from the national databases to continue operations of the forthcoming VBA EWS coordination unit.

PROPOSAL FOR A REGIONAL PROJECT

PART I: PROJECT INFORMATION

Title of Project:	**Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin**
Countries:	Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo
Thematic Focal Area:	Disaster risk reduction and early warning systems
Type of Implementing Entity:	Multilateral Implementing Entities (MIE)
Implementing Entity:	World Meteorological Organization (WMO)
Executing Entities:	World Meteorological Organization (WMO), Volta Basin Authority (VBA) and Global Water Partnership West Africa (GWP-WAF)
Amount of Financing Requested:	7'920'000 USD (in U.S Dollars Equivalent)

Project Background and Context:

Project Overview

Africa is one of the most vulnerable continents due to its high exposure and low adaptive capacity to water-related disasters in general and climate change impact particularly. Besides measures taken at national level to decrease the negative effect of extreme events, such as floods and drought, it is recognized that additional programs must be implemented at local level in order to build disaster-resilient communities through more integrated climate adaptation measures, policies and practices, including stakeholders' perspectives and a participatory approach.

With a total population over 24 million living on the Volta Basin[1], integrated water resources management (IWRM) and any measures to reduce natural hazards related to extreme events, such as flood and drought, provide high benefits to support socio-economic and environmental development of the six West African riparian countries. The geographic setting of the Volta Basin, covering an area of about 400 000 km^2 and extending from semi-arid to sub-humid areas, is highly vulnerable to meteorological and hydrological events. Over the last 20 years, almost two million people have been affected by floods in the Volta basin. In Burkina Faso alone, close to 20 million people suffered from drought periods since the 1980s.

Key affected stakeholders are mainly people working in the agricultural sector as around 68% of the 24 million people living in the basin are largely dependent on agriculture, which is mainly rain-fed, poorly mechanized and consists of small family farms particularly vulnerable to climate related impacts. Moreover, people affected by poverty tend to move to urban areas and, due to the lack of land-use planning and alternatives, mostly live in areas prone to risks such as valley and mountain slopes, particularly vulnerable to floods and landslides. Besides exposure to riverine floods along the river courses, high intense pluvial events cause localized floods particularly devastating in

[1] Williams et al, 2016,The Volta River Basin: Water for Food, Economic Growth and Environment and Volta Basin fact Sheet, Flood and Drought Management Tools (FDMT) project (2017-2019)
http://sites3.iwlearn3.webfactional.com/fdmt/en/documents/Information%20sheets/volta-basin-profile/view

urban areas, as this has been the case during the June to September 2009 extreme pluvial monsoon over West Africa and event on Ouagadougou with some 120,000 people displaced.

These socio-economic baseline problems in the Volta Basin are exacerbated by a climate that has undergone considerable change in recent decades and is expected to continue changing throughout the 21st century. Through various studies, climate predictions foresee a mean annual reduction of precipitation and an increase of temperature in the Volta Basin. This will modify the current distribution of water resources over the different climatic zones, therefore aggravating an already existing situation of conflict between the competing uses. If drought increase is evident, more severe and frequent pattern of floods are also predicted, due to dry and eroded soil conditions exacerbating the surface runoff during the scarce, nevertheless intense, rainfall events. Overall, dry seasons are expected to be longer and drier, while rainy seasons are going to be shorter but characterized by more intense precipitation events. Combined with the socio-economic context (majority of people depending on rain-fed agricultural production and internal migration towards urban centres, currently not tailored to absorb additional people), this will translate into a hampered food security situation, loss of income and livelihood for farmers and increase of people living in informal settlements located in flood prone areas of urban centres.

Besides the above mentioned socio-economic problems, the West African countries are also suffering from the deterioration of the ecosystem due to increasing pressure on the natural resources and climate variability. In the Volta Basin region, expected changes in water needs and climate may additional create loss of native biodiversity consisting of savannahs, grasslands, forest plantations, wetlands, mangroves, ponds, lakes and lagoons as well as protected areas[2]. This situation is aggravated by the increased flooding and water shortages during drought, lack of knowledge and awareness, as well as the need for improved implementation of legislation and policies along with the necessary reinforcement of institutional capacities[3].

With limited adaptation interventions, the regional and national agencies acknowledge that a large proportion of the Volta Basin's population will remain extremely vulnerable to the interacting effects of climate change and ecosystem degradation. There is a need for improving and complementing the adaptation plans, projects and policies on the climate-based threats especially floods and drought events in the Volta Basin region. At the national level, most countries of Volta Basin region have existing climate change adaptation action plans and strategies or are in the process of implementing National Adaptation Plans (NAPs) and National Adaptation Programme of Action (NAPA) enhancing the climate change adaptation efforts of the national agencies and their communities. Furthermore, all countries have listed activities on integrated water resources management, early warning and climate adaptation in their intended nationally determined contributions (INDCs). The main areas for INDCs listed by the six countries are summarized in Table 1 for the topics closely related to the major fields of the Volta project. The countries are dedicated to find support for achieving the targets.

[2] UNEP-GEF Volta Project, 2013. Volta Basin Transboundary Diagnostic Analysis (pg. 33-38).

[3] GWP and VBA, 2014. Final Report on the Assessment of the Current State of Water Management and Climate Change in the Volta Basin as part of the Establishment of an Observatory for Water Resources and related ecosystems.

Table 1: INDC areas of the six countries

Countries / NDC contributions to	Benin	Burkina Faso	Cote d'ivoire	Ghana	Mali	Togo
Vulnerability and Impacts	☒		☒			
Climate change and environment	☒			☒	☒	☒
Agriculture	☒	☒	☒		☒	☒
Water resources	☒	☒		☒		☒
Human awareness and knowledge development	☒					☒
Health	☒	☒	☒			☒
Strengthening early warning system		☒		☒		
Gender				☒		
Coastal zones	☒		☒	☒		☒
Land-Use	☒	☒	☒	☒	☒	

Source: http://www4.unfccc.int/ndcregistry/Pages/All.aspx

At the transboundary level, the Master Plan for Development and Sustainable Water Management (MPDSWM) is being developed by the Volta Basin authority, the transboundary water management institution of the region, to effectively manage water resources among the Volta Basin countries.

The implementation of regional and national adaptation plans, frameworks and strategies for climate change adaptation and disaster risk reduction is, however, insufficient due to lack of regular monitoring and follow-up activities. With the growing population, improper land-use or land management and climate change variabilities over the years, more and more people are at risks and their resilience capacities have not improved. The government agencies of the Volta Basin countries require support in terms of adaptation projects which will enhance their capabilities and prepare them from the future climate change related impacts therefore contributing to the national implementation of the Sendai Framework (2015-2030).

Transboundary coordination, exchange of knowledge and mutualisation of technical infrastructures are therefore becoming a challenge as growing population and impact of climate change add increasing pressure on natural resources. Already in 2016, assessment of capacity building needs on the six riparian countries and the Volta Basin was performed by national experts in a consultative process with the main relevant stakeholders to form the basis for integrated flood management projects[4]. The main conclusions of these participative consultations highlighted major priorities to build on the current context and to prepare the region to future economic and environmental changes, such as:

- integration of disaster risk reduction in the national management frameworks,
- increase knowledge of communities on risks,
- enhancement of synergy and coordination mechanisms at regional level to foster integrated flood and drought management,
- availability of standardised data and information, especially real-time data,
- early warning systems and strategies to manage disaster risks,

[4] GWP West Africa, 2016. Evaluation des besoins de renforcement des capacités. Préparation des projets de gestion intégrée des inondations pour le Bénin, Burkina Faso, Côte d'Ivoire, Ghana, Mali et Togo et le bassin de la Volta en Afrique de l'Ouest. Series of seven reports. Unpublished

- coordination of information channels and procedures developed for end-to-end early warning systems,
- involvement of communities into flood preparedness and contingency plans.

As a response to this needs assessment, the proposed project aims to implement concrete actions in order to increase the resilience of population and ecosystems and alleviate the impacts of climate change in the Volta Basin. The project will provide floods and drought risks maps, hydro-meteorological information and evaluate the future impacts on the climate, environment, water resources and livelihood. The integrated approach for floods and drought events through End-to-End early warning systems will be developed at the national and transboundary level providing support for the decision- makers and people. The project will expand its intervention to improve or update the existing governance policies, guidelines and protocols for the data sharing and water management at the transboundary level increasing their resilience in a coordinated way. Overall improvements of environmental management through education and policy strengthening will increase the resilience of ecological resources and associated livelihoods. Besides those goals related to the support and improvement of the capacities (human resources and data management) of the hydrometeorological and climate services, the project provides an opportunity to raise awareness and foster activities to link the understanding of hydrometeorological processes to the environmental protection and ecosystem sustainability. This will be particularly welcomed by the local communities that are expecting new solutions to overcome the negative effects of recurrent floods and concomitant drought periods during the same year.

By developing and implementing activities at national and regional level on natural disaster risk reduction, the project will participate to the achievement of the Sustainable Development Goals (SDG) by the six countries. The project will have a direct beneficial impact on SDG 13 (take urgent action to combat climate change and its impact) and more specifically on targets as below:

Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters,
Target 13.2: Integrate climate change measures into national policies, strategies and planning,
Target 13.3: Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

Indirectly, the project will advance the implementation of other SDGs such as SDG 1 (no poverty), SDG 2 (zero hunger), SDG 3 (good health and well-being), SDG 5 (gender equality), SDG 6 (clean water and sanitation), SDG 7 (affordable and clean energy), SDG 8 (decent work and economic growth), SDG 10 (reduced inequalities), SDG 11 (sustainable cities and communities), SDG 15 (life on land) and SDG 17 (partnerships for the goals). The project will focus on improving integrated water resources management implementation including the transboundary cooperation (SDG 6). IWRM and more specifically flood and drought integrated management, are two major goals supported by the three executing partners in their long-term strategies. This covers the concept of holistic approach for the management of these two extreme events, targeting activities to maximize the productivity and efficient use of flood plains, while minimizing the loss of life and impact on livelihoods through protective measures. Risk-informed decision making is a key element of integrated hazard management. Doing so, the project will place effort to achieve the target and indicators of SDG 6 as below[5]:

Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
Target 6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

[5] Sustainable Development knowledge Platform https://sustainabledevelopment.un.org/sdg6

Background context

Geographical context

The Volta basin is located in West Africa between latitudes 9°N to 15°N and longitudes 6°W to 3°E (Figure 1). It is the 9th greatest fluvial basin in Sub-Saharan Africa and covers an area of around 400,000 km^2.

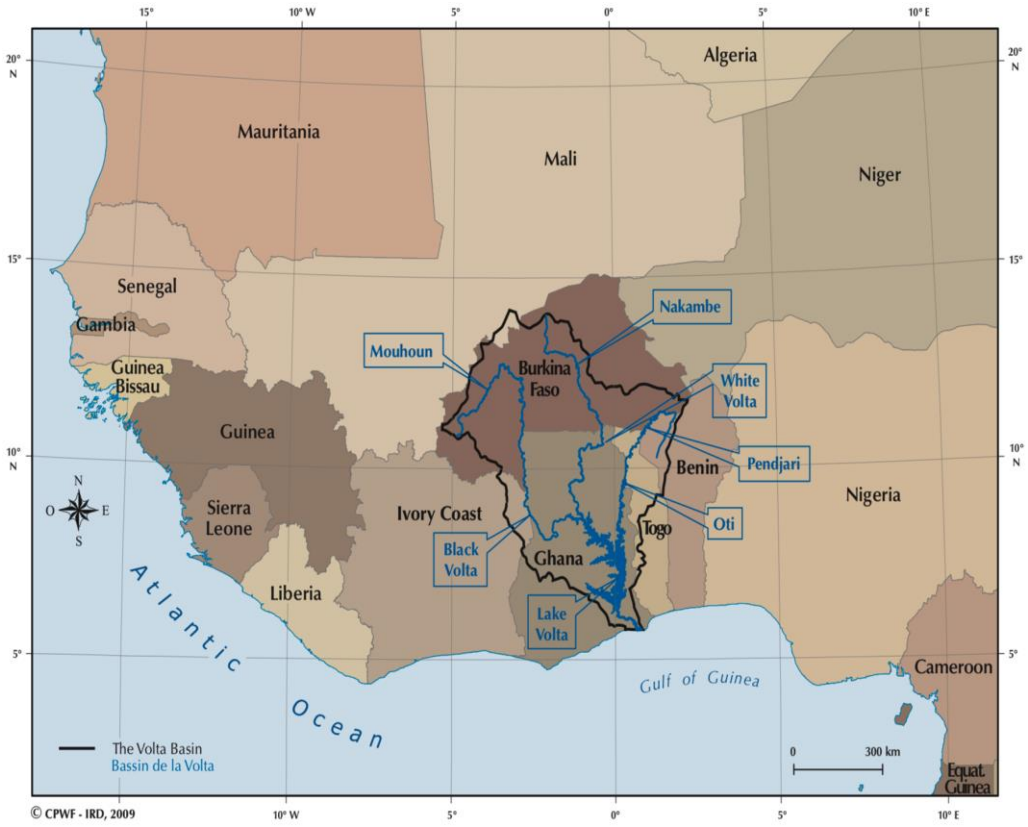


Figure 1: Location of the Volta Basin in West Africa[6]

The basin is shared by six riparian countries: Benin, Burkina Faso, Côte d'Ivoire, Ghana, Togo and Mali. Table 2 provides basic data for the distribution of the basin over the six countries, and the area of each country that lies within the basin. The Volta basin is made of three major tributaries: The Black Volta River (called Mouhoun in Burkina Faso), the White Volta (called Nakambé in Burkina Faso) and the River Pendjari, which becomes the River Oti in Togo. These rivers meet in Lake Volta and form the River Volta downstream Akosombo dam. The Mouhoun and Oti rivers are respectively part of the borders between Ghana, Burkina Faso and Ivory Coast for the former and between Togo, Benin, Ghana and Burkina Faso for the latter.

[6] Lemoalle J., de Condappa D., 2009. Water atlas of the Volta basin. Colombo, Marseille: CGIAR/CPWF.

Table 2: Area of Volta Basin within respective countries[7]

	Area of basin (km^2)	Percentage of basin in the country	Percentage of the country in the basin
Benin	13 590	3.41	12.1
Burkina Faso	171 105	43.0	62.4
Côte d'Ivoire	9 890	2.48	3.07
Ghana	165 830	41.6	70.1
Mali	12 430	3.12	1.00
Togo	25 545	6.41	45.0
Total	398 390	100	-

Ghana and Burkina Faso cover most (85%) of the basin in terms of surface area.

In Burkina Faso, the Volta Basin covers all or part of most of the regions of the country and is drained by the Mouhoun and Nakanbé rivers.

Within Ghana, the major sub-basins of Volta include the Black Volta basin, White Volta basin, the Oti basin and the Lower Volta basin which includes the Volta Lake. Volta Lake is the largest man-made lake in the world by surface area. It is completely included within Ghana and has a surface area of about 8,500 km^2, an average depth of about 18.8m and a shoreline of about 5,500 km.

Togo contains only a small percentage of the total basin but this area comprises a significant proportion of the entire country, with the basin covering all of two regions, Savanna and Kara, and part of three other regions: Central, Plateaux and West Maritime.

In Benin, the national share of the Volta basin accounts for about 12% of the national territory and extends its influence mainly on the departments of Atacora and Donga, where it occupies 47% of their cumulated territories; respectively 90% and 10% of its area in these departments.

The Ivorian part of the Volta Basin covers the regions of Bounkani and Gontougo. This region is administratively subdivided, respectively, into Bouna and Bondoukou Departments which are in turn subdivided into districts. The Ivorian portion of the Volta Basin covers about 3.5% of the national area and 3% of the basin area.

In Mali, the Volta River basin is represented by the Sourou River sub-basin located in the Mopti Region, a tributary of the Volta River that flows about 80 km in Mali before entering Burkina Faso where it merges with the Mouhoun. The Mouhoun itself is an important permanent tributary of the Volta River, which owes the permanence of its flow to many sources in its upper basin in Burkina Faso. In Mali, it drains an area equivalent to 3% of the total area of the basin.

Socio-economic context

The countries that share the Volta Basin are among the poorest in the world, with underdeveloped economies, and majority of the people living below the poverty line. Table 3 provides the latest Gross Domestic Product figures for the Volta Basin countries, with values ranging from US$ 579 in Togo to US$ 1,526 per capita per annum in Côte d'Ivoire.

[7] UNEP-GEF Volta Project, 2013. Volta Basin Transboundary Diagnostic Analysis.

Table 3: Gross Domestic Product (GDP) for countries in the Volta Basin (2016)

	GDP* (billion US$)	Population (millions)	Population growth (annual %)	GDP per capita (US$)
Benin	8.58	10.87	2.8	789
Burkina Faso	12.12	18.65	2.9	650
Côte d'Ivoire	36.16	23.69	2.5	1526
Ghana	42.69	28.21	2.2	1514
Mali	14.05	17.99	3.0	781
Togo	4.40	7.61	2.5	579

Source: http://databank.worldbank.org/data/home.aspx.

Notes: * Figures are for the countries and not just the basin region.

Benin belongs to the group of least developed countries with a GDP per capita of US$ 789 (current $US) in 2016. In terms of the Human Development Index (HDI), Benin ranks 167 out of 188 in the 2015 UNDP report with an HDI of 0.485 and still is among the 40 poorest countries in the world[8]. The population of the National Portion of the Volta Basin (NPVB) was 750 236 habitants or 7.49 % of the total population of Benin in 2002, a third of them living in urban areas, and 2 third in rural areas[9]. On the NPVB, the main economic activities concern agriculture (rainfed and subsistence type), livestock rearing, fisheries and aquaculture, logging, mining, trade and tourism. The agricultural sector employs about 83% of the population in the whole area. It is the first sector providing resources to households. Of the NPVB, arable land is estimated at 1,400,000 ha and less than 10% is actually harvested[10].

In Côte d'Ivoire, according to the World Bank's latest Living Standards Measurement Study in 2015, the incidence of poverty declined from about 51 percent in 2011 to 46 percent in 2015. Poverty remains a predominantly rural phenomenon, linked to inequalities of access to essential services and gender disparities. 68% of the labour force depends on primary agriculture and 43% is illiterate[11]. The population of the Volta Basin in Côte d'Ivoire is 450,000 inhabitants or 2% of the national population and only 2% of the population of the Volta Basin estimated at about 22 million inhabitants in 2016. Agriculture is the main activity of the NPVB: thanks to its geographical location, straddling two ecological zones (forest to the south and savannah to the north), the climatic diversity allows the cultivation of a wide range of crops, ranging from cash crops (coffee, cocoa) to food and vegetable crops. The area is also suitable for livestock rearing development.

Mali is ranked among the least developed countries with a GDP per capita of US$ 781 in 2016. Human development indicators point to a difficult socio-economic situation. The Malian economy remains highly dependent on the mining sector and on agriculture. In fact, agriculture contributed, on average, to 39% of GDP over the period 2006-2010. The population grows by 3% per year,

[8] http://hdr.undp.org/en/indicators/137506.
[9] GWP West Africa, 2016. Evaluation des besoins de renforcement des capacités, Benin.
[10] UNEP-GEF Volta Project, 2008. Etude sur l'établissement d'un système régional d'échange des données et informations relatives au bassin versant de la Volta au Benin. UNEP/GEF/Volta/NR BENIN.1/2008.
[11] GWP West Africa, 2016. Evaluation des besoins de renforcement des capacités, Côte d'Ivoire.

which does not allow to consider a doubling of the per capita income before thirty-five years. In Mali, the Sourou Basin has a population of 668,000 inhabitants according to the provisional results of the General Census of Population and Housing (RGPH-2009). The population of the basin is mostly young and rural with 330,300 men in 2009 for 335,700 women in 2009, therefore 98 men for every 100 women. The plain of Sourou has undergone major hydro-agricultural development: more than 3,800 ha of land are managed in total water control and operated by more than 3,000 producers. The Sourou Basin has a total economic value estimated at 19.85 billion FCFA (≈35.5 million $US). Among the goods and services identified, land resources are the most important in the area and provide in monetary terms nearly 30% of the resources of the valley. Although fishing is considered a very important activity in the area, its contribution to total economic value is only 10%[12].

In Togo, poverty affects nearly 62% of the population, in rural areas and larger households. According to the 2006 QUIBB survey[13], the incidence of poverty in rural areas is 74.3%, representing 80% of the poor. The economy of Togo is largely dependent on the agricultural sector (including livestock and fisheries), which is the main source of income and employment for 63% of the population, as well as a significant share of merchandise export earnings. The population of the Volta Basin in Togo was estimated at 1.6 million in 2000[14]. In 2010, this population is approximately 2.15 million and is expected to grow to 2.9 in 2020 and 3.9 in 2030. This population increase is a threat for natural resources. The watershed covers about 47% of the national territory. It provides all of the togolese cocoa and coffee production and more than half of the cotton production. The floodplains of the Volta basin offer enormous services for both humans and wildlife: these plains are interesting lowlands for rice growing and also shelter a hydrophilic fauna that attracts a large number of tourists, incurring significant financial inflows for these areas. In the light of this observation, the search for solutions to the various environmental problems will improve the national GDP.

Burkina Faso is a low-income country, with nearly 45% of the population living on less than a dollar a day[15]. According to statistics published in 2009 by the National Institute of Statistics and Demography, the poverty rate in Burkina Faso is estimated at 46%. The report on the Human Development Index (HDI) of the United Nations Development Program (UNDP) for 2015 ranks Burkina Faso 185th out of 188 countries. The population of Burkina Faso, which grows at an average annual rate of 2.9%, is characterized by its youth (more than 60% under 20 years) and its rurality (76%). Burkina Faso economy is highly vulnerable to external shocks due to the predominance of export agriculture (notably cotton) and the importance of external assistance[16]. Since 1995, economic growth - mainly due to the expansion of the primary and tertiary sectors - has been 5.5% per year, but the international context and the adverse climatic conditions have led to a slowdown in activity in 2000. The economy is dominated by the primary sector. Like the national territory, the socio-economic context of the Volta Basin in Burkina Faso remains characterized by the preponderance of the primary sector which is based on agriculture, livestock rearing and forestry. These sectors absorb on average 30 to 35% of public investment programs. 90% of the areas planted for cotton growing is located in the Volta Basin, which contains the two largest cotton basins in the country: the western cotton basin (Mouhoun basin) and the eastern cotton basin (Nakanbé basin). In the Mouhoun basin, cereals and cash crops occupy 67% and 30% of the cultivated area respectively. In terms of industry and mining, the territory of the Volta Basin in Burkina Faso supports most of the country's industrial activity. In the Nakanbé basin, 47 irrigated perimeters are identified but the developed areas are only 2,620 ha, including 1,000 ha

[12] GWP West Africa, 2016. Evaluation des besoins de renforcement des capacités, Mali.
[13] Questionnaire Unifié des Indicateurs de Base du Bien-être.
[14] GWP West Africa, 2016. Evaluation des besoins de renforcement des capacités, Togo.
[15] BAD/OCDE, 2008. Perspectives économiques pour l'Afrique.
[16] MEF, 2012. Schéma National d'Aménagement et de Développement Durable du Territoire.

for Bagré which is a hydro-agricultural and hydroelectric mixed-use dam. In terms of energy, the Bagré dam with a productivity of 44 GWH per year contributes to about 25% of the national electricity production.

Ghana is a middle-income West African country which experienced impressive economic growth from 2005 to 2012. This growth has slowed significantly since 2013 in light of macro-economic challenges, such as high budget deficit and inflation, but is still expected to remain positive, due to the country's stable democratic institutions and rich natural resources. Per capita GDP reached US$ 1,514 in 2016, and the Human Development Index improved as access to health care and education increased, making Ghana one of the few 'medium human development' countries in the region. Furthermore, Ghana has met the Millennium Development Goal of halving poverty and hunger before 2015 (MDG1). Nevertheless, over a quarter of the population still remains below the poverty line of US$ 1.25/day, particularly in the Northern regions. Agriculture is a key sector of Ghana's economy, accounting for 23 percent of the national GDP in 2012[17]. Agriculture is even more dominant in the Volta Basin, with more than 50% of employment. Job creation in the basin, as in all parts of the country, has not kept pace with population growth resulting in, among other things, high rates of unemployment, underemployment and poverty. Exports account for a significant share of GDP but are not diversified in terms of products and destinations: gold and cocoa accounted for over 70% of exports in 2009. The Akosombo Dam was constructed to supply electricity from the Volta River for industry and to supply power to the towns and cities of Ghana and neighbouring countries. The Akosombo, Bui and Kpong dams are still Ghana's major source of electricity. Demand for power continues to increase in the country, especially within the urban-industrial sector. The country's continued commitment to hydropower as an engine of growth is demonstrated by the ongoing construction of the Bui Dam in the Bui Gorge (Black Volta). This dam is designed to fill the gap in the supply of electricity and increase Ghana's generating capacity[18].

Environmental and Ecosystem Context

The vulnerability in West African countries is not only increasing because of social changes but also through environmental stresses due to modification of natural hazards, environmental degradation, climate change and losses of natural resources and biodiversity. These stresses have a major impact on the livelihood of the most vulnerable population (security, health condition economic opportunities) as highlighted in Figure 2.

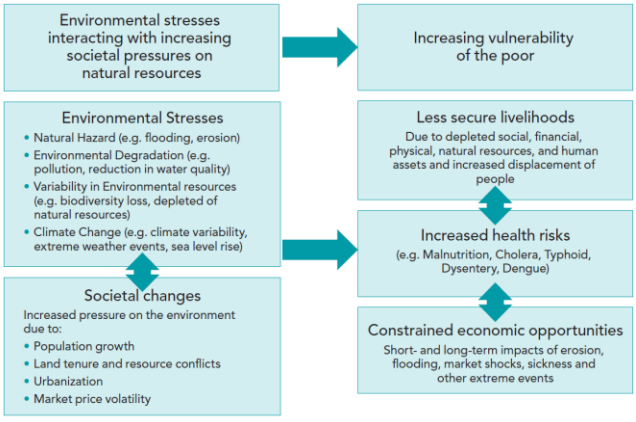


Figure 2: Vulnerability Profile of West Africa[19], [20]

[17] FAO, 2015. Country fact sheet on food and agriculture policy trends, Ghana.
[18] UNEP-GEF Volta Project, 2013. Volta Basin Transboundary Diagnostic Analysis.
[19] Dow, K. 2005:Stockholm Environment Institute https://www.sei-international.org/mediamanager/documents/Publications/Risk-livelihoods/West_Africa_lowres.pdf

The Volta Basin region host an abundance of natural resources providing vital and diverse ecosystems services both on land and water bodies. The ecosystem resources such as fresh water, lake habitats, protected areas and forest ecosystems play a key role in the economic development and physical resilience to current and future challenges posed by climate, weather and water. The distribution of these ecosystems services varies significantly across the Basin and their direct and in-direct contributions helps in the survival of the living organisms and promote livelihood opportunities for humans. The Basin ecosystems are continuously being threatened by multiple drivers of change mainly due to human activity (use of environmental pollutants and increase of pollution from industry, agriculture, households and transportation) but also stresses due to climate change variability.

In 2002, the project 'Transboundary Diagnostic Analysis (TDA)' was carried out by the six riparian countries with technical assistance of Global Environment Facility-United Nations Environment Programme[21] to identify the major perceived problems and issues (MPPI) on the environmental aspects of the Volta Basin region. The results of the MPPI were ranked by attributing a score to a list of main issues as shown below on Table 4, to help guide the priorities of future interventions for improving the Volta River Basin ecosystem.

Table 4: Analysis of Land, Water and Environmental issues in the Volta Basin

Problem/Issue	Benin	Burkina Faso	Cote d'Ivoire	Ghana	Mali	Togo	Basin Average	Rank
Land Degradation	8.5	7.5	8.5	8	10	9	8.6	1
Flooding	5.5	6	4.5	5	10	7	6.3	6
Water Scarcity	8.5	9.5	8	7	9	9	8.5	2
Growth of Aquatic Weeds	5.5	6	5	7	7	7	6.3	7
Loss of Biodiversity	7.5	7.5	8	7	9	8	7.8	4
Water Quality Degradation	6	8	7.5	6	9	8	7.4	5
Water-borne Diseases	8	8.5	8	7	9	8	8.1	3
Coastal Erosion	6	-	-	5	-	6	5.7	8

Source: Volta River Basin Preliminary Transboundary Diagnostic Analysis, 2002.

In the second TDA phase in 2012[22], the analysis indicates that the Volta River Basin continues to experience high levels of water quality and flow degradation, coastal erosion, increased sedimentation of rivers, invasive aquatic species, loss of soil and vegetative cover and ecosystem degradation as a result of factors related to climate change, livelihood practices, poor governance and mismanagement of the basin's natural resources. Poor land-use practices are resulting in loss of vegetative and forest cover such as bush-fire to clear land, deforestation, over-cultivation of agriculture land etc. These practices in the upper most of the Volta Basin are contributing to the increased run-off and siltation leading to soil and coastal erosion. Deforestation plaguing areas in the Volta Basin region are resulting in loss of important ecosystems such as wetlands and species such as Ephmeroptera, an important food resource for the fish in the Volta River.

[20] WACA Project, 2015: A Partnership for Saving West Africa's Coastal program, World Bank Group
http://documents.worldbank.org/curated/en/382201468181130416/pdf/101176-REVISED-PUBLIC-WACA-Brochure-April-2016.pdf

[21] Volta River Basin Preliminary Transboundary Diagnostic Analysis, 2002
http://www.ais.unwater.org/ais/aiscm/getprojectdoc.php?docid=293

[22] Volta River Basin Institutional Development Project-Concept Stage, Pg-3
http://iwlearn.net/resolveuid/116e4bdf3ac24250be9fb2409a132c02

Moreover along the river courses, more than 1180 small reservoirs have been built in the Volta basin. Their water quality has been deteriorating due to harmful water nutrients resulting from land degradation and through the usage of pesticides and fertilizers for agricultural growth. Rapid urbanization is leading to inappropriate discharges of domestic waste into the streams and rivers, degrading the quality of the water. The present potential changes in discharge and stress on water resources induced by competing uses are also impacted by climate variability, hydrological changes and hydropower dams constructed on several river courses of the Volta Basin. The variation in water levels has a significant influence on the habitat size and characteristics. Long-term effect of climate variability and extreme events such as floods and drought has been noticed on aquatic ecosystems and wetland vegetation[23]. Irregular flood events, especially in streams and arid zone rivers, require more resilient strategies for organisms to survive these events rather than to implement adaptation approaches. There is a lack of recognition of the importance of flood dynamics or pulsed nature and its linkage with the key biodiversity elements. The flood-pulse concept (FPC), well adapted to large temperate and tropical riverplains, states that the flood pulse is the main driving force in river-wetland systems affecting the biota and processes in the flood plain[24]. It causes variably strong disturbance that can modify or even reset environmental conditions in the system. Short and generally unpredictable pulses occur in low-order streams or heavily modified systems with flood plains; organisms have limited adaptation capacity for directly utilizing the aquatic/terrestrial transition zone (ATTZ)[25]. Whereas, a predictable pulse of long duration engenders organismic adaptations and strategies that utilize attributes of the ATTZ. The effect of the flood pulse on biota is principally hydrological[26].

The envisaged connections between the Volta project activities and the components supporting biodiversity are illustrated on Diagram 1 below (adapted from [27]).

[23] Participatory assessment of wetland ecosystem services in the Volta Basin, John Mbabugri Atibila, submitted in accordance with the requirements for the degree of Doctor of Philosophy (PhD) The University of Leeds School of Earth & Environment May 2011 https://dlc.library.columbia.edu/catalog/ldpd:495827/bytestreams/content/content?download=true

[24] Junk W.J Wantzen K.M; The flood pulse concept: new aspects, approaches and applications-an update, Maxx-Planck-Institute for Limology, Germany and The flood pulse concept in River-Floodplain systems , 1989 https://www.nrem.iastate.edu/class/assets/aecl518/Discussion%20Readings/Junk_et_al._1989.pdf

[25] River flood plain systems consist of an area surrounding a river that is periodically flooded by the overflow of the river as well as by precipitation, called the aquatic/terrestrial transition zone (ATTZ).

[26] Junk W.J,1989; The flood pulse concept in River-Floodplain systems https://www.nrem.iastate.edu/class/assets/aecl518/Discussion%20Readings/Junk_et_al._1989.pdf

[27] Environmental aspects of Integrated Flood Management, APFM, 2006, WMO no. 1009 (pg.19) http://www.floodmanagement.info/publications/policy/ifm_env_aspects/Environmental_Aspects_of_IFM_En.pdf

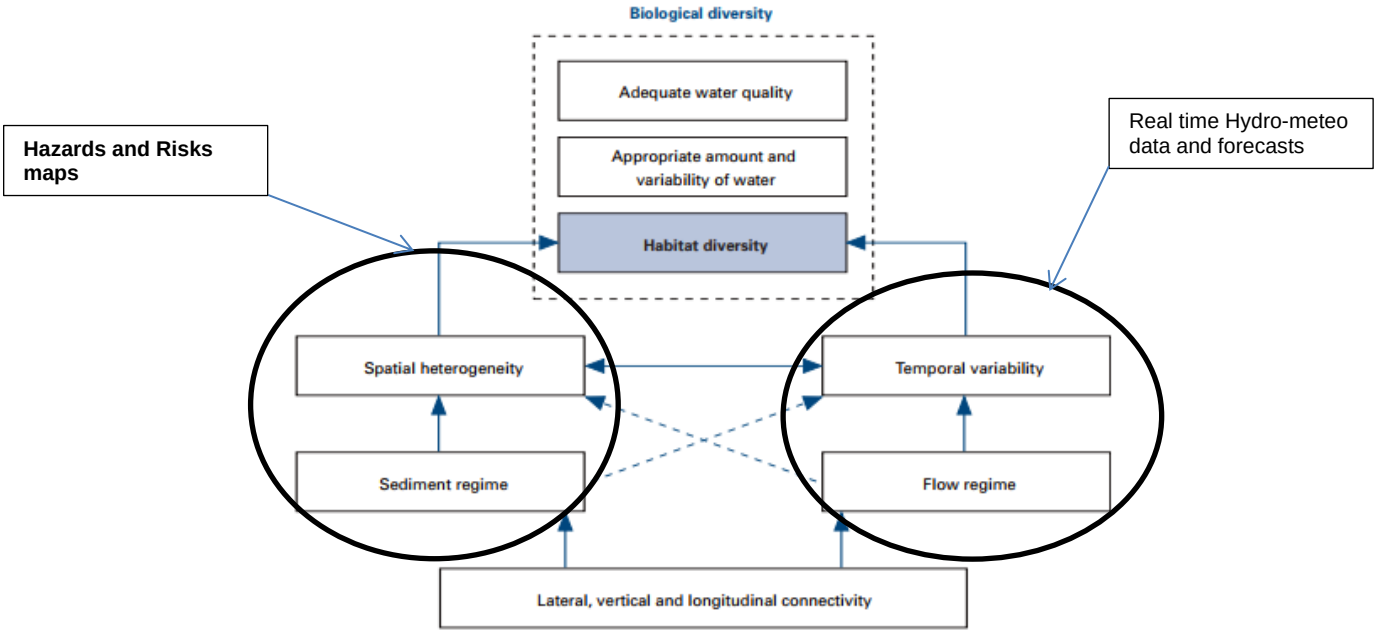


Diagram 1: Link between bio-diversity and hydrometeorological components[27]

Status of Hydro-Meteorological Observation Network

The hydrological and meteorological networks of the Volta Basin are sparse, as presented in Table 5. Moreover, some stations are not functioning optimally. It is worth noting that 76 %, and 47 % respectively, of the stations operated by the Meteorological Agencies in Burkina Faso and Ghana are located in the Volta basin (Figure 3). Some part of the equipment was bought by national governments whiles others were delivered to countries as supports from various projects. There are still efforts by ongoing projects, such as CREWS, to provide support and install new equipment to strengthen the hydro-meteorological network in the respective countries.

Table 5: Meteorological and hydrological stations of the Volta Basin

Country	N° of synoptic stations	N° of agro-meteorological and climatological stations	N° of rain gauge stations	N° of hydrometric stations	Total
Benin	1	0	8	3	12
Burkina Faso	7	15	102	24	148
Côte d'Ivoire	1	0	4	3	8
Ghana	8	6	40	16	70
Mali	0	0	3	3	6
Togo	1	5	25	11	42

Source: Volta Basin Authority, 2010.

Within the White Volta basin, thanks to the FEWS-Volta project, most of the old stations have been rehabilitated and new ones have been installed including river gauge stations for the Hydrological Service Department (HSD). Currently, 20 river gauge stations have been registered in the NPVB of Ghana but their functioning must be assessed.

All the six countries are aware of the need of funding from governments to support National Meteorological and Hydrological Services in order to improve their network of stations. Of the number of river gauging and meteorological stations in the Volta basin, only a few deliver continuous and reliable data. As a result, the Volta Basin Authority (VBA) through the Volta HYCOS initiative (2005 to 2010, financed by FFEM/ AFD and later 2011 to 2015, financed by AfDB/AWF) selected about sixty (60) hydrometric stations in the countries and installed/upgraded hydrometric stations with new equipment to guarantee the data quality needed for planning water resources. Furthermore, about seventeen (17) synoptic stations, twenty-six (26) agro-climatic stations and several rainfall gauges were selected by VBA for the purpose of data sharing to ensure sustainable planning in the basin.

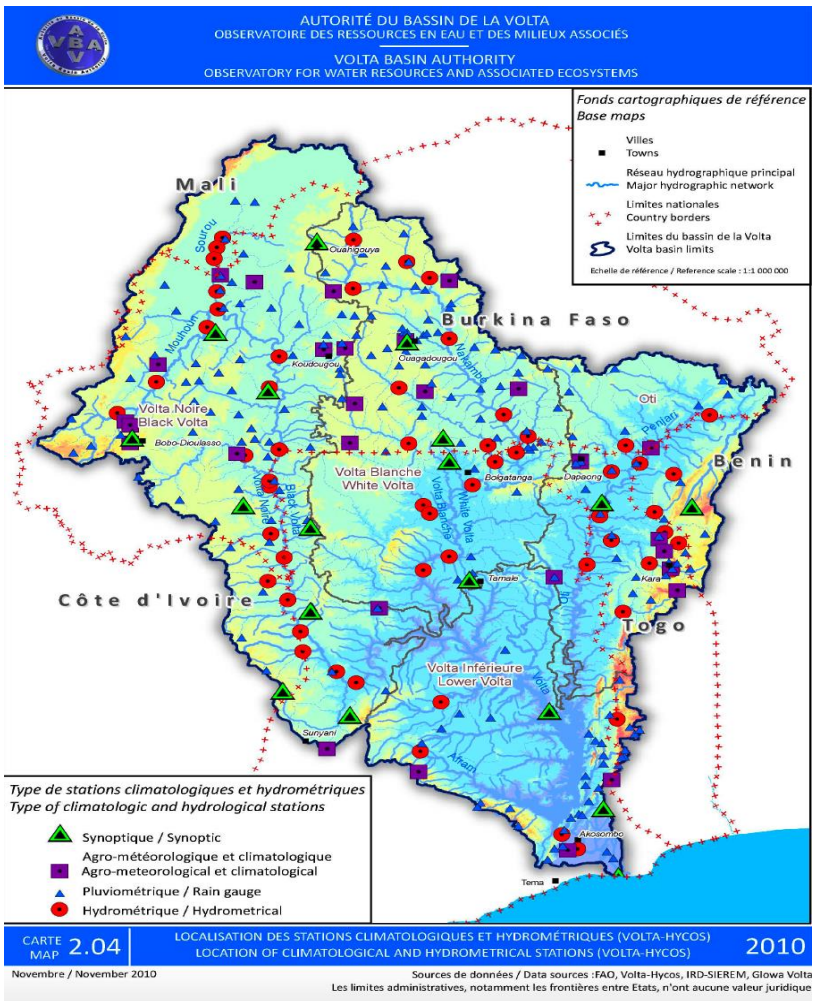


Figure 3: Hydro stations of the Volta Basin[28]

[28] GWP West Africa, 2016. Regional Needs Assessment Report on Integrated Flood Management – Volta Basin.

Status of Flood Forecasting and Early Warning Solutions

Despite the efforts in strengthening the hydrometric network listed above, VBA does not have yet the capacity to provide early warnings to forecast floods. However, efforts are made by the six riparian countries to develop early warnings systems for management and decision making.
Benin is currently implementing an early warning systems (EWS) project that focuses on floods and drought in the entire country. The project aims to strengthen capacity for climatological and hydrological monitoring.

Burkina Faso has initiated several Early Warning Systems for the sectors of water, agriculture and environment. They are related directly or indirectly to flood disasters, such us:

- *The National Information System on water (NIS water)*. NIS water is being implemented by the General Directorate of Water Resources (DGRE) through the Department of Water Studies (DEIE). The NIS water system includes four (4) main components: the definition of information needs, data collection, data storage and processing and the dissemination of the generated information. The NIS water is still under development with most of components not yet operationalized.
- *The forecast system of the General Directorate of meteorology*. The forecast made by meteorological services aims to alert citizens towards preparedness, prevention and management of climate-related natural disasters.
- *The Integrated Food Security System (SISA)*. SISA was created by executive order of the Minister of Agriculture. The Directorate General for the Promotion of the Rural Economy (DGPER) is responsible for its implementation and is specialized in the collection, processing and dissemination of information related to early warning for agricultural production and food security.
- *Burkinabe Red Cross Early Warning System* is based on contingency plan activated in the event of disasters including floods.
- *Early Warning System on Climate Information* of National Council for the Environment and Sustainable Development (CONEDD). The system provides climate information at national level to support management of several sectors, such as agriculture, water, health and energy.
- *Strengthening national capacities for EWS Service Delivery in Burkina Faso (CREWS)* will improve the operational capacities in Burkina Faso to produce and deliver hydrometeorological services for flood early warning and risk information for agriculture and food security.

In Ghana, the Flood Early Warning System (FEWS-Volta) has been developed for the White Volta Basin (2011-2012) and for the Oti basin (2016-2018) with the support of the World bank and local ghanaian and togolese (for the Oti basin) governmental institutions. In the same period, the Community Resilience and Early Warning (CREW) project was sponsored by the Norwegian Government and implemented by UNDP through National Disaster Management Organization (NADMO). The project started in 2013 and ended in 2016. It was a follow up of the Africa Adaptation Programme (AAP) in Ghana where flood and drought risk mapping was carried out for 10 pilot districts in the country. Within the pilot districts, hotspots or communities were identified for more in-depth flood and drought risk profiling as well as drawing up of possible mitigation measures. In each of the district, risk, hazard and vulnerability mapping was carried out as well as the setting up of an Early Warning System similar to the FEWS-Volta. In most districts, up to 3 hotspots/communities were mapped. Thanks to both FEWS-Volta project and CREW projects, plans to send weather alerts and flood warnings to end-users at all levels (national, regional, district and communities), using mobile platforms (SMS and voice mails) and web-based application, are far advanced. Some telecommunication companies in Ghana like Vodafone and MTN are supporting some of these initiatives. Mobile Service providers such as Farmerline

Limited, ESOKO, Human Network International (HNI) are assisting farmers to get access to weather and hydrological information as well as agronomic and financial counselling.

Côte d'Ivoire, Mali and Togo on the other hand, have not developed any EWS for the part of the countries in the Volta Basin. However, there are early warning systems developed for the Segou area in Mali and Abidjan in Côte d'Ivoire due to the losses suffered by these cities over the years.

Climate change context

Past and present climate change

High confidence for evidence of warming is noted across Africa, consistent with anthropogenic climate change. Over West Africa and the Sahel near surface temperatures have increased over the last 50 years. The number of cold days and cold nights have decreased and the number of warm days and warm nights have increased between 1961 and 2000. Many of these trends are statistically significant at the 90% level, and similar trends are found in extreme temperature indices[29]. All of these trends suggest changes in temperature, rainfall volume and patterns, and frequency and intensity of storms. Reductions of rainfall and run-off in the Volta Basin are observed since 1970s[30].

In the period 1960 - 2009, the average annual temperature in Benin increased by 1.3 °C, with a decrease in the number of cold nights and an increase in the number of hot days[31]. Observations also showed a tendency for maximum temperatures to increase, the average of which increased during the period 1971-2000 compared to the period 1940-1970.

According to the second national communication on climate change, the inter-annual variability of rainfall in the Natitingou region in Benin from 1950 to 2010 is negative, especially since the 1970s while that of temperature is increasing. At the seasonal scale, the situation is characterized by anomalies in rainfall with particularly high concentration of rains over a brief period and a sudden interruption of rains in high season[32].

Indeed, during the 1960s, average rainfall across the countries in West African Sahel was around 700mm, but, due to recurrent drought years, average rainfall declined in the 1970s, and particularly in the 1980s, to about 550mm. Average rainfall for the 1982–1985 period was only 381mm[33]. The driest of all years was 1983, with over 90% of the Volta basin in extreme drought conditions.

According to the IPCC report "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)"[34], much more severe and longer droughts occurred across West Africa in the past centuries with widespread ecological, political, and socioeconomic consequences. Furthermore, floods in West Africa are becoming more and more recurrent and damaging and are seen as potential consequences of climate change. In 2007 and 2009 more than 800,000 people were affected in West Africa, but 2010 represents the year when most loss of life was recorded with about 1.9 million people affected[35].

[29] IPCC, 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Chapter 22: Africa.
[30] UNEP-GEF Volta Project, 2013. Volta Basin Transboundary Diagnostic Analysis.
[31] PANA-Benin, 2008. Programme d'action national d'adaptation aux changements climatiques du Bénin.
[32] GWP West Africa, 2016. Evaluation des besoins de renforcement des capacités, Benin.
[33] Kasei, R., Diekkrüger, B., Leemhuis, C., 2009. Drought frequency in the Volta Basin of West Africa. Sustain. Sci. 5:89-97
[34] IPCC, 2012. Chapter 3: Changes in Climate Extremes and their Impacts on the Natural Physical Environment.
[35] GWP West Africa, 2016. Evaluation des besoins de renforcement des capacités. Préparation des projets de gestion intégrée des inondations pour le Bénin, Burkina Faso, Côte d'Ivoire, Ghana, Mali et Togo et le bassin de la Volta en Afrique de l'Ouest. Series of seven reports.

Past and current effects of climate change

In early 1970s, Burkina Faso and other countries in West African Sahel suffered from a series of drought periods, with devastating consequences for the inhabitants of the whole region. The years of recurrent drought, high variability in the monsoon rain and variations in its onset and offset, as well as their intensities greatly affected crop production negatively, inducing structural food shortages and hunger. In Ghana, food production was below normal in 1983. Low water levels in the Akosombo dam in 1998 caused a major energy crisis in Ghana, which may have been caused purely by unreliable and poorly understood rainfall variability, even though many Ghanaians blamed Burkina Faso's water development.

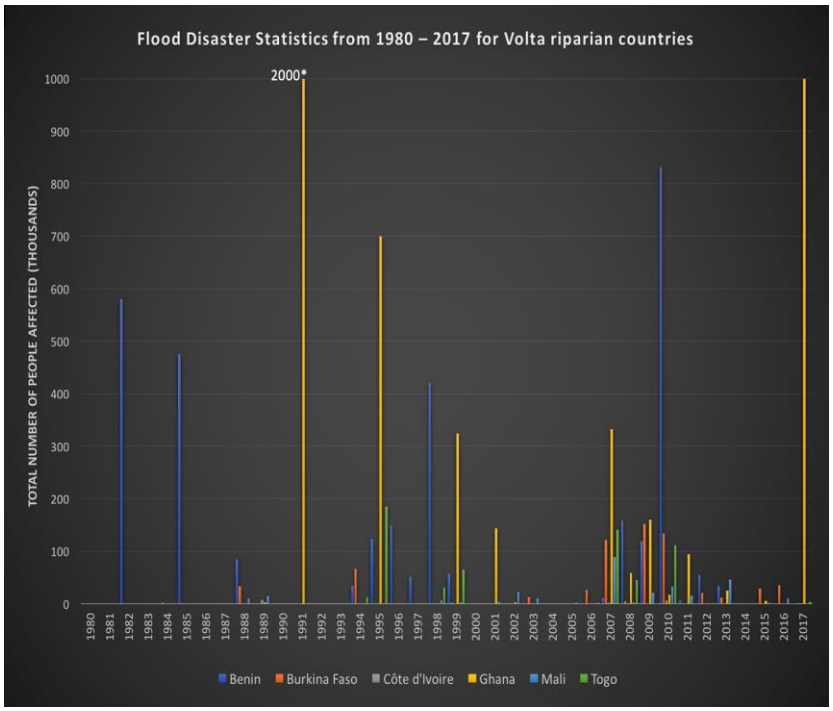
Table 6. Drought Disaster Statistics from 1970 – 2017 for the Volta countries

Year	Country	Total number of people affected
1971	Ghana	12 000
1971	Togo	150 000
1972	Benin	115 000
1977	Burkina Faso	442 000
1980	Burkina Faso	1 250 000
1980	Mali	1 500 000
1983	Benin	2 100 000
1983	Ghana	12 500 000
1988	Burkina Faso	200 000
1988	Benin	270 000
1989	Togo	400 000
1990	Burkina Faso	2 600 000
1991	Mali	302 000
1995	Burkina Faso	75 590
1998	Burkina Faso	20 700
2005	Mali	1 000 000
2006	Mali	25 000
2010	Mali	600 000
2010	Benin	680 000
2011	Mali	3 500 000
2011	Burkina Faso	2 850 000
2014	Burkina Faso	400 0000

Source: EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium. Created on: December 07, 2017.

Table 6 shows Drought Disaster Statistics from 1970 to 2017 for the six riparian countries. In 1983, severe droughts affected 2.1 million people in Benin and 12.5 million people in Ghana. According to the information gathered, from 1970 to 2017, more than 33.6 million people were affected in the Volta Basin countries.

Figure 4 gives the Flood Disaster Statistics from 1980 to 2017 for the six Volta riparian countries.



* The value is 2000.

Figure 4. Flood Disaster Statistics from 1980 -2017 for the six Volta riparian countries[36]

Floods have been recorded in various parts of the riparian states of the Volta Basin and their impacts are reflected on three levels as:

- *Social*: loss of human lives and livelihoods, destruction of houses leading to homeless vulnerable people, with possible outbreak of epidemics and trauma by the victims;
- *Economic*: destruction of crops, loss of livestock, reduction of agro-processing activities thereby limiting trade opportunities etc.;
- *Infrastructure*: destruction of runways, bridges, roads, water and sanitation facilities, and other infrastructures, such as schools and health centres.

Benin

Benin is facing more and more recurring floods since the late 1980s. These floods, which are reported each year in the basins of Ouémé, Niger, Pendjari and Mono, affected in 2010 nearly 831,000 victims, 150 000 of them became homeless. According to the Post-Disaster Assessment

[36] EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir - www.emdat.be, Brussels, Belgium. Created on: December 07, 2017.

Report of the 2010 floods in Benin, the economic impacts of the 2010 floods would amount to 127 billion FCFA. As for damage (assets, infrastructures, stocks ...), they are estimated at nearly 78.3 billion FCFA; and the losses (reduced flows, production losses, reduced turnover, costs and expenses incurred as a consequence of the disaster) estimated at nearly 48.8 billion FCFA...".

The flood events in the NPVB are recorded almost every year locally at the village, municipal and even intercommunal level. The areas at high risk of flooding represent approximately 32% of the basin area and are located northwest of the sub-basin, particularly on sedimentary formations with a high density of drainage, where agglomerations and crop areas are concentrated, i.e. 33% of the crops cultivated areas. Populations in Atacora-Donga departments' high flood risk zones are potentially vulnerable to flooding due to poverty, food insecurity and lack of access to drinking water, road and sanitation infrastructure.

Togo

Between 1925 and 1992, Togo was affected by 60 urban and rural floods that caused property damage and loss of life[37]. The years 2007, 2008, 2009 and 2010 were particularly marked by floods with disastrous social and economic consequences for the country. During these years nearly 300,000 people were affected by floods. Losses in human lives (68 deaths) have been recorded, as well as the massive destruction of road infrastructure, buildings (homes and workplaces) and fields. These phenomena, previously located mainly south of the Lake Togo basin and part of the Volta Basin (North Oti sub-basin), have become widespread in recent years throughout the country.

The floods within the Togolese part of the watershed are often recurrent. These floods mainly affect the communication routes (tracks, roads, etc.), often isolating some localities throughout the rainiest months, but also areas of food crops cultivation. The stagnation of surface water during these periods of flooding leads to the proliferation of insects, malaria and water-related diseases such as diarrhoea, cholera and guinea worm. The numerous floods induce various negative consequences: land degradation, loss of biodiversity, proliferation of aquatic plants, degradation of water quality, silting up of water courses, the degradation of aquatic ecosystems, erosion and soil depletion.

Côte d'Ivoire

In Côte d'Ivoire, floods events in the last ten years, largely located in the city of Abidjan, have disrupted the living conditions of the resident populations in the flood zones. For example, the most remarkable socio-economic impacts are the loss of 25% of the banana production of one of the major Ivorian companies. Indeed, between 28 and 30 June 2014, Agnéby, the coastal river that borders the plantations of Nieky (west of Abidjan), overflowed its bed and destructed 1,300 hectares of banana plantations. According to the information gathered, from 1996 to 2017, more than 149 people lost their lives following the floods.

On the contrary, the Volta Basin area in Côte d'Ivoire is almost not affected by flooding. A case of urban flooding was reported in the Bondoukou department in Tagadi and Campement, due to extreme rainfall and probably to poor drainage of rainwater.

Mali

The floods in Mali, generally due to the overflow and flooding of rivers and streams, the failure of drainage systems but also the irrational occupation of space by the population, have occurred fifteen times in 30 years, affecting between 1,000 and more than 88,000 people at each event. On

[37] GWP West Africa, 2016. Evaluation des besoins de renforcement des capacités, Togo.

August 28, 2013, they caused 56 deaths with a lot of material damage in Bamako. In 2010, they caused 110 deaths; 6,052 homes destroyed; 12,000 hectares of flooded fields and the destruction of roads and bridges in the country.

According to the 2010 UNEP-FEM report "Transboundary Diagnostic Analysis of the Volta Watershed: Mali National Report", the floods have considerable socio-economic impacts in the basin. These impacts are:

- impoverishment of the population through the reduction of production due to the loss of cultivable land in the lowlands;
- loss of medicinal plants due to the disappearance of certain species of plants from the Samori forest;
- increased potential for conflict in the exploitation of the few remaining lowlands for crops and resources;
- increased migration of populations in search of new lands favourable to lowland crops;
- reduced food security.

Burkina Faso

Sahelian country, Burkina Faso offers a context of development very vulnerable to the risks of natural disasters including floods. The country was ranked as the 24th most vulnerable nation by “the Global Leaders for the Tomorrow Environment Task” et al, 2002.

For the period 1980-2017, the floods have made more than 93,000 homeless and caused about 172 deaths. In addition, more women were affected by the disaster than men. The three (3) major floods that the country experienced between 2007 and 2010 affected nearly 400,000 people and caused about 77 deaths. From 31st August to 1st September 2009, torrential rains caused severe flooding in Burkina Faso's capital, Ouagadougou. All five neighborhoods in the district were affected, as well as other nearby regions. The government estimated that approximately 150,000 people were affected by the floods (10% of the capital’s population). Significant damage was incurred on infrastructure, agriculture, livestock and housing[38]. These floods cost almost 2% of GDP. They result in both a significant loss of income and fewer investments to improve the livelihoods of the country's population, 78% of them living in the Volta Basin. For the period 2009 to 2015, the year 2010 represents the year that required the most financial resources for assistance to flood victims. According to the Ministry of Economy and Finance, beyond the disaster assistance, the impact felt in 2010, in terms of reconstruction activities as a share of the fiscal weight, accounted for 1.5% of the estimated GDP level after the floods. The budget deficit persisted for the next four years.

In 2016, heavy rainfall, started in June and continued until 23 July, led to widespread flooding across four of the 13 regions in the country. It is estimated that up to 10,260 people have been affected, with 10 injures and 4 deaths also reported[39].

Ghana

In the National Part of Volta basin in Ghana, the worst flood was recorded on 6 September 2009 in the White Volta basin after water level rise as a result of heavy rainfall forcing water from the Bagre dam to be spilled[40]. Prior to this flood event, some flooding had been experienced in the White Volta in September 2007 and 2008[41]. In 2007 event, the three Regions of Northern Ghana

[38] Global Shelter Cluster, 2011. Review of the IFRC-led Shelter Cluster Burkina Faso September 2009 Floods Response.
[39] International Federation of Red Cross and Red Crescent Societies, 2016. Emergency Plan of Action (EPoA), Burkina Faso: Floods.
[40] Amoah, M., 2011. Nationalism, Globalisation and Africa. Palgrave Macmillan, Macmillan Publishers Limited, England.
[41] GWP and VBA, 2014. Final Report on the Assessment of the Current State of Water Management and Climate Change in the Volta Basin as part of the Establishment of an Observatory for Water Resources and related ecosystems.

(Upper West, Upper East and Northern Regions) were impacted by the floods resulting in over 300,000 people being affected[42].

On September 10, 2010 due to prolonged flooding as a result of the heavy rainfall and the spilling of the Bagre dam, 17 people lost their lives, 3,234 houses from 55 communities collapsed, 23,588 farmers had their farmlands destroyed, 1109 ruminants were carried away, and 25,112 people displaced in the Central Gonja District of the Northern Ghana. In June 2015, although not directly as a result of floods in the Volta basin, more than 100 people lost their lives in Accra after a two-day heavy rainfall over the capital city, coupled with the explosion at a petrol station located at Kwame Nkrumah Circle in Accra.

Future climate change

Temperatures in Africa are projected to rise faster than the global average increase during the 21st century. Under current IPCC future scenarios[43], temperature projections over West Africa for the end of the 21st century from both the CMIP3 GCMs (SRES A2 and A1B scenarios) and CMIP5 GCMs (Representative Concentration Pathways RCP4.5 and RCP8.5) range between 3°C and 6°C above the late 20th century baseline (Figure 5). Regional downscaling produces a similar range of projected change.

As shown in Figure 5, West African precipitation projections show inter-model variation in both the amplitude and direction of change that is partially attributed to the inability of Global Climate Models (GCMs) to resolve convective rainfall. However, Regional Climate Models (RCMs) can alter the sign of rainfall change of the driving GCM. The recent regional model studies suggest that over West Africa both the number of dry and intense rainfall days during the boreal summer are projected to increase indicating that the summer rainfall will be delivered in fewer, but more intense event[44].

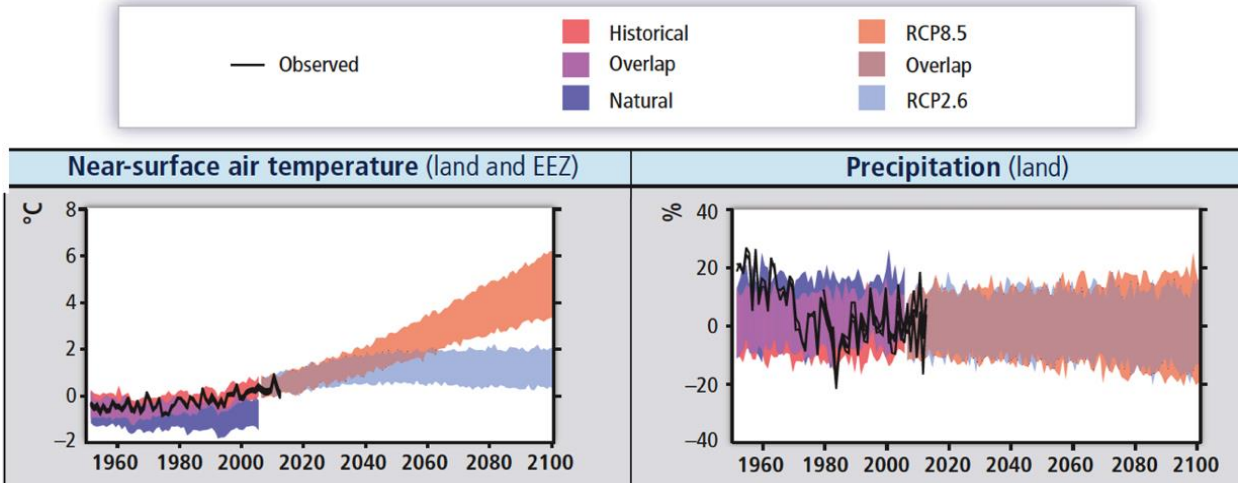


Figure 5: Observed and simulated variations in past and projected future annual average temperature over Economic Community of West African States (ECOWAS)[45]

[42] Asumadu-Sarkodie, S., Owusu, P. A., and Rufangura, P., 2015. Impact analysis of flood in Accra, Ghana. Advances in Applied Science Research, 2015, 6(9):53-78.
[43] IPCC, 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Chapter 22: Africa.
[44] Vizy, E.K. and K.H. Cook, 2012. Mid-twenty-first-century changes in extreme events over northern and tropical Africa. Journal of Climate, 25(17), 5748-5767.
[45] IPCC, 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Chapter 22: Africa.

As shown in Figure 6, the number of extreme rainfall days increases by 10%-30% between April and October, with the largest changes in June (i.e., +0.7 day) and August (+0.45 day), which are statistically significant at the 90% and 80% intervals, respectively.

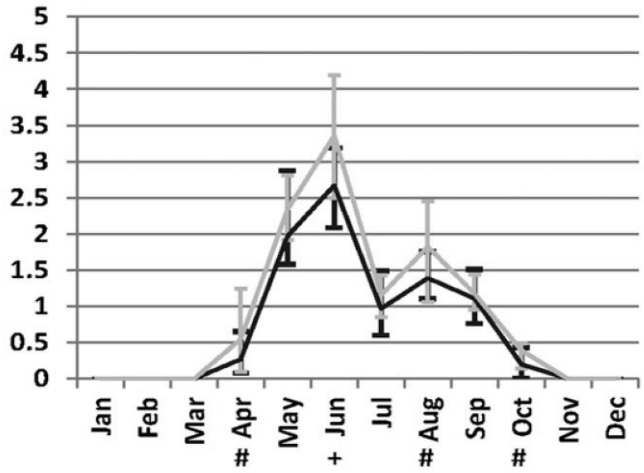


Figure 6: The late twentieth century 1981-2000 (black line) and the mid-twenty-first century 2041-2060 (gray line) ensemble mean average number of extreme heavy rainfall days per month for the West Africa region[46]

Furthermore, an increase in drought intensity and frequency is projected over the Volta River Basin[47]. Figure 7 shows that drought frequency (event per decade) may be increased by a factor of 1.2 (2046-2065) to 1.6 (2081-2100) compared to the present-day episodes in the Basin.

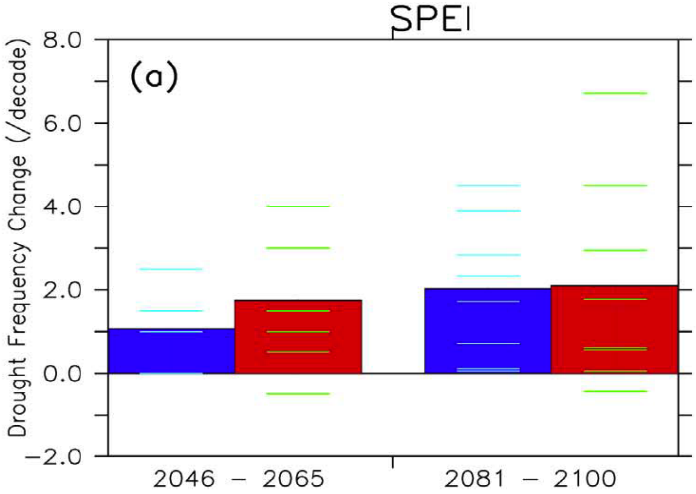


Figure 7: Projected changes in drought frequency per decade for Standardized Precipitation and Evapotranspiration Index (SPEI) over the Volta Basin for RCP4.5 and RCP8.5[35]

[46] Vizy, E.K. and K.H. Cook, 2012. Mid-twenty-first-century changes in extreme events over northern and tropical Africa. Journal of Climate, 25(17), 5748-5767.
[47] Oguntunde, P.G., et al., 2017. Impacts of climate change on hydro-meteorological drought over the Volta Basin, West Africa. Global and Planetary Change 155 (2017) 121-132.

Future effects of climate change

Africa's food production systems are among the world's most vulnerable because of extensive reliance on rainfed crop production, high intra- and inter-seasonal climate variability, recurrent droughts and floods that affect both crops and livestock, and persistent poverty that limits the capacity to adapt[48]. Weather-related crop failures, fishery collapses, and livestock deaths in addition to losses of property are already causing economic losses and undermining food security in West Africa. With the highest rates of population growth, this situation is likely to become more desperate as global warming continues.

Certainly, decreased precipitation and an increase in temperature will pose tremendous challenges to farming and related livelihoods. High temperatures above the ranges tolerated by crops will definitely affect the physiology of plants, including staple crops in the region, with consequences of decreased productivity that will affect food production. This situation could be aggravated by genetic erosion due to the inability of plants to survive harsh conditions. Similarly, animal production, including livestock and fisheries, could be adversely affected[49].

On the other hand, a drastic increase in rainfall in hitherto dry areas could pose serious challenges to adaptation and the conservation of biodiversity, at least in the short run. Increased humidity and flooding could threaten the existence of plants and animals adapted to dry conditions in the Sahel. The mosquitoes and tsetse flies that transmit the pathogens that cause malaria in human beings and sleeping sickness in cattle, respectively, abound in humid conditions. An increase in rainfall in the Sahel could pose a serious threat to the cattle industry, with a need to adjust the prevailing farming system[50].

The climate of the Volta Basin is predominantly semi-arid and sub-humid, hence the potential evaporation in this semi-arid climate exceeds precipitation. Higher temperature will result in an increased evaporation from the crops. It will also dry reservoirs impacting the river basins water balance. Climate change could cause reduction in groundwater recharge between 5 and 22% by the year 2020, and for the year 2050 reduction is projected to be between 30 and 40%. Furthermore, irrigation water demand could be considerably affected by climate change. For the dry interior savannah, increases in irrigation water demand are about 150% to 1200% for 2020 and 2050 respectively[51].

In the case of Ghana, the three main aspects identified during the assessment phase conducted in 2016 with the six countries and that might be impacted are[52]:

- *Water*: Simulations using projected climate change scenarios suggested reduction in river flows of between 15 and 20% and 30 and 40% for the year 2020 and 2050 respectively in all river basins.
- *Agricultural crops*: Potentially high temperatures, along with decreased precipitation, could have serious implications for the yield and production of major food security crops like maize, rice, and groundnuts.
- *Coastal flooding*: With a quarter of the population living below the 30-meter level, an estimated sea level rise of 1 meter by 2100 could inundate 1'120 km^2 of land and put 132'000 people at risk.

[48] IPCC, 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Chapter 22: Africa.
[49] International Food Policy Research Institute, 2013. West African Agriculture and Climate Change.
[50] International Food Policy Research Institute, 2013. West African Agriculture and Climate Change.
[51] Climate Change Adaptation through Integrated Water Resources Management (IWRM) in the three Northern regions of Ghana (DANIDA-WRC).
[52] Institute for Security Studies, 2008. Available at: http://www.iisd.org/pdf/2008/asr_vol17_no3_climate_west_africa.pdf.

During the same assessment phase, the four main consequences of climate change have been stressed out for Burkina Faso:

- *Water*: A projected increase in the frequency of heavy rains and flooding is expected to lead to widespread erosion and siltation along each of Burkina Faso's four basin slopes. When combined with projected decreases in overall rainfall, this will result in reduced run-offs by 2050, ranging from 30% for the Nakanbé basin to 70% for the Mouhoun basin.
- *Agriculture*: Average annual rainfall could drop by 3.4% by 2025 and 7.3% by 2050. For an economy, heavily dependent on rain-fed agriculture, such a drop will have significant impacts for crops and planting cycles across the country. There have already been declines in cotton, maize and yams production in the south as a result of drought.
- *Stockbreeding*: An expected rise in temperature of 1.7˚C by the middle of the century will, combine with decreased rainfall, reduce the drinking points open to stock breeders. Floods are expected to supplement these threats by killing livestock.
- *Forestry/fisheries*: Increased erosion and siltation are expected to damage land and water ecosystems, while land clearing is expected to continue apace, due to rainfall pressures.

The future effects of climate change will therefore mainly affect people living in the agricultural sector and in urban areas[53,54,55]:

1) **People working in the agricultural sector** (estimated to 16 million people over the basin such as farmers, pastoralists, fishermen) that accounts for 40% of the basin's economy output. More than two third (around 68%) of the 24 million people living in the basin are largely dependent on agriculture, which is mainly rain-fed, poorly mechanized and consists of small family farms that are particularly vulnerable to climate change impacts, especially risks of drought and floods. This vulnerability is caused by high dependence on rain-fed agriculture but also the low levels of data and information, in addition to the prevalence of poverty and the relatively low capacity of the governments and communities to adapt.

   The projected temperature increase and rainfall decrease will result (and some impacts are already visible) in crop failure and loss of livelihoods for farmers that practice rain-fed and flood recession agriculture (majority of them in the basin).

   In Mali for example, in the Sourou Bassin (national portion of the Volta Basin in Mali), local activities (agriculture, livestock farming and fishing) are completely dependent on the Sourou floods due to the extreme poverty of local communities. However, rainfall have been irregular which directly impact local economic activities. Farmers cannot stock cereals which hinder financial and food security stability. They often choose crop diversification and exodus to cities as adaptation strategies.

   Other major impacts will include higher food prices and inflation in riparian countries, in addition to outbreak of diseases such as malaria, water-borne diseases (e.g. cholera, dysentery, etc.) associated with floods, and respiratory diseases associated with drought.

2) **Poor people living in areas at risk in cities.** Due to the lack of land-use planning and alternatives, people affected by poverty mostly live in areas at risk such as valley floors and slopes, particularly vulnerable to floods and landslides. This population can be estimated to a 10% of the urban population, therefore not far from 1 million people over the basin. As an example, during the September 2009 floods in West Africa, 150,000 people in Ouagadougou (Burkina Faso) were affected by floods, following the heaviest rainfall seen

[53] Volta Basin Authority, 2014. Assessment of the Current State of Water Management and Climate Change in the Volta Basin as Part of the Establishment of an Observatory for Water Resources and Related Ecosystems.
[54] Available at: http://iwlearn.net/resources/documents/2481.
[55] GWP West Africa, 2016. Country Needs Assessment Report, Ghana.

in the country's capital in 90 years. As floods are predicted to become more severe and frequent with climate change, more people will be at risk in the cities of the Volta basin.

Targeted Project Areas and beneficiaries

In the Volta Basin, extreme weather hazard and climate change affect people on various spatial, temporal and social scale. By alleviating the impact of drought and flood hazard, the project will benefit the overall population of the basin, in particular the Early Warning System will be designed to reach the civil security services and other private and public stakeholders concerned by extreme events, but the general public as well. More specifically, the groups of people who will most directly benefit of the project outputs are related to the types of activity: 1) new tools developed for risk reduction, such as flood and drought risk maps and Early Warning System, and climate change adaptation measures, 2) testing of the EWS on pilot areas, 3) capacity building activities integrated into the three components of the work project.

Phase 1: In the Volta basin, flood hazard has been mostly reported either as pluvial flood linked to high rainfall precipitation or as riverine flood. The flood risk maps should therefore be developed for the overall surface of the basin to account for possible pluvial floods and more particularly for the floodplains to be prepared for fluvial floods. Drought on the other hand can affect any part of the basin. Through the development of the risk maps and EWS, the project will therefore provide new information for a large part of the population. The expected beneficiaries of the new tools within the six countries range from:

1. National Meteorological and Hydrological Services (some 500 persons for the six countries), who will be contributing to the development of the tools, providing improved or new services but also gaining in capacities and means of actions;
2. Emergency, Civil protection authorities and Disaster Management Services (estimated from 500 to 1000 persons over the basin), who will be integrating the new risk maps and warnings into their procedures and crisis management;
3. National authorities of the six countries and related departments (estimated to 200 persons) such as Health, Water, Irrigation and Agriculture;
4. Social Institutions such as schools, hospitals, fire stations etc. (estimated to several thousands of people over the basin), who will be able to prepare or improve their emergency plans;
5. Non-governmental organizations (NGO's), International Non-governmental organizations (INGO's) (estimated to several hundreds of persons), who will either directly use the new information to improve their resilience capacity and adaptation or transfer to their partners;
6. Community-based organizations, farmer and fishermen associations, in particular women groups etc. (estimated to some thousands of persons over the basin) who will be using the new tools and methodologies to decrease their vulnerability to extreme events;
7. Managers of industrial sites (estimated to several thousands of people over the basin), who will be able to draw emergency plans and build more resilient infrastructures;
8. Community individuals of urban and rural areas especially youths who are more familiar with Information Technologies (potentially the whole population of the basin, but in a first stage, estimated to only a 1 to 5%, therefore up to 1 million persons) who will upload the applications, get warning messages and possibly contribute to crowdsourcing.

Phase 2: A series of pilot testing on the dissemination, use and feedback of the flood and drought Early Warning System will be conducted during the monsoon and dry season for selected target areas, which involve representatives of the major groups of beneficiaries. Ten pilot tests areas that could be studied during year 2 and 3 of the project have been identified on the basis of several criteria (final selection will be performed during the course of the project):

- agricultural or urban areas on which collaborations are already established with communities and groups of citizen for example in the field of water resources management, land planning, risk reduction, exercises with civil security, any project related to the participation of citizens and communities;
- agricultural or urban areas that have been affected by extreme events (drought or flood);
- areas where Early Warning Systems have been set up (by previous projects) and are being used;
- preferably areas with mobile network coverage or with a good telecommunication system;
- areas where the effect of extreme events is known, or supposed, to be affected by dam operations.

Table 7: Pilot tests location for the flooding and dry season

Location of pilot sites	Estimation of the number of people participating to the pilot testing exercise	Criteria for selection
Ouagadougou, Burkina Faso	50 - 100	Ouagadougou is the capital of Burkina Faso where are concentrated 70% of the industrial activities of the country with a population of 1.5 million inhabitants. In 2020 the capital is expected to reach 3.4 million inhabitants, making it one of the most rapid growing cities in the region. 50% of the population live in poor conditions. Women are particularly exposed, with less access to education, employment and land. The extension of flood prone areas in Ouagadougou is very large due to its flat topography. In 2009, Ouagadougou experienced the worst flooding event in the last 50 years. An estimated 150'000 people were affected. Significant damage was incurred on infrastructure, agriculture, livestock and housing. In flood prone area the people's decisions on urban development seem to be conditioned by poverty and not by their level on risk knowledge.
Bagré dam, Burkina Faso	30 - 50	Bagre Dam is a multipurpose dam on the White Volta located near Bagré Village in Burkina Faso. The dam provides gravity-fed irrigation to some 1'440 hectares of prime agricultural land and 10% of the country's electricity insuring the energy and food security of Burkina Faso. The release or spilling of the dam is controlled and information about the spilling is shared with Ghana and therefore the downstream inhabitants.
Centre-Nord Region, Burkina Faso	50 - 100	In early 1970s, Burkina Faso suffered from a series of drought periods, with devastating consequences for the inhabitants of the whole region. In the early 1980s, 14 out of 18 households in the village of Oualaga (Centre-Nord Region) had a food deficit of more than 50%.

Akosombo dam, Ghana	20 - 50	The Akosombo Dam was constructed to supply electricity from the Volta River for industry and to supply power to the towns and cities of Ghana and neighbouring countries. The Akosombo dam is still Ghana's major source of electricity. Demand for power continues to increase in the country, especially within the urban-industrial sector. Low water levels in the Akosombo dam in 1998 caused a major energy crisis in Ghana, which may have been caused purely by weak capacity to forecast extreme weather phenomenon. In 2017, the Akosombo dam contributed to 30% of the energy requirements of the countries. This is also due to low levels of water in the dam.
Upper East Region (UER), Ghana	50 - 100	Upper East Region has the highest proportion of poor people in the country who depend on climate-sensitive livelihoods, especially agriculture. Agriculture engages about 80% of the economically active population. UER borders Burkina Faso and is the first area to flood following the opening of Burkinabe dams which occur almost every year. It has also been shown to be more vulnerable to single hazards and less food secure than other parts of Ghana. In the 2007, all eight districts of the region were hit by floods affecting more than 40'000 people, damaging more than 11'000 homes (most of them were completely destroyed). A UNICEF team estimated that 8'000 to 10'000 people were displaced in six of the region's eight districts. Furthermore, the floods destroyed crops and washed away 12'220 hectares of farmland.
Sourou, Mali	40 - 80	In Mali, the Sourou Basin, classified as RAMSAR site, has a population of 668'000 inhabitants (mostly young and rural). The plain of Sourou has undergone major hydro-agricultural development: more than 3'800 ha of land are managed in total water control and operated by more than 3'000 producers. The Sourou Basin has a total economic value estimated at 19.85 billion FCFA. Among the goods and services identified, land resources are the most important in the area and provide in monetary terms nearly 30% of the resources of the valley. Although fishing is considered a very important activity in the area, its contribution to total economic value is only 10%.
Oti River, Togo	20 - 50	Seven communities of the Oti River Basin in Togo are the poorest in the country with the poverty rate more than 90%. Their livelihoods are derived from subsistence farming, animal husbandry and informal labour, all of which are threatened by the impacts of climate change. Most of the dwellings are informal self-housing units, poorly planned and made of mud walls, wooden doors and windows. Consequently, many buildings collapse from the force of the flood water. Heavy rainfall in September 2007 caused the worst flood that Oti River Basin had ever faced. According to the International Federation of Red Cross and Red Crescent Societies (IFRCRCS), by September 2007, 25 people were killed and 97 people were critically injured. In recent years, the most damaging floods were experienced in 2008, 2010 and 2012.

National Part of Volta Basin (NPVB), Benin	20 - 50	The flood events in NPVB are recorded almost every year locally at the village, municipal and even intercommunal level. The areas at high risk of flooding represent approximately 32% of the basin area and are located northwest of the sub-basin, particularly on sedimentary formations with a high density of drainage, where agglomerations and crop areas are concentrated, i.e. 33% of the crops cultivated areas. Populations in Atacora-Donga departments' high flood risk zones are potentially vulnerable to flooding due to poverty, food insecurity and lack of access to drinking water, road and sanitation infrastructure.
Kompienga downstream area (Burkina Faso and Togo)	100-200	Kompienga dam is located at the border between Burkina Faso and Togo. It is used mainly for hydropower generation. The population located in the downstream area of the Togo northern region usually experience flood events.
Bui region, Côte d'Ivoire	100-200	Bui National Park is a protected area of guinea savannah extending about 1800 sq. km. About 385 sq. km of land (20% of the national park) and near-by areas of border is prone to flooding due to the release of water from the Bui dam and lack of proper channels for water movements.

The pilot testing will provide the opportunity to train communities and agencies during virtual flooding or drought situations which will help to assess the effectiveness of the EWS. The results of the exercises will provide lessons learnt and will allow to identify gaps and challenges to improve the system and services. The knowledge gained by the communities and agencies will be helpful to implement similar activities with other stakeholders. The pilot testing communities (100-150 at each site including women and youths) and agencies (10-20 at each site working in disaster management, civil protection, irrigation department, CBO's, NGO's) are expected to disseminate this knowledge and skills in other areas, inside or outside the basin, where floods and drought management are also of growing concerns.

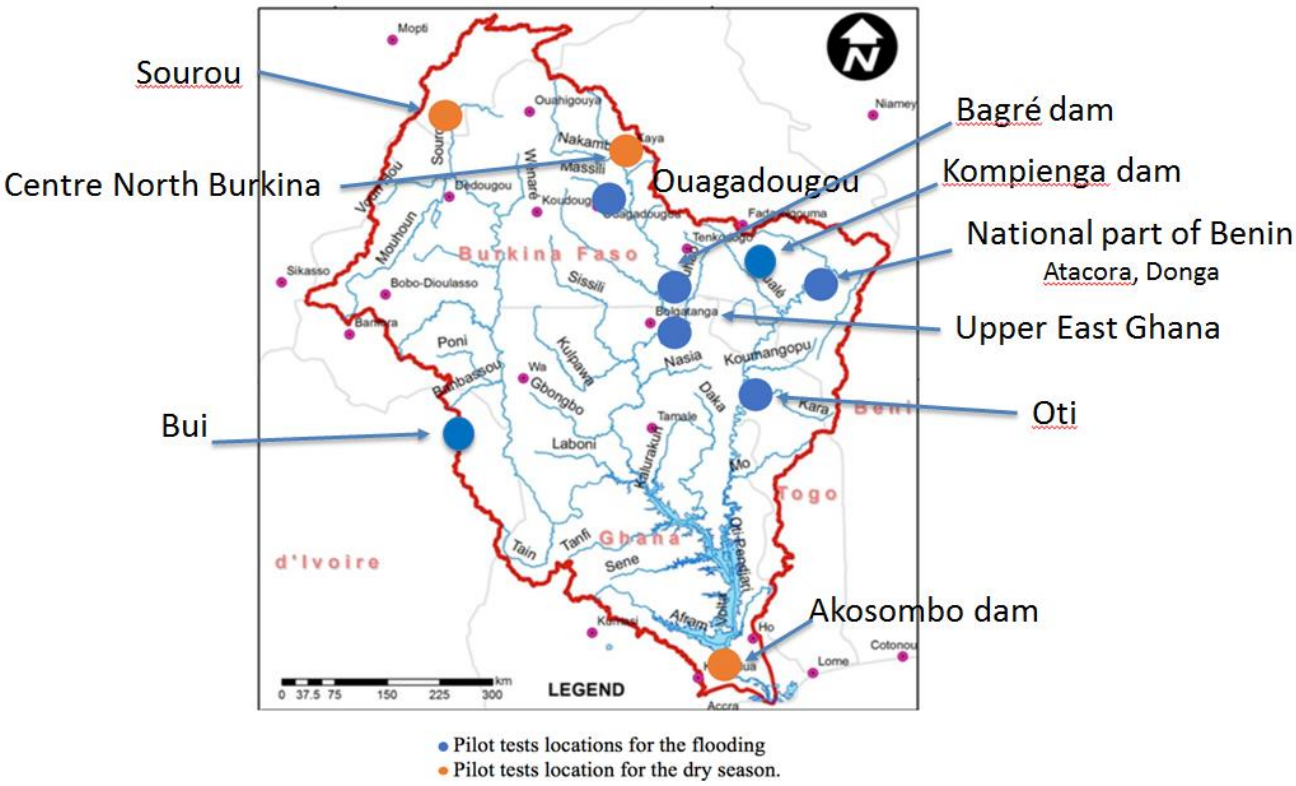


Figure 8: Volta Basin region for which Flood and Drought risk map will be developed

Phase 3: Capacity development activities will be carried out for both agencies at local/national and regional level and communities which are affected by floods and drought events during the different phase of the project. An estimation of the number of people who will benefit of the capacity development activities is provided in the next Table along with the types of participants (men, women, elderly, youths etc.) from the institutions, agencies, organisations and communities.

Through 3 cycles of sessions, the capacity building activities are planned to reach some 200 representatives in each of the six countries and from the regional agencies. Some of these training sessions will be organized on the same areas and with the people involved in the pilot testing:

- Extreme events, risks maps and climate change adaptations
  - Vulnerability Capacity Exposure and Risk assessment and information on VCER's database;
  - Floods and drought risk maps development at national and transboundary level;
  - Information on future social and environmental risk scenarios and risk management strategies.
- Early Warning System for floods and drought and measures to reduce risk
  - End-to-End Early Warning System;
  - dissemination of early warnings to agencies, communities and citizens;
  - Natural and nature-based solutions for floods considering ecosystem sustainability.
- Governance
  - Mainstreaming Gender in Flood Management;
  - Identification of gaps, and needs for the long-term strategies for floods and drought management and climate change adaptation by local and national stakeholders of six countries;

- Revision, or development, of plans, policies and guidelines for risk reduction in the view of future climate change by national and regional policy-makers.

The purpose of the training sessions is to raise awareness about the added-value of the tools and methodologies developed during the project, but also to identify participants who will be able in the future to carry out similar exercises or workshops with other stakeholders. It is also foreseen to plan visits of the pilot sites that could be led by local agencies for non-target communities, where they will interact and learn from each other experiences. Communication using social media, radio, television etc. will be used to inform about the experience of the pilot tests to spread awareness and knowledge over in the region.

Project Objectives:

The main objective of the Flood and Drought Volta project is to assist the six countries in **the implementation of coordinated and joint measures to improve** their existing management plans at regional, national and local level and to build on the lessons learned from the past and current projects related to **disaster risk reduction and climate adaptation**. The six riparian countries will therefore benefit not only from a **basin-wide transboundary management framework to ensure long-term environmental and economic development, as well as concrete solutions** to alleviate a potential increase of vulnerability and to build an effective network of actors. As droughts and floods are a common feature in the Volta basin region, integrated water resources management, **risk maps and development of early warning systems must be implemented to increase resilience to floods and droughts** and ensure socio-economic sustainable development. Equilibrated management of the water resources will be sought to make better use of the water surplus during floods to be stored in view of drought events. Furthermore, at local scale, agricultural production will be tailored to these challenges with provision of knowledge and early warnings that will enable farmers to adapt their production methods. To respond to the needs expressed in 2016 by a large number of stakeholders, the project will include **the selection and implementation of appropriate End-to-End Early Warning Systems for Floods and Drought allowing integration of short-term to seasonal indicators into the long-term management framework**. The system will embed both hazards that will be forecasted using different methodologies (indicators using different criteria to assess risk; hydrological and hydraulic models informing on threshold level; maps showing levels of risk through color-coding). As per the dissemination of warnings, existing systems (e.g. on White Volta and Oti basin) will be implemented within a common platform. The system will be built on the basis of open-source codes and free technologies, future integration of modules covering additional natural and health hazards will be foreseen to allow its upgrading towards a Multi Hazard Early Warning System.

The Volta project has the ambition to provide the first large scale and transboundary implementation of Integrated Flood and Drought Management strategies by empowering the National Meteorological and Hydrological Services (NMHS) and other competent authorities of the six riparian countries with robust and innovative solutions for disaster risk reduction and climate adaptation, including green solutions and gender sensitive participatory approaches. Existing local and national hydrological modelling systems, decision support and early warning platform will be integrated into the transboundary Early Warning System.

Increasing knowledge on the hydrological characteristics of the river system will contribute towards the understanding of their ecological processes. The study of the impacts of extreme climatic events is also crucial for wetland ecosystem management and protection strategies. Physical variables (discharge, sediment transport and temperature) are recognised as major processes governing the riverine biodiversity and productivity. New input data on the spatial and temporal

distribution of water levels and flows in the river courses will be extremely valuable to create dialogue on biological diversity. The integrated approach for flood and drought management that will be fostered by the Volta project activities will provide a base for the interactions of the two scientific communities. **A forum will be created to link physical and biological expertise related to the environmental flows and to push towards defining the ecosystem flow requirements thresholds** that could be derived from the hydrometeorological data and implemented in the Early Warning System.[56]

The project will tackle climate adaptation issues, ensuring transversal solutions from governance to technical and decision making. It will develop the underlying capacity of national and regional institutions to maintain long-term sustainability and to scale up the results. It will support stakeholders at all levels by providing **policy and management guidance and by sharing scientific information, knowledge and best practices for Integrated Disaster Risk Reduction and Climate Adaptation**. One main purpose will be to support the implementation of the Memorandum of Understanding (MoU) between VBA and the six riparian countries to promote data sharing, which is currently not sufficiently structured and demand-driven.

The Volta project is aligned with the Adaptation Fund objective to ***"reduce vulnerability and increase adaptive capacity of communities to respond to the impacts of climate change at local, national and regional level".*** Implementing climate adaptation strategies and improving the management of water resources is recognised by the six riparian countries as one of the major challenge facing national services and the transboundary Volta Basin Authority. The integrated approach at the scale of hydrological basin ensures that the existing knowledge and resources benefits from a global and unified framework and that further improvements can be more effectively integrated into a common structure. It provides a powerful tool to foster collaboration and exchanges of experiences to national partners, and to the Volta Basin Authority, as any action on the basin at short (due to crisis events) or longer term (due to climate change impact) influences the future socio-economic development of the six countries.

A scheme of the rationale and sequence of the project phases is presented in Figure 9 to illustrate and summarize how the activities proposed in each of the components contribute to solving the main issues affecting the region.

[56] An ecosystem flow is the flow of water in a river or lake that sustains healthy ecosystems and the goods and services that humans derive from them. Effective quantification of these flows includes the ecologically important range of flow magnitudes (low flows, high flow pulses, and floods), as well as the timing, duration, frequency, and rate of change of these flow conditions. Globally, these flows are most commonly referred to as "environmental flows". Additionally, "ecosystem flow requirements" have been considered as the specific quantified flows necessary for sustaining the health of a ecosystem. From Shafroth, P.B., and Beauchamp, V.B., 2006, Defining ecosystem flow requirements for the Bill Williams River, Arizona: U.S. Geological Survey Open File Report 2006-1314, 135 p. Also available online at: http://www.fort.usgs.gov/products/publications/21745/21745.pdf

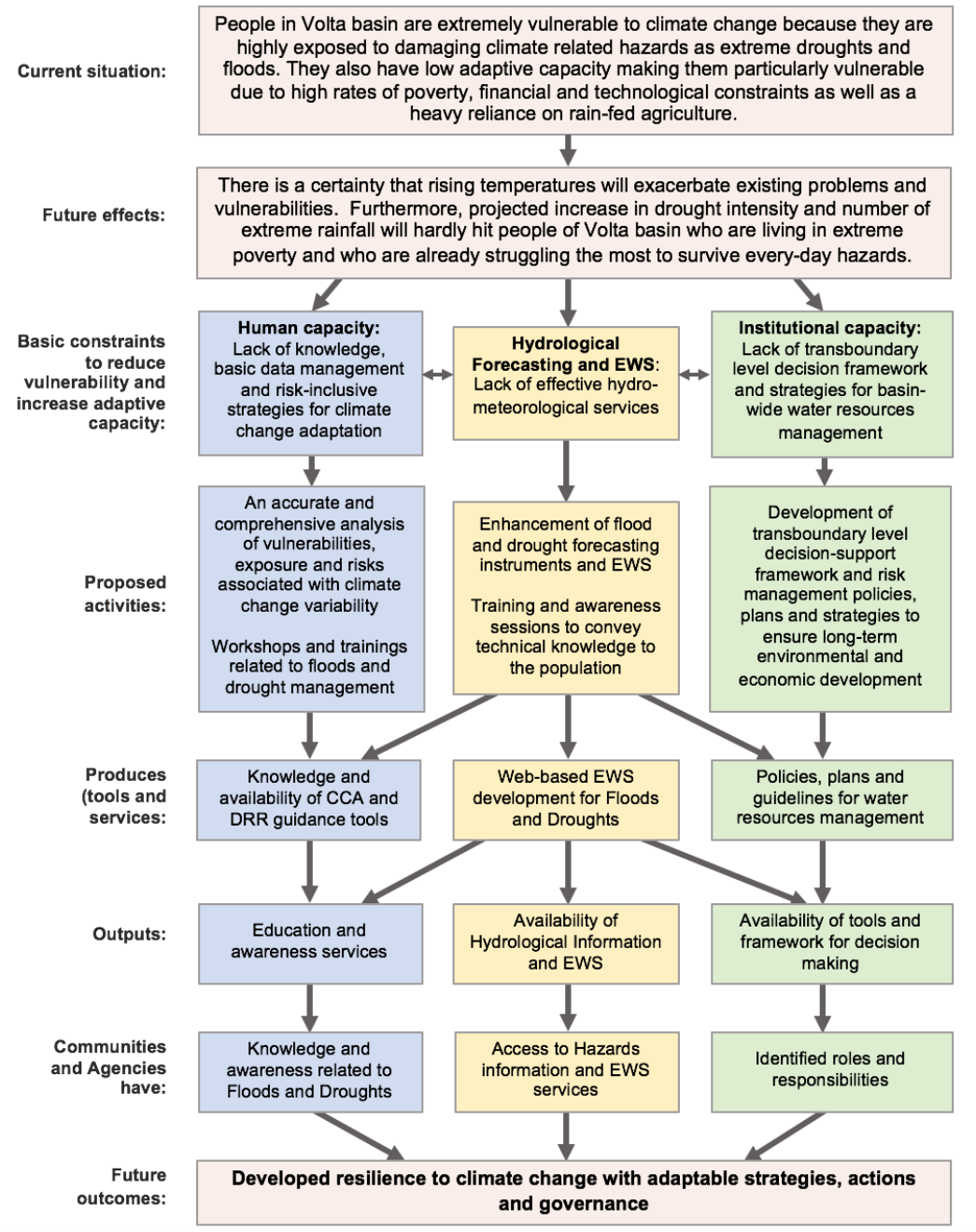


Figure 9: Schematic representation of the Volta project framework

Project Components and Financing:

Currently, the institutional arrangements for managing the water resources of the transboundary rivers of the Volta basin are lacking or not enforced. This will change with effective synergy and coordination between the Volta Basin Authority and the regional, national and other basin institutions. The separate approach of the respective countries leads to non-integrated management of water resources increasing the risk of water scarcity, land and natural ecosystem degradation.

Over the Volta Basin, flood forecasting and early warning systems have until now been developed only for the White Volta (Ghana) and Oti (Togo and Ghana) sub-basins through the World Bank supported projects. A large part of the whole basin is therefore still needing some type of warning procedure to organize actions between the technical institutions in charge of assessing extreme hazards, the National Meteorological and Hydrological Services (NMHS), the institutions in charge of disaster civil security and the communities and citizens at risk. This means therefore that the technical capacities to develop and run the models must also be developed, on the basis of the Ghana experience. Depending on the responsibilities and capacities of the Meteorological Service/Agency and the Hydrological Service in the six countries, the development and maintenance of the forecasting tools could be assigned at the regional level to the Volta Basin Authority.

Coordination and communication within the agencies and communities on issues of floods and drought must be improved by developing the appropriate information services, radio programmes, websites and mobile platforms. Furthermore, communities should trust and follow the official messages from their national or regional centres. As the most effective way of communication is through mobile platforms, national institutions should explore the use of multiple channels of communication.

Several aspects must be defined and implemented in order to foster appreciable level of participation from communities and citizens into flood, drought and environmental management. Besides Legal Instruments and operational procedures to support integrated water resources management in the Volta Basin, additional non-structural measures, such as development of risk culture, education, capacity building, next to natural and nature-based solutions should be implemented with the involvement of the stakeholders to increase climate resilience of the population.

Project Components	Expected Outcomes	Expected Outputs	Countries	Amount (US$)
Component 1: Develop capacity and established frameworks at the local, national and regional levels to ensure risk informed decision-making	**Outcome 1.1**: Improved knowledge of risks, climate change impacts and risk management capacities through knowledge sharing and participatory mechanisms	**Output 1.1.1**: Inventory of information on vulnerabilities, capacities, exposure and risks (VCERs) for floods and drought in the Volta Basin is conducted	Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo	1'500'000
		Output 1.1.2: Database of VCERs, floods and drought related risk maps are developed		
		Output 1.1.3: Capacity of stakeholders to use Floods and Drought risk maps is enhanced		
		Output 1.1.4: Reports and communication documents on vulnerabilities, capacities,		

		exposure and risks (VCERs) and Floods and Drought risk maps of the Volta Basin are available		
	Outcome 1.2: Bridging the gap in adaptation measures to integrate future scenarios (economic, urban, climate, environment etc.) into current practices and knowledge	**Output 1.2.1**: Scenarios for socio-economic and environment development along with the climate change projections are collected		
		Output 1.2.2: Projected impacts on water resources, urban development and agricultural areas are analysed on the basis of future scenarios		
		Output 1.2.3 Impact on environmental and ecosystem services indicators is evaluated for current and future scenarios		
	Outcome 1.3: Risk management strategies in short, medium and long-term to be integrated into development plans (economic, social, environmental aspects)	**Output 1.3.1**: Guidance documents for stakeholders are developed to raise awareness about the future scenarios		
		Output 1.3.2: Capacity of stakeholders to use future scenarios and to develop action plans is enhanced		
Component 2: Develop concrete adaptation and environmentally friendly actions with an integrated approach	**Outcome 2.1**: Improved flood and drought forecasting instruments and Early Warning Systems (EWS) and coordination at the transboundary level to reduce disaster risks in vulnerable communities	**Output 2.1.1**: Needs and existing resources of national and regional agencies staffs for web-based EWS are defined	Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo	4'000'000
		Output 2.1.2: The operational centre for the VoltAlarm Early Warning System is established in synergies with the NMHSs and the Volta Basin Authority		
		Output 2.1.3: The historical and real-time hydrological data from the gauging stations are collected and the procedure to link with the meteorological data is defined		
		Output 2.1.4: Thresholds for Floods and Drought risk levels are selected for the various parts of the Volta Basin and linked with environment thresholds		
		Output 2.1.5: The procedure for producing impact based forecasts for the sub-basins and vulnerable areas on a daily basis is defined		
		Output 2.1.6: The web-based		

		Early Warning dissemination interface for VoltAlarm is designed		
		Output 2.1.7: Knowledge and awareness about VoltAlarm within the user groups are increased		
	Outcome 2.2: Demonstration of the added value of the E2E EWS VoltAlarm through a series of pilot testing during monsoon and dry seasons	**Output 2.2.1**: Pilot testing for a number of areas over the basin during the monsoon and dry seasons is performed		
		Output 2.2.2: Feedback from the series of pilot testing is collected		
		Output 2.2.3 Development and implementation of community-based flood and drought management		
	Outcome 2.3: Strengthened awareness of vulnerable people on hydro-meteorological risks, prevention, preparedness, and response strategies through education programs using participative solutions	**Output 2.3.1**: Knowledge and capacity development using the Flood Green Guide (FGG)		
		Output 2.3.2: Capacity development based on the Training Manual for mainstreaming gender in the E2E-EWS-F and flood management		
Component 3: Strengthening policy and institutional capacity for integrated flood and drought management at the local, national and transboundary levels	**Outcome 3.1**: Decision support and policy development for strengthening resilience at the local, national and transboundary levels of the Volta Basin	**Output 3.1.1**: The transboundary governance plans, policies and guidelines about long term flood and drought management are evaluated	Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo	1'000'000
		Output 3.1.2: Awareness of policy-makers from the six countries on the key long-term strategies for floods and drought management and environmental impact is strengthened		
		Output 3.1.3: Experiences of local communities on key long-term strategies for floods and drought management are collected		
	Outcome 3.2: Strengthened capacities of actors and decision makers at national and transboundary	**Output 3.2.1**: Strengthened implementation of the revised, or new, climate adaptation plans (NAPA, NAP, NDC), policies and guidelines (on data and information exchanges) on		

	level on long term risk management policies, plans and strategies	issues related to risk reduction and EWS		
		Output 3.2.2: Improved integration of national policies on long term risk reduction and climate adaptation into the transboundary Strategic Action Programme		
	Outcome 3.3: A collaborative process is developed to ensure those instruments and strategies are accepted by the local organization and communities and adapted to the local context	**Output 3.3.1**: Collaboration with local communities and organizations in defining the procedures and measures to manage risks and to adapt to climate change		
		Output 3.3.2: Collaboration with local communities and organizations in finalizing policies and procedures to manage risks and to adapt to climate change		
Project Execution cost				750'000
Total Project Cost				6'500'000
Project Cycle Management Fee charged by the Implementing Entity				670'000
Amount of Financing Requested				**7'920'000**

Projected Calendar:

Project Duration: 4 years (48 months)

Milestones	Expected Dates
Start of Project Implementation	January 2019
Mid-term Review (if planned)	January 2021
Project Closing	January 2023
Terminal Evaluation	January/March 2023

PART II: PROJECT JUSTIFICATION

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

The 3 components of the project target 3 thematic areas identified by the partner countries in their recent needs assessment: 1) risk informed decision making from local to regional level, 2) development of integrated risk reduction and adaptation measures, 3) policy coordination and community capacity building at transboundary level.

A schematic representation of the Volta project components and their outcomes is presented in Figure 10. It illustrates the linkages among the outcomes of components and highlights the activities proposed in each of the components. The continuous project management and coordination, sustainability and dissemination of the project outputs during the project implementation are also represented.

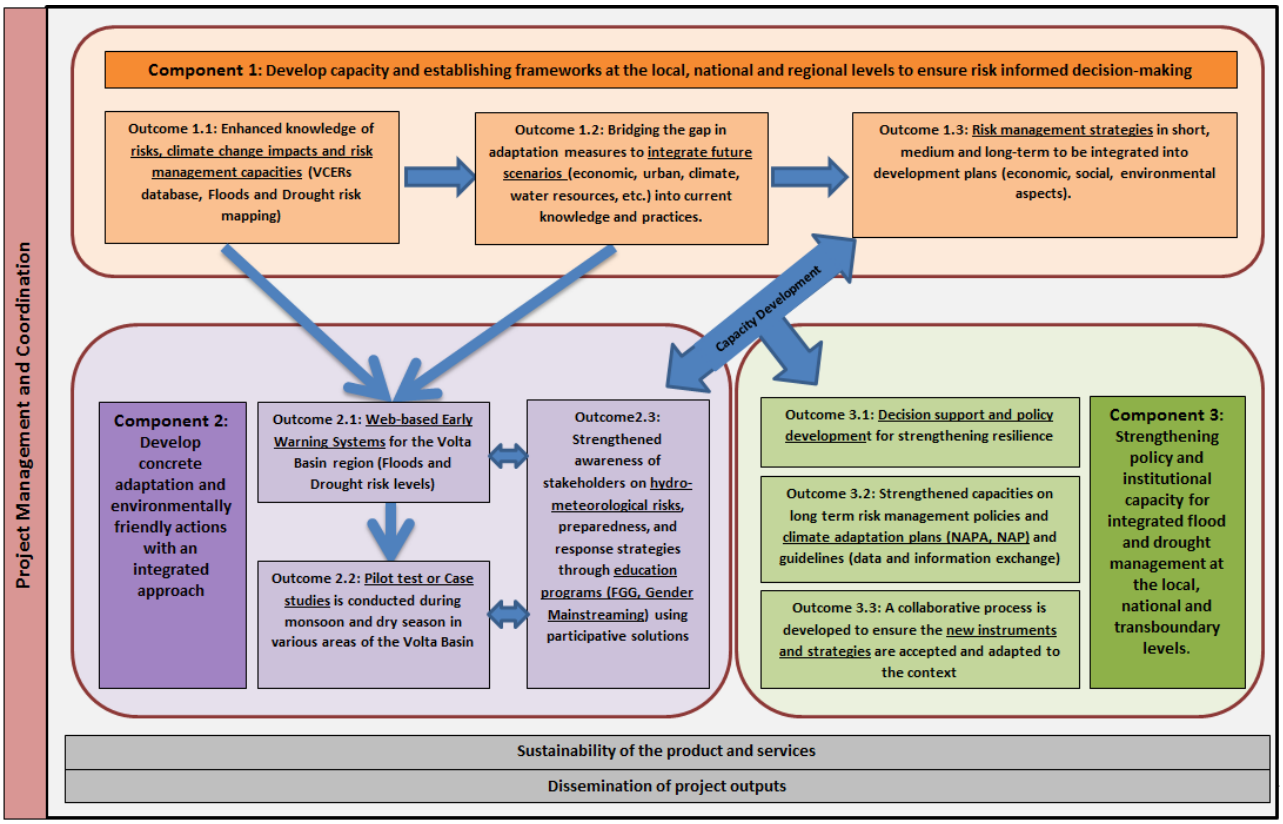


Figure 10: Schematic representation of the Volta project components and their linkages

Component 1: Develop capacity and established frameworks at the local, national and regional levels to ensure risk informed decision-making

In the Volta Basin region, integrated management of extreme hazards will help to reduce vulnerabilities and risks of the communities living in different socio-ecological contexts and relying on water resources to support their livelihoods and well-being. With population growth, limited resources, climate threats and the difficulties related to transboundary river basin management, vulnerabilities, exposure and risks related to extreme events of floods and drought have increased over the years.

Activities of the Component 1 are meant to identify and assess the current, and future, vulnerabilities, capacities, exposures and risks (VCERs). Floods and drought risk maps will be developed at local, national and regional level. Climate scenarios will be gathered and disseminated to the stakeholders, together with the risks maps, to study the possible impact of climate change on the current VCERs during capacity building sessions. This will provide opportunities to draw recommendations for integrating climate change adaptation approaches into the current disaster risk strategies.

The understanding of (natural) functional processes in river-floodplain ecosystems of basins worldwide is in a primitive state[57]. There is a need for evaluation of ecosystem services and drivers that influence their supply, as well as provide estimates of their economic values. This approach will provide indicators and tools to raise awareness of stakeholders about the benefits of ecosystem functions for human well-being and the importance of protecting and restoring native ecosystems. Furthermore, these indicators will help in planning strategies for adequate consideration of preserving wetlands and other areas of transboundary importance such as bio-diversity hot-spots.

Outcome 1.1: Improved knowledge of risks, climate change impacts and risk management capacities through knowledge sharing and participatory mechanisms

A warmer climate, with its increased climate variability, will modify the risk of both floods and droughts. Over the last decades, vulnerabilities and exposure to climate variabilities have increased in the Volta basin resulting in additional socio-economic impacts. Assessment of these varying changes will help in planning climate change adaptation solutions.

Output 1.1.1: Inventory of information on vulnerabilities, capacities, exposure and risks (VCERs) for floods and drought in the Volta Basin is conducted

Activities under output 1.1.1

Activity 1.1.1.1 Conduct a desk study (compilation of existing evidence-based past data (topographic maps, satellite images etc.), studies of extreme events, reports of disasters, etc.) and field visits to gather available information on VCERs and identify gaps or additional needs.

Activity 1.1.1.2 Develop an action plan to complement gathered information on the VCERs

Activity 1.1.1.3 Organize meetings with the relevant stakeholders working on risk management to select priority areas for community consultations

Activity 1.1.1.4 Conduct pilot field studies (focus group discussion and semi-structured interviews) with communities to identify the multi-dimensional drivers of vulnerability and risk (social, economic, ecological, cultural, political and infrastructural determinants of vulnerability) in the Volta Basin areas highly exposed to different hydro-meteorological hazards

Activity 1.1.1.5 Draft the field studies reports and the Volta-atlas

[57] Tockner et al, 2000, An extension of the flood pulse concept, Department of Limnology, Dubendorf, Switzerland https://www.researchgate.net/publication/202001243_An_extension_of_the_flood_pulse_concept

Output 1.1.2: Database of VCERs, floods and drought related risk maps are developed

Activities under output 1.1.2

Activity 1.1.2.1 Assess the available IT equipment (computers, servers, databases, etc.) and IT/GIS expertise at the VBA observatory, the NMHSs services and other relevant services (e.g. Geographical Institute, Civil security, etc.). Purchase additional equipment if necessary

Activity 1.1.2.2 Create the Volta Basin information exchange IT network by connecting the VBA observatory and the national services

Activity 1.1.2.3 Develop the database and create the links with the existing databases for the collected information on VCER including the main driving hydro-meteorological parameters for floods and drought events (e.g. precipitation, water levels, temperature, soil moisture, soil type, etc.)

Activity 1.1.2.4 Develop web-based flood and drought risk maps using the VCER database and existing maps developed in Ghana through the past projects funded by the World Bank and the Global Environment Facility (see part G for more information)

Activity 1.1.2.5 Assign roles and responsibilities to the agencies and organisations forming a task team to regularly complement and improve the database and risk maps and also to monitor and report on the new updates.

Output 1.1.3: Capacity of stakeholders to use Floods and Drought risk maps is enhanced

Activities under output 1.1.3

Activity 1.1.3.1 Organize training workshop for local professionals (hydrologists, disaster managers, GIS experts etc.) to convey knowledge and improve skills needed for using risk maps

Activity 1.1.3.2 Organize joint workshops for stakeholders to deliver knowledge on VCERs and Floods and Drought risk maps of Volta Basin and to gather feedbacks and suggestions for improvement.

Activity 1.1.3.3 Take advantage of community meetings to raise awareness of a larger number of Floods and Drought risk maps' beneficiaries, to discuss the potential indirect risks that could arise (involuntary resettlement, protection of natural habitats, conservation of biological diversity, public health, physical and cultural heritage, lands and soil conservation) and to identify safeguard actions which will help minimizing those potential negative impacts.

Output 1.1.4: Reports and communication documents on vulnerabilities, capacities, exposure and risks (VCERs) and Floods and Drought risk maps of the Volta Basin are available

Activities under output 1.1.4

Activity 1.1.4.1 Produce technical report on the added value, success and challenges of VCERs and Floods and Drought risk maps for the stakeholders and Adaptation Fund project technical committee

Activity 1.1.4.2 Develop documentation for raising public awareness (infographics, videos, mobile phone applications, educational tools for children and students, etc.)

Outcome 1.2: Bridging the gap in adaptation measures to integrate future scenarios (economic, urban, climate, environment) into current practices and knowledge

Historical patterns alone are no longer a good basis for planning and risk reduction measures as climate variability is forcing to modify the past practices. It becomes necessary to confront the current VCERs and risks maps to various scenarios describing the effects of socio-economic development and climate projections in order to foresee possible changes that people would not expect. This will not only help decision-makers to understand the potential impact of Floods and

Drought events on their planning, investment decisions and adaptation measures, but also to envisage with the communities how current practices need to be modified.

This first step will be complemented by a thorough evaluation of the potential direct and indirect impacts of the proposed activities on the environmental function of the humid zones and river courses.
Indirect impacts might be caused by a change in the practices of the communities and farmers when receiving a warning message on flood, drought or even ecosystem stresses, for example:

- In case of flood warning, people living in the flood zone could be migrating to safer places where fight for resources and space could result into an increase of social risk among the population,
- In case of upcoming drought period, the farmers could build small scale water reserves impacting the ecosystem balance.

This approach will be carried out for areas with a large evidence-based knowledge of the ecosystem parameters and the links with the operational hydrology. In the framework of the project, two or three of the pilot sites (the Ramsar site of the Bagré dam is for sure one of them) will be selected to test this methodology. This will involve the enlargement of the partnership to agencies specialized on these topics, such as WWF, IUCN, the RAMSAR convention, etc. The lessons learned will be disseminated over the whole basin and similar approaches could be developed by the partners within national projects.

Output 1.2.1: Scenarios for socio-economic and environment development along with the climate change projections are collected

Activities under output 1.2.1

Activity 1.2.1.1 Gather all available information on climate change scenarios from best scientific studies and global databases for the Volta basin and select the most relevant datasets

Activity 1.2.1.2 Gather the data on input for socio-economic scenarios of the Volta Basin region over the next decades

Activity 1.2.1.3 Organize the data on climate and socio-economic predictions for further integration with VCERs and risk maps developed under outcome 1.1

Output 1.2.2: Projected impacts on water resources, urban development, environment and agricultural areas are analysed on the basis of future scenarios

Activities under output 1.2.2

Activity 1.2.2.1 For areas covered with hydrological and hydraulic models (White Volta, Oti for example) perform a series of runs using the future socio-economic and climate scenarios to determine changes in VCERs and risk maps

Activity 1.2.2.2 For areas not covered with numerical models, carry out a first qualitative assessment of the possible evolution of VCERs and risk maps under future changes

Activity 1.2.2.3 Draft report with the methodologies and tools used for studying the impacts of future scenarios

Output 1.2.3: Impact on environmental and ecosystem services indicators is evaluated for current and future scenarios

Activities under output 1.2.3

Activity 1.2.3.1 Define indicators related to environment and ecosystem services (wetlands) conditions

Activity 1.2.3.2 Collect and process information for various environmental indicators,

Activity 1.2.3.3 Select thresholds and carry out analysis for current and future climate scenarios

Activity 1.2.3.4 Identify 2 to 3 areas (Ramsar Bagré dam for example) with appropriate dataset on ecosystem services to test the methodology

Activity 1.2.3.5 Draft report with the methodologies and tools used for studying the impacts of environmental flow[58] and experience of pilot tests.

Activity 1.2.3.6 Drafting an integrated basin-wide wetland guidelines to promote ecosystem services sustainability (aquatic/terrestrial transition zone (ATTZ)) and capacity building of relevant stakeholders.

Activity 1.2.3.7 Support for developing bankable national projects for promoting sustainable aquatic/terrestrial transition zone (ATTZ) for the depended bio-diversity

Outcome 1.3: Risk management strategies in short, medium and long-term to be integrated into development plans (economic, social, environmental aspects)

It is foreseen that climate change will give rise to major impacts on ecosystems, agriculture and water resources in the Volta basin. Planning for effective risk management strategies will help in reducing disasters in the short to medium-term, while reducing vulnerability and increasing resilience over the longer term.

Output 1.3.1: Guidance documents for stakeholders are developed to raise awareness about the future scenarios

Activities under output 1.3.1

Activity 1.3.1.1 Design and develop the guideline presenting the whole process of risk maps development and future impacts on VCERs assessment with examples of implementation on high vulnerable urbans and agricultural areas

Activity 1.3.1.1 Develop supplementary means of communication to reach a wider population (infographics, leaflets for schools, etc.)

Output 1.3.2: Capacity of stakeholders to use future scenarios and to develop action plans is enhanced

Activities under output 1.3.2

Activity 1.3.2.1 Organize trainings and workshops with stakeholders (representatives of communities, local policy-makers and decision makers) to disseminate the information on future climate and risk changes and to obtain additional qualitative input **on potential impacts for social, economic and environmental development**

Activity 1.3.2.2 Design capacity building courses for NMHSs improving their competencies to periodically perform scenarios and assessments

Activity 1.3.2.3 Develop safeguard action plan for risk management at medium and long term with the output from workshops and consultations with the stakeholders

Component 2: Develop concrete adaptation and environmentally friendly actions with an integrated approach

Floods and drought have been identified by the six countries as priority areas for transboundary management, together with other factors related to the degradation of ecosystems, such as soil

[58] Ecosystem flows is the flow of water in a river or lake that sustains healthy ecosystem and the goods and services that humans derive from them. Effective quantification of these flows include ecologically important range of flow magnitudes (low flows, high flows and peak flows) as well as the timing, duration, frequency and rate of change of these flows conditions. Globally, there flows are most commonly referred to as “environmental flows”. https://www.fort.usgs.gov/sites/default/files/products/publications/21745/21745.pdf (page-1)

degradation and deforestation[59].The Volta project will provide the basis for an integrated flood and drought management approach [60] in the region, thanks to the data systems, collaboration frameworks and early warning systems that will be put in place in the basin. The development and implementation of the End-to-End (E2E) Early Warning System for floods and droughts at the scale of the Volta basin is the key output of the project (outcome 2.1). To improve sharing of information, the system will cover the global chain from vulnerability and risk mapping to forecasting, warning dissemination and decision support. The project takes into account the results (resources, infrastructures and services) obtained by past and ongoing projects to ensure sharing of knowledge and to avoid overlap of funding. This task is a major challenge as some projects are relatively old and their integration into the new technologies must be assessed. The first development phase will be concentrating on the most vulnerable river courses and on pluvial floods due to high rainfall intensities. Link with flash flood warning could be considered thanks to the future Flash Flood Guidance System (FFGS) under discussion within the CREWS programme. This would allow to benefit from its WMO-USAid successful implementation since 2009 in more than 50 countries using remote sensing, meteorological observation networks and soil moisture data. The E2E EWS will be designed to integrate additional features, thereby possibly including other natural hazards, such as fire and erosion, and also linking with agricultural and health indicators.

The operational use of the new E2E Early Warning platform will be supported by a series of pilot tests (outcome 2.2) in different sub-basins and vulnerable areas, covering different socio-environmental conditions (Figure 8 and Table 7). The implementation of the activities will be done in close collaboration with the stakeholders and end-users. Capacity development activities will be carried out to ensure an adequate uptake of the new products, services or tools developed.

Activities are planned (outcome 2.3) to widen the dissemination of these outputs to a larger circle of institutions and communities, including consultative and participatory meetings with local communities, policy makers, expert groups, advisory committees and other relevant stakeholders (NGOs). Additional solutions are included into this part of the work project to raise awareness on the benefits of Integrated Flood Management and community participation by making use of recently published guidelines: the Flood Green Guide (FGG) by WWF on natural and nature-based solutions and the WMO-GWP Guide for Mainstreaming gender in early warning systems and integrated flood management (under finalization).

Outcome 2.1: Improved flood and drought forecasting instruments and Early Warning Systems (EWS) and coordination at the transboundary level to reduce disaster risks in vulnerable communities

One of the central outputs is the development of an End-to-End Early Warning System covering the various areas at risk of floods and drought. The system will allow to produce and disseminate warnings according to pre-defined levels of risks, using colour coding and icons for the different types of hazards, similarly to the warning systems largely installed over a large number of countries and transboundary watersheds (see for example the MeteoAlarm platform that is gathering information from European countries https://www.meteoalarm.eu/). These multi-hazard

[59] (2016): Evaluation des besoins de renforcement des capacités. Préparation des projets de gestion intégrée des inondations pour le Bénin, Burkina Faso, Côte d'Ivoire, Ghana, Mali et Togo et le bassin de la Volta en Afrique de l'Ouest. Series of seven reports GWP West Africa. Unpublished

[60] the term "integrated management" refers to the consideration of all aspects of both hazard management from the technical studies, i.e. engineering, hydrometeorological and agronomic solutions, to the socio-economic, environmental and institutional implications that floods and drought entail, as explained in literature produced within the GWP-WMO associated programmes on Flood and Drought Management http://www.floodmanagement.info/publications/concept_paper_e.pdf and http://www.idmp.info/documents/IDMP_Concept_Note.pdf)

warning systems provide already information to the end-users on various types of extreme events, from meteorological (wind, temperature, precipitations and heavy rainfall for example) and hydrological (soil moisture, high and low water levels) nature, but also from geological (landslide) or health related (heat wave) origin.

The E2E EWS will make use of available infrastructures and services based on meteorological, hydrological and remote sensing data to generate additional indicators relevant for flood and drought risk management. The web-based interface will provide operational forecasts and indicators for Floods and Drought. It will include short and medium-term predictions of meteorological parameters (rainfall distribution, intensities, temperatures, etc.) together with forecasts obtained by hydrological rainfall-runoff and/or hydraulic models. It will also include drought indicators which can be used by different sectors (water resources, agricultural etc.) and private companies.

Early Warning Systems deliver successful information when they are suited to the needs of the services in charge of decision making and action in the field. The end-users should therefore contribute to the development of the visualization interfaces and the selection of the decision criteria, as the benefits of Early Warning and risk reduction measures (at short and long term) are greatly increased with stakeholder's preparedness.

A high-level prototype (available in the Annex 2), called VoltAlarm, has been envisaged by WMO and shared with project partners to illustrate what kind of information could be produced by the NMHSs and disseminated, after registration or with free access on desktops/computers, tablets or mobile phones, either directly or through the VBA observatory to the end-users.

Output 2.1.1 Needs and existing resources of national and regional agencies staffs for web-based EWS are defined

Activities under output 2.1.1

Activity 2.1.1.1 Select the participants (hydrologists, meteorologists, IT and GIS experts, etc.) within the NMHSs and flood or drought related services (Defence, Agriculture, etc.)

Activity 2.1.1.2 Develop the curriculum on the basis of the capacity building documentation developed by GWP and WMO for their programmes on flood and drought management taking into account hydro-meteorological and socio-economic conditions of target areas

Activity 2.1.1.3 Organize the training sessions at the transboundary level (with participants from each riparian country) including theoretical trainings and practical exercises

Output 2.1.2 The operational centre for the VoltAlarm Early Warning System is established in synergies with the NMHSs and the Volta Basin Authority

Activities under output 2.1.2

Activity 2.1.2.1 Define the needs related to facilities (rooms for developers, operational shifts, crisis communication, air conditioning, etc.), equipment (hard and software, including real-time connections), technical capacities, human resources (for daily activities and with additional resources during crisis)

Activity 2.1.2.2 Buy, install and test the equipment needed to create and use the VoltAlarm EWS

Activity 2.1.2.3 Develop capacity of the operational team in charge of VoltAlarm at the national services and at VBA (hydro-meteorological forecasters, IT specialists, communication officers, on-call teams, etc.) in continuous monitoring of the Web-based EWS

Activity 2.1.2.4 Write the operational manual including procedures and responsibilities

Activity 2.1.2.5 Run and maintain the VoltAlarm system

Output 2.1.3 The historical and real-time hydrological data from the gauging stations are collected and the procedure to link with the meteorological data is defined

Activities under output 2.1.3

Activity 2.1.3.1 Make an inventory of the gauging stations with real-time data transfer (or pseudo real-time) in the Volta Basin and prepare descriptive sheets for each station (location, equipment, data series, etc.)

Activity 2.1.3.2 Perform a field/desk study to check the availability and quality of the data and information related to runoff, rainfall and other relevant meteorological and agrometeorological data

Activity 2.1.3.3 Develop the database of hydro-meteorological parameters, or interconnect with existing platforms

Activity 2.1.3.4 Organize training for the NMHSs staff related to data collection, calibration and maintenance of equipment following WMO standards

Output 2.1.4 Thresholds for Floods and Drought risk levels are selected for the various parts of the Volta Basin and linked with environment thresholds

Activities under output 2.1.4

Activity 2.1.4.1 Use topographic data, VCERs database, Floods and Drought risk maps to mark out the boundaries of the basin, sub-basins, highly vulnerable areas

Activity 2.1.4.2 Describe the thresholds for flood events and for drought period based on VCERs and risk maps for various risk levels (level 0: no risk, level 1: very low, level 2 : low, level 3: moderate, level 4: high) through consultations with technical services and local representatives supported by evidence-based experiences.

Activity 2.1.4.3 Define the values of the thresholds for floods and for drought events for each zone or area close to a gauging station, in relationship with past events

Activity 2.1.4.4 Link the environment threshold with the threshold of flood and drought

Output 2.1.5 The procedure for producing impact-based forecasts for the sub-basins and vulnerable areas on a daily basis is defined

Activities under output 2.1.5

Activity 2.1.5.1 For the areas with available forecast models in the sub-basins (e.g. White Volta, Oti), create the procedure to use the outputs of the existing models within the network of centers producing VoltAlarm (NMHSs and VBA)

Activity 2.1.5.2 For the areas not covered with hydrological models, develop charts and graphs (with various standard icons and images) to define the flood and drought indicators using hydro-meteorological data from past events

Activity 2.1.5.3 Write the software to collect the meteorological and hydrological forecasts and to calculate the daily warning levels for each of the sub-basin and vulnerable areas

Activity 2.1.5.4 Design and develop the interface to gather all individual warning levels on the main system at the VBA observatory

Output 2.1.6 The web-based Early Warning dissemination interface for VoltAlarm is designed and developed

Activities under output 2.1.6

Activity 2.1.6.1 Organize consultations with the end-users from national and regional agencies and from communities to gather their expectations related to their future use of the prototype proposed on Figure 11 (background maps, zooms, types of graphs, location of evacuation centre, hospital, emergency centre, first-aid, etc.)

Activity 2.1.6.2 Develop and test the web-based dissemination interface

Activity 2.1.6.3 Write the user guide to convey all available knowledge on the interface to the various groups of users (forecasters, IT staff, decision-makers, etc.)

Output 2.1.7 Knowledge and awareness about VoltAlarm are increased within the user groups.

Activities under output 2.1.7

Activity 2.1.7.1 Carry out trainings and capacity development workshops with the NMHS professionals, local/national agencies and users of the web-based EWS

Activity 2.1.7.2 Gather feedbacks, suggestions and scope for improvements from the workshop participants

Activity 2.1.7.3 Organize a workshop to discuss with the trained participants how similar risk maps and early warning systems can be developed for areas outside of the Volta Basin

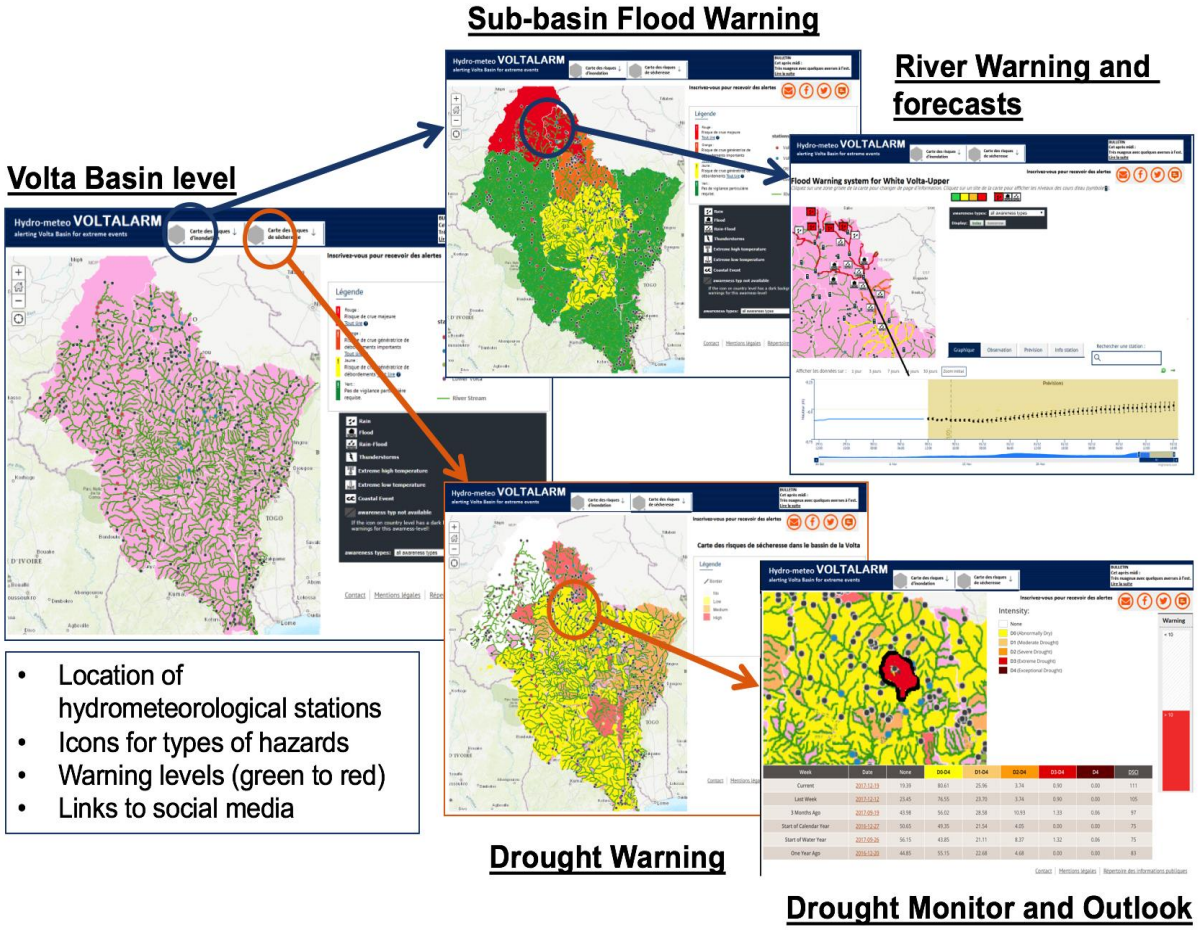


Figure 11: VoltAlarm (prototype of the E2E EWS for Floods and Drought to be developed)

Outcome 2.2: Demonstration of the added value of the E2E EWS VoltAlarm through a series of pilot testing during monsoon and dry seasons

A series of pilot testing will ensure that VoltAlarm is a robust platform, that the warnings messages are delivered on time and understood by the users. These tests in real conditions will also provide the opportunity to clarify the responsibilities, roles and collaborations among actors and stakeholders involved in Floods and Drought management activities. Training and awareness sessions at local level will ensure that warnings are delivered in a suitable way to the population,

especially the most vulnerable groups, and that proper actions are undertaken when extreme events are forecasted.

Output 2.2.1 Pilot testing for a number of areas over the basin (Figure 8) during the monsoon and dry seasons are performed

Activities under output 2.2.1

Activity 2.2.1.1 Finalize the selection of the pilot tests areas with the concerned agencies and communities on the basis of the draft list presented in Table 7

Activity 2.2.1.2 Organize meetings on each of the pilot areas to assign the roles and responsibilities of the different groups of stakeholders during the tests and present the coordination and collaboration mechanism enabling first responders to receive and use efficiently the early warning information

Activity 2.2.1.3 Identify the good practices, challenges and limitations of products and services during the Flood and Drought events at each of the pilot testing locations

Activity 2.2.1.4 Raise awareness about the pilot testing using multi-media channels

Activity 2.2.1.5 Develop an action plan to further improve products and services after the pilot testing

Output 2.2.2 Feedback from the series of pilot testing is collected

Activities under output 2.2.2

Activity 2.2.2.1 Organize national consultative workshops (participants from local/national agencies involved in Floods and Drought management) to share the knowledge (new methodologies, concepts and tools for effective forecasting and dissemination of early warnings) from the pilots tests

Activity 2.2.2.2 Collect feedbacks from the workshop participants highlighting their views and perception of developed products and services

Activity 2.2.2.3 Draft the series of reports on the experiences from the pilot testing and provide a summary of recommendations

Activity 2.2.2.4 Develop communication materials to disseminate the results of the pilot testing and describe the added value of VoltAlarm

Output 2.2.3 Development and implementation of community-based flood and drought management

Activities under output 2.2.3

Activity 2.2.3.1 Conduct participative community consultations to identify and select the appropriate local measures or equipments (non-structural preparedness tools such as early warning dissemination through loudspeakers and local radio, locally installed rain-gauge and river-gauge for hydrological data collection, marking of vulnerable houses for rapid response support, flood level marking plates to mark the previous year's floods useful for future construction of resilient houses, simulation exercises, knowledge and awareness session on disaster risk reduction, ecosystem services, climate change adaptation and drought indicators).

Activity 2.2.3.2 Develop and install the local measures as identified with the communities under activity 2.2.3.1.

Activity 2.2.3.3 Capacity building and formation of local community flood and drought management committees

Activity 2.2.3.4 Development of community-based flood and drought management manuals including safety and safeguard measures for preservation of natural habitats, land and soil conservation, biological diversity.

Activity 2.2.3.5 Organize meetings to share knowledge and experience of added-value of local measures or equipments

Outcome 2.3: Strengthened awareness of vulnerable people on hydro-meteorological risks, prevention, preparedness, and response strategies through education programs using participative solutions

Besides the development of new tools to reduce the impact of extreme events, capacity building activities allow to spread knowledge on disaster risk reduction prevention to a larger number of communities and to focus on the most vulnerable groups. To foster enhanced participation of local population, the methodologies from two different guidelines will be implemented: 1) the Flood Green Guide published by WWF in 2017 to help selecting the most appropriate (results and cost efficiency) combination of structural and non–structural methods, including natural and nature-based flood solutions, to maximize the benefits of floods, 2) the Training manual for mainstreaming gender in Integrated Flood Management from WMO. These methodologies highlight special aspects of risk prevention with practical guidance to give attention on urban development, areas of global importance for ecosystems protection and women participation.

Output 2.3.1 Knowledge and capacity development using the Flood Green Guide (FGG)[61]

Activities under output 2.3.1

Activity 2.3.1.1 Develop the Training Curriculum of the FGG

Activity 2.3.1.2 Organize dedicated short courses (at least one per country) on the FFG approaches and concepts for targeted beneficiaries to disseminate knowledge on natural and nature-based solutions for flood management

Activity 2.3.1.3 Collect feedbacks from the workshop participants on their views and perception of FGG tools

Activity 2.3.1.4 Recommend actions to increase the use of natural and nature-based solutions and environmentally friendly methodologies with the involvement of local population and aligning with the Adaptation Fund ESP principles

Activity 2.3.1.5 Conduct workshops to provide support for developing bankable project proposals (submission to the internal and external agencies in future) on natural and nature-based solutions for the flood events.

Output 2.3.2 Capacity development based on the Training Manual for mainstreaming gender in the E2E-EWS-F and flood management[62].

Activities under output 2.3.2

Activity 2.3.2.1 Finalize the development of the Training Manual for mainstreaming gender in the E2E-EWS-F and flood management

Activity 2.3.2.2 Organize and conduct workshops (at least one per country) on the Training Manual for mainstreaming gender in the E2E-EWS-F and flood management with potential participants from NMHSs, local policy-makers, civil authorities, women and community based organizations etc.

Activity 2.3.2.3 Collect feedbacks from the workshop participants on their views and knowledge sharing on mainstreaming gender in E2E-EWS-F and IFM with other stakeholders

Activity 2.3.2.4 Recommend actions that would improve the participation of women into flood management and early warning

[61] WWF in partnership with the US Agency for International Development Office of Foreign Disaster Assistance (OFDA), has developed the Flood Green Guide to support communities at a local level in using natural and nature-based methods for flood risk management.

[62] WMO will also test the methodology proposed in the forthcoming training manual for mainstreaming gender in Flood management, and its facilitator guide to support trainers.

Component 3: Strengthening policy and institutional capacity for integrated flood and drought management at the local, national and transboundary levels

Presently, the Volta basin region lacks transboundary level decision framework and strategies to overcome the challenges of the basin-wide water resources management. To increase adaptive capacity and empower people to cope with their changing environment, the development of decision-support framework can help national and local agencies to mutually understand and respond to challenges and opportunities in the Volta Basin.

The project builds on a number of risk reduction master plans, such as the Volta Basin Strategic Action Programme, development strategies and adaptation measures listed in the Second edition of the Disaster risk management Program published by the Global Facility for Disaster Reduction and Recovery (GFDRR) of the World Bank in 2009. Four of the six Volta Basin countries (Burkina Faso, Ghana, Mali and Togo) are identified as major priorities due to their high vulnerability to natural hazards and low resilience to climate change. Even though considerable funding has already been (or is being) attributed to the six countries, a large coordination effort, joint methodologies and shared tools are still needed to ensure that the results and outputs of the national projects are integrated at transboundary level.

Activities of component 3 explore how coordination efforts will be beneficial to the concerned institutions, such as the integrated programmatic approach proposed for the National Council for Emergency Relief and rehabilitation (CONASUR) and the National Council on Environmental and Sustainable Development (SP/CONEDD) in Burkina Faso. In Ghana, the National Disaster Management Organization (NADMO) will implement new solutions from national to local level through the involvement of the Zonal offices. Joint initiatives will be envisaged with the Economic Community of West African States (ECOWAS), and the Coordination Unit for Water Resources.

Adaptation measures and strategies aligning with AF ESP and gender principles will be discussed at local level in agreement with local organizations and communities to increase the resilience to floods and drought. The participation and engagement of local stakeholders will facilitate the adoption of the strategies and subsequently result in long-term sustainability.

Outcome 3.1 Decision support and policy development for strengthening resilience at the local, national and transboundary levels of the Volta Basin.

Output 3.1.1 The transboundary governance plans, policies and guidelines about long term flood and drought management are evaluated

Activities under output 3.1.1

Activity 3.1.1.1 Conduct a desk study, and hold meetings with partners, to identify the status of climate and future socio-economic changes in the transboundary governance plans, policies and guidelines for flood and drought management

Activity 3.1.1.2 Develop a short report underlining the strengths together with the identified gaps and additional needs related to climate and development impacts

Activity 3.1.1.3 Propose long-term actions for strengthening resilience and capacities at transboundary level to be implemented by VBA and the other regional agencies

Output 3.1.2 Awareness of policy-makers from the six countries on the key long-term strategies for floods and drought management and environment impact is strengthened

Activities under output 3.1.2

Activity 3.1.2.1 Describe the network of the relevant policy-makers responsible for floods and drought management as well as other related fields (health, agriculture, ecosystem, forestry, soil and land management.)

Activity 3.1.2.2 Organize and conduct national workshops to identify the gaps and needs in policies and plans with special attention on safeguard actions for minimizing

direct and indirect risks arising from the project activities , and to highlight the key long-term strategies for floods and drought management

Activity 3.1.2.3 Collect feedbacks and recommendation at national level and needs for interconnection with transboundary policies

Activity 3.1.2.4 Present the recommendations to the policy-makers and ministries

Output 3.1.3 Experiences of local communities on key long-term strategies for floods and drought management are collected

Activities under output 3.1.3

Activity 3.1.3.1 Draft a report with **evidence-based** experiences at local level

Activity 3.1.3.2 Organize and conduct local workshops to get a wider input of communities on possible solutions and arrangements for improving socio-economic development.

Activity 3.1.3.3 Collect feedbacks and recommendation at local level and provide input on the needs for relationships to national policies

Outcome 3.2 Strengthened capacities of actors and decision makers at national and transboundary level on long term risk management policies, plans and strategies

Output 3.2.1 Strengthened implementation of the revised, or new, climate adaptation plans (NAPA, NAP, NDC), policies and guidelines (on data and information exchanges) on issues related to risk reduction and EWS

Activities under output 3.2.1

Activity 3.2.1.1 Organize and conduct workshops to disseminate the revised, or new, plans, policies and guidelines on climate adaptation measures in the Volta Basin.

Activity 3.2.1.2 Collect feedbacks, suggestions and recommendations from the workshop participants on the links between activities of National Programmes and the Volta basin project

Activity 3.2.1.3 Identify roles and responsibilities of the individual organizations and define the coordination mechanism to improve the implementation of the climate change adaptation measures

Output 3.2.2 Improved integration of national policies on long term risk reduction and climate adaptation into the transboundary Strategic Action Programme

Activities under output 3.2.2

Activity 3.2.2.1 Launch national consultations in the six countries to gather feedback on the effective coordination between national and transboundary policies in the framework of floods and drought management and climate adaptation

Activity 3.2.2.2 Draft a report with recommendations from the consultations

Activity 3.2.2.3 Organize the dissemination of the report to policy-makers

Outcome 3.3 A collaborative process is developed to ensure those instruments and strategies are accepted by the local organization and communities and adapted to the local context

Output 3.3.1 Collaboration with local communities and organizations in defining the procedures and measures to manage risks and to adapt to climate change

Activities under output 3.3.1

Activity 3.3.1.1 Conduct a desk study and consultation of local stakeholders to gather examples of best practices for flood and drought risk reduction and climate adaptation related measures

Activity 3.3.1.2 Develop capacity building documentation for local communities with the help of the local stakeholders
Activity 3.3.1.3 Draft report on recommendations from local communities

Output 3.3.2 Collaboration with local communities and organizations in finalizing policies and procedures to manage risks and to adapt to climate change

Activities under output 3.3.2
Activity 3.3.2.1 Prepare a framework of safeguard actions for community involvement on long term disaster risk reduction with local stakeholders
Activity 3.3.2.2 Conduct community-based workshops with agencies, local communities and organizations to prioritize adaptation measures
Activity 3.3.2.3 Collect feedbacks, suggestions and recommendations
Activity 3.3.2.4 Propose action plans at local and national levels to increase local participation

B. Describe how the project would promote new and innovative solutions to climate change adaptation, such as new approaches, technologies and mechanisms.

The components of the Volta project deal with innovative solutions, mechanisms and technologies in the following ways:

Under component 1: Develop capacity and established frameworks at the local, national and regional levels to ensure risk informed decision-making

Component 1 will ensure that the existing vulnerabilities, capacities, exposure and related risks to Floods and Drought events are assessed and mapped so that the risk zones in the Volta Basin are characterized and priorities are attributed to the most vulnerable areas. Moreover, climate change predictions will help the stakeholders at the local/national/transboundary level to identify the future impacts of climate change variabilities and to provide support in risk informed decision-making. These results could be further updated for other types of natural hazards and climate change adaptation initiatives/measures to study the impacts on various sectors of the environment and water resources. The floods and drought risk maps will be open-source and enable the mainstreaming of results into other initiatives focused on Floods and Drought management in the Volta Basin. Coordinating with the VBA at the regional level will help to promote the methodologies of risks assessment and mapping to other countries in West Africa which are also prone to Floods and Drought events.
The preservation of the environmental resources and ecosystem services will be studied by integrating environmental indicators to the more usual human and properties approaches when describing the vulnerability and risks (which are part of component 1 activities). This will be furthermore useful to increase the awareness related to the negative impacts, as well as the benefits, of the environmental resources.

Under component 2: Develop concrete adaptation and environmentally friendly actions with an integrated approach.

An integrated flood and drought early warning system is an immediate need for the Volta Basin where timely and relevant information are lacking for announcing incoming hydro-meteorological hazards. The end-to-end hydrological monitoring, forecasting and disseminating system will be

designed based on a web-based open-source, cost-effective and real-time chain of modules that will enable collection and transmission of timely, accurate, and local data to users.

It must be underlined that the methods for producing warnings will differ depending on the characteristics of the hazard (flood or drought), as both hydrological extremes differ in their spatial and temporal distribution: floods are relatively rapid events, caused by intense precipitation, limited in time and affecting localized areas (compared to drought); whereas drought is a more slow induced event, and might have a much distributed impact both in area and time. On the one hand, the data needed to describe both phenomena can be partially shared, such as meteorological, hydrological and agronomical parameters. On the other hand, the methodology to forecast the two phenomena varies considerably and depends on the availability of different types of meteorological forecasts (from nowcasting for short pluvial events to seasonal and sub-seasonal forecasts for drought onset). The hydrological and agronomical forecasts will be produced by a range of methods, from simple graphs using the current levels of indicators (VCER's, upstream-downstream river water levels, rainfall-water level relationships, various drought indicators) to more elaborated modelling (depending on the existing models developed on some of the sub-basins during previous projects. The main point of the approach is to be able to link hydro-meteorological hazards to their consequences on the vulnerable areas from the social and environment point of view. Flood and drought risks maps are therefore a first major input, which still need to be built, and made available to the communities, over the entire watershed.

Information will be transferred to fit local contexts and local languages using multiple technology options including simple message texts on mobile phones, social media, and radio. The goal is to provide localized information to the general public that will be better prepared to the effects of floods and drought. Furthermore, the proposed system will provide possibilities to receive information from the users (crowd sourcing) about their observations during the floods and drought events. The web-based early warning system will be made compatible and scalable to integrate other hazards in future, such as fire, diseases etc.

The integrated web-based Early Warning System (EWS) provides a way to disseminate information to national services, civil security, and to the population which can suffer from these both types of extreme events during the same year. It becomes a support tool to foster collaboration and knowledge sharing between institutions and populations.

Moreover, adaptation strategies could be tested through the early warning system at some of the pilot locations during monsoon and dry period. The experience will be shared with other communities having similar socio-ecological contexts in the Volta Basin. The natural and nature-based solutions for floods and gender mainstreaming in E2E-EWS will help representatives of agencies, organization and communities to develop knowledge and skills enhancing the flood management approach with environmental and social benefits. This approach is rarely included when warning systems are established because the intend is mostly to prevent the loss of lives and properties. In the Volta basin, the interdependency of the human and social impacts with the environmental resources needs to be linked, therefore increasing the resilience capacity of the environment.

These adaptation strategies will ensure the transfer of best practices, skills and lessons learned from the pilot-sites trained beneficiaries to the non-targets actors and communities. Subsequently, the knowledge upscaling and replication of methodologies beyond the pilot sites will be encouraged, which will strengthen the adaptive capacity and resilience of other communities prone to climate-based extreme events. It will also empower individuals to participate in the decision making processes at local/national/regional level.

Under component 3: Strengthening policy and institutional capacity for integrated flood and drought management at the local, national and transboundary levels.

The upstream and downstream countries of Volta Basin must coordinate their responses in managing water resources (excess water during monsoon and transfer of water during dry season). Component 3 includes knowledge exchange, inter-country dialogue and cooperation which will strengthen the development of policy, plans and guidelines for managing shared water resources and climate extreme events. For decades, VBA has been working on protocols on data sharing and coordinated strategies at the transboundary level. The Volta project will facilitate engagement between VBA and the riparian countries in understanding the present challenges and develop strategies and action plans to build robust cooperation on transboundary resource management. The other initiatives under this component will be to:

- Establish mechanisms for information exchange and networking (including exchange visits of officials to other countries to share ideas, knowledge, practices and lesson learned) ;
- Developing open source databases with tools, polices and guidelines;
- Framework and expertise for carrying out regular monitoring and evaluation after the project period ensuring long-term sustainability.

Strengthening of stakeholder knowledge through capacity building

Additionally, the capacity building activities at the national and local level will be key in achieving the long-term support: to ensure a better adoption of the innovative solutions proposed in the project. The wide range of training curriculum will involve local and national counterparts and communities to develop knowledge and skills in end-to-end early warning systems for flood management, integrated drought management, hydrological status and outlooks, community based flood and drought management, mainstreaming gender, roving seminars for farmers on agro-meteorology, etc. These trainings will be delivered based on materials already tested and made available by WMO in the framework of specific activities such as the Flood Forecasting Initiative, or the Integrated Drought Management Programme (IDMP). These training could also be embedded in wider WMO initiatives (e.g. corresponding to the work plan of the WMO Commission for Hydrology), and therefore provide an in-kind commitment from WMO in the development of training materials and the logistical organization of the training workshops.

Countries would benefit from this training and at the same time contributing in-kind by having their NMHSs staff attending the workshops, or assisting on the local logistical arrangements for holding the workshops. These trainings will strengthen NMHS capacities in generating and delivering climate information and prediction products for climate services by developing skills required to access forecasts and reforecast data from Global Producing Centres for Long-Range Forecasts (GPCLRF). GPCLRF is an integral part of the WMO Global Data-Processing and Forecasting System (GDPFS) underpinning the generation of climate information products by the NMHSs. The GPCLRFs follow a strict designation process according to which the Centres adhere to well-defined standards to ensure consistency and usability of output. These standards include a fixed forecast production cycle, a standard set of forecast products and the WMO defined verification standards. Currently there are 13 WMO designated GPCLRFs.

Figure 12. WMO Global Producing Centres for Long-Range Forecasts

Considering that climate forecasts produced by the Global Producing Centres (see Figure 12) often do not have sufficient resolution for application in national scale climate services and differ in format, uniformity and forecast visualization techniques, the trainings will also focus on WMO Regional Climate Centres (RCCs) and two Lead Centres: the Lead Centre for Long-Range Forecast Multi-Model Ensemble prediction (LC-LRFMME) and the Lead Centre for Standard Verification System for Long Range Forecasts (LC- SVSLRF).

RCCs have been established to deliver regionally focused high resolution data and products including long-range forecasts that support regional and national climate activities and climate services. Regional Climate Centres are operated as Centres of Excellence that strengthen capacity of WMO Members in a given region to deliver the best climate services to national users.

Long-Range Forecast Multi-Model Ensemble is jointly managed by the Korean Meteorological Agency and NOAA's National Centre for Environmental Prediction in the USA. Its functions include: collection of long-range forecast data from all GPCs each month; maintaining a central portal from which forecast users can access the GPC output in standard digital and graphical formats; developing and providing multi-model forecast products with improved skill and promoting research into techniques for combining predictions from different models.

LC-SVSLRF is jointly managed by the Australian Bureau of Meteorology and the Meteorological Service of Canada. The key role of the LC-SVSLRF is to collate and display GPC hind-cast verification diagnostics in standard formats that allow easy comparison between models. The Lead Centre provides access to: verification datasets; verifying software; documentation of the system; broad technical support; and, access to the final verification data as well as graphing and display of results.

To enhance the predictions of droughts and floods' consequences (crop damage, water shortages, epidemic outbreaks, food insecurity, etc.), the trainings will promote NOAA's Climate Prediction Center which updates regional hazards outlooks for food security for many regions of the world every week. The outlooks are prepared in partnership with government agencies

including United States Agency for International Development (USAID), United States Geological Survey (USGS), United States Department of Agriculture (USDA), National Aeronautics and Space Administration (NASA), and the private sector, and draw from expertise in a variety of fields, including meteorology, hydrology, agriculture, remote sensing, environmental and social science. The hazard outlooks feature both long-term (past conditions throughout the season) monitoring of the climate system and outlooks into the near future about one week to a season. The objective is to provide targeted forecasts for areas that are vulnerable to floods or drought that might result in adverse impact on crops or pastures.

The procedures outlined are analogous to impact-based climate forecasting systems for other socio-economic sectors, provided that NMHSs and stakeholders from these sectors are both involved in the preparation of the forecasts either together or at different stages of the forecasts. The WMO Climate Services Toolkit (CST) could serve as an excellent resource for providing NMHSs and RCCs with much of the climate monitoring, forecasting, and climate data management tools that are required to manage data and create graphics for the preparation of impact-based forecasts.

The trainings will be coordinated with the Regional Climate Outlook Forum For Sudano-Sahelian Africa (PRESASS), coordinated by the African Centre of Meteorological Application for Development (ACMAD) in Niamey (Niger) and which covers all Volta Basin riparian countries. PRESASS provides consensus-based, user-relevant climate outlook products by adapting the large and regional scale forecasts to the national context.

The PRESASS implementation process includes:

- A pre-COF training workshop on seasonal climate prediction to strengthen the technical capacity of national and regional climate experts;
- Meeting to present and interpret available real-time climate monitoring and assessment, seasonal prediction products from WMO global data and monitoring centres, GPC-LRFs and RCCs as well as the country-level forecasts, assess the skills of forecasting systems, and develop the consensus seasonal climate outlook statement for the region;
- Together with the user representatives, the forum participants discuss the potential applications of RCOF products for decision making in the agriculture, disaster, water and health sectors;
- Special outreach session involving media experts to develop effective communication to stakeholders;
- Verification of past outlooks by NMHSS and ACMAD/RCC, assessment of the use of climate information through surveys, meetings, regional food security and DRR forums, group discussions, dialogue days, exhibitions and side events;
- Share recent studies and findings on regional climate variability, predictability and climate change and discuss their integration in forecasts operations;
- Updates of the consensus product.

Sessions for hydrologists and agrometeorologists are organized in parallel generating discharge outlooks and agrometeorological advices presented at the forum plenary. ACMAD/RCC prepare and publish for the disaster management sector a brief for policy and decision making including a synthesized climate outlook, related expected hazards and potential impacts as well as measures for contingency plan updates and implementation.

The RCOF outlook is communicated to participants at meetings of the West African regional Committee on disaster management and the national flood management committee in Niger in collaboration with the National Meteorological Service.

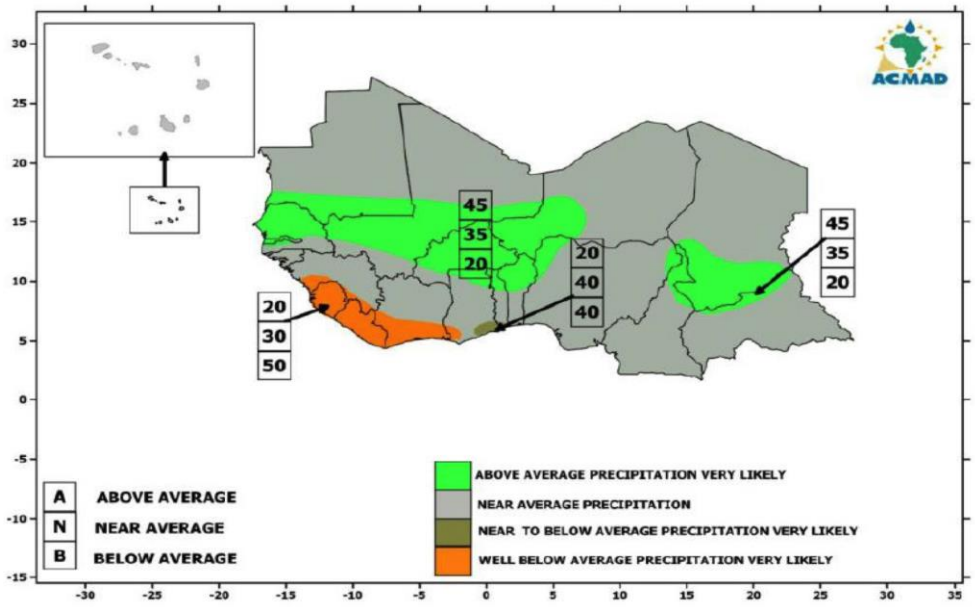


Figure 13. Seasonal Precipitation forecasts issued on May 19, 2017 and valid for July-September 2017 over West Africa, Chad and Cameroon.

Often RCOFs are followed by National Climate Outlook Forums (NCOF) to develop detailed nationally-scale climate outlooks and risk information (see example on Figure 13), including advisories for communication to decision-makers and the public. Based on the needs of specific sectors, Climate Services User Forums (CSUF), such as CSUF Water, Health, Agriculture for South Asia, and specialized, sector-oriented outlook forums, such as the Malaria Outlook Forums in Africa, are being held in conjunction with Regional Climate Outlook Forums.

During the proposed project's implementation period, an innovative monitoring programme (including a Monitoring & Evaluation plan) will be established under component 1, 2 and 3. This monitoring and evaluation (M&E) programme with local/national/transboundary agencies will collect information on the effectiveness of project implementation cost and monitor the results of the climate change adaptation interventions across various socio-economic contexts. This M&E methodologies and resources could be easily used after the project completion and further integrated into the other on-going and future adaptation projects at the local/national and regional level.

C. Describe how the project provides economic, social and environmental benefits, with particular reference to the most vulnerable communities, and vulnerable groups within communities, including gender considerations. Describe how the project will avoid or mitigate negative impacts, in compliance with the Environmental and Social Policy of the Adaptation Fund.

In line with the Environment and Social Policy of the Adaptation Fund and its principles, the ecosystem approach is fundamental in the concepts of Integrated Flood, and Drought Management supported by WMO and GWP and it will be one of the major aspects considered when developing medium and long-term adaptation measures. This will be achieved by taking into account the existing guidance material developed by the Associated Programme on Flood Management (APFM) with its partners based on the IFM concept (e.g. IFM Tool Series and WWF

Flood Green Guide). Awareness on prevention, preparedness and response (component 2.3) will mostly involve national agencies, Civil Protection, NGOs, to develop education programs using participative solutions.

National policies, regulatory instruments, coordination institutions for risk reduction and climate change impacts are already in place at the level of each individual country but an integrated approach at the scale of the watershed will allow to evaluate the impact of individual measures on the whole water cycle and on the related agricultural development (component 1).

The six countries of the Volta basin count a large number of stakeholders and institutions that will contribute to the development of technologies and trainings proposed in the Project. Risk mapping, risk prevention measures and nature-based solutions, Early Warning System designed to integrate further natural and agricultural hazards, enhanced community (particularly vulnerable groups such as women) preparedness to risk and climate change impact will provide economic, environmental and social benefits.

Outcomes of the project	Existing challenges	Expected challenges	Economic benefits	Social benefits	Environmental benefits
Outcome 1.1: Improved knowledge of risks, climate change impacts and risk management capacities through knowledge sharing and participatory mechanisms	• Limited availability of data (electronic form) on hydro-meteorological, vulnerabilities (social and structural entity), exposure, hazards, and available resources. • Need for detailed descriptions of historical events (evidence-base). • The limited capacity of authorities and communities to better integrate climate-resilient techniques into water resources management at national and regional level;	• Increase or decrease of risks in the Volta Basin region due to urban migration or population increase • Continuity and improvements in data collection and transmission (including satellite data) of hydro-meteorological and social risks factors.	• The flood and drought risks and climate change impacts will help in safeguarding public and private assets in the Volta Basin, reducing damage worth of millions US dollars due to future climate change events. • The risks maps will provide information for improving soil conservation and sustainable land management techniques, subsequently, better development of agro-economy. • Reducing agricultural production losses through better management of drought areas using indicators. • Availability of new tools and technologies	• Involvement of communities and social groups to gather and understand information on vulnerabilities (socio-economic, institutional etc.), exposure and associate risks. • The risks maps information will benefit the population with the formation of new development strategies and plans by the local and national agencies.	• Availability of information on water ways and channels helping agencies and communities to improve the sustainability of the natural resources through reduced soil erosion and siltation. • Possibilty to access to all relevant data about ecosystem services on a compatible system.

Outcome 1.2: Bridging the gap in adaptation measures to integrate future scenarios (economic, urban, climate, environment etc.) into current practices and knowledge	• National agencies and communities have a limited understanding of the climate variability and future impacts and challenges posed on the economic, social and environmental resources • Lack of information on historical and future climate, weather, water data.	• The integration of the new climate information into the design and implementation of national and transboundary development plans and actions. • At the national and transboundary level, to provide up-to-date climate information and to be recognized in the global networks.	• The technical knowledge of local communities and agencies will help on better decision-making for the anticipated weather/climate scenarios, helping in planning for climate resilient adaptation interventions, potentially delivering significant environmental benefits as well as cost savings. • To increase water security, the countries' efforts will be focused on building flood and drought risk maps for different climate scenarios and adaptation guidance for local governments. The latter will help agencies in revising laws and regulations such as sustainable water abstraction thresholds, building codes and land-use planning. They will also be adjusting economic instruments such water-related	• Climate scenarios will help in safeguarding social assets (ponds, lakes and cultural heritage). • The information will provide additional input to the population in order to adapt their agricultural production and practices.	• Historical and future data on weather and other relevant environmental variables will be useful to develop the future scenarios with index time series and determine values at risk (such as crop yield, water resources, aquatic habitats, wetlands and farming land). • A better understanding of the interaction between climate, environment and human factors which impact the sustainable use of natural resources

			environmental taxes, and flood and drought insurance schemes.		
Outcome 1.3: Risk management strategies in short, medium and long-term to be integrated into development plans (economic, social, environmental aspects)	• Lack of risk management strategies at local and national level considering social, economic and environmental aspects	• Use of decision support system (DSS) based on risk maps and climate scenarios and Implementation of integrated and sustainable risk management strategies. • Ensure that the new methodologies and tools will be applied outside of the basin (on the national territory).	• Exchange of knowledge and experiences at a regional scale will promote the adoption of climate-resilient livelihoods. • Livelihoods of vulnerable groups especially farmers will be enhanced and the viability of the ecosystems (they depend highly on natural resources) will be strengthened and maintained through the decision support system tool. This will possibly help to reduce the number of people migrating to urban areas/cities for livelihoods and subsistence. • Representatives of rural communities will be trained and better organized to use flood plain for income-generating activities. They will also provide	• Local stakeholders will be involved in the monitoring of the project activities, to support medium- and long-term sustainability. • Decision support tools will help to provide additional or alternative mechanism or approaches to improve social-economic benefits.	• Enhanced knowledge and protection of catchment , soil conservation and bio-diversity through better risk management strategies, plans and policies

			valuable human resources for future livelihood based on climate change adaptation activities beyond the lifespan of the project • Effectively and efficient management of water resources in the Volta Basin will ensure energy and water security, which may alleviate the reduction of water for daily-usage and energy supply disruptions.		
Outcome 2.1: Improved flood and drought forecasting instruments and Early Warning Systems (EWS) and coordination at the transboundary level to reduce disaster risks in vulnerable communities	• The need of open-source hydrological models for forecasting flood and drought events. • The lack of accurate and timely Flood and Drought Early Warning information at and between local, national and regional levels;	• Improving the EWS system with real-time ground station data and information (presently the Volta basin region has around 60-70 Hydro-meteorological ground stations). • Possibly to adapt the system to the availability of radar data as well as new technologies	• The Early warning information will help in saving agricultural crops through rainfall forecasting and seasonal patterns, adjusting or adapting their livelihood activities. • The EWS will provide improved planification tools for infrastructures, social institutions and industrial sites.	• More than 10000 people especially farmers in the project locations will be directly benefiting from the Early Warning System for Floods and Drought, supporting agricultural production and water security. • Urban population (estimated to be around thousands) will also benefit of the EWS to gain knowledge on natural hazards and be better prepared and	• The proposed early warning system will be able to deliver information regarding the water scarcity or abundance, water quality of the major reservoirs, etc. to the communities and agencies of the Volta Basin.

	• People have long-lasting marginalization and damages , to their lands from climatic and anthropogenic events, as well as adverse impacts from climate variabilities.			more reactive when events will be forecasted	
Outcome 2.2: Demonstration of the added value of the E2E EWS VoltAlarm through a series of pilot testing during monsoon and dry seasons	• Coordination and collaboration issues between agencies and communities in responding to climate change events.	• Feedback from the pilot testing are continuously used to revise strategies and coordination for the next events and after the project period. • Wider validation of the operational EWS through the commitment and ownership of national agencies	• Climate change event indicators will help in identifying alternative measures for resilient economic activities	• The involvement of communities, Community Based Organizations (CBO), NGOs and local policy-makers in the capacity development activities will help in developing sustainable climate adaptation strategies and early warning systems.	• The EWS pilot testing will be used to promote awareness on environmental safeguarding for the climate change events and variabilities.

Outcome 2.3: Strengthened awareness of vulnerable people on hydro-meteorological risks, prevention, preparedness, and response strategies through education programs using participative solutions	• Sensitization of issues faced by vulnerable groups is not carried out. • Involvement of women and vulnerable groups in climate change adaptation and disaster risk reduction activities and decision-making in the Volta Basin region are limited	• Sustainable participation and involvement of women's and youths • Adaptation to the natural and nature-based solutions instead of structural or hard measures	• Women will be empowered to develop livelihood based on climate change adaptation • Involvement of youths will create interest for taking up career in hydrological, meteorological and green infrastructures educational courses, leading to work opportunities.	• Participation of NGOs, community based organizations (CBOs) including women's and indigenous groups will be promoted in the awareness activities and decision making processes related to climate change adaptation and disaster risk reduction. • More gender sensitive approach in the capacity development activities such as attention to the vulnerable groups, involvement of women, elderly, youths and school children etc. will promote social integration in the communities and diversify livelihood on the basis of disaster risk reduction activities.	• Awareness and skills for developing natural and nature-based solutions; sustaining bio-diversity through non-structural measures such as awareness for protection of wetland and aquatic/terrestrial transition zone (ATTZ).
Outcome 3.1: Decision support and policy development for strengthening resilience at the local, national and transboundary levels of the Volta Basin	• Lack of decision support tools and policies available for strengthening resilience local, national and transboundary	• Refinement of decision support tools, policies, action plans at the local, national and transboundary level periodically or after any major	• Decision-support tools and policies will help in developing and promoting livelihood-based climate change adaptation and disaster risk reduction strategies	• Local population including vulnerable people will have knowledge and awareness on decision-making for strengthening climate change resilience	• Increased protection against land degradation and desertification will be achieved through the actionable plans and policies at local and national level.

	levels of the Volta Basin	events.			
Outcome 3.2: Strengthened capacities of actors and decision makers at national and transboundary level on long term risk management policies, plans and strategies	• Policy-makers lack financial support and human resources for adapting and implementing risk management policies, plans and strategies at national and transboundary level	• Application of risk management action plans by the agencies through the national budget (presenting the benefits to the respective ministries) at the local, national and transboundary level	• Risk management strategies will help in developing sustainable economies for the people and also provide new opportunities to integrate modern and traditional patterns.	• Long term risk management policies, plans and strategies will provide opportunities for social cohesion and further work on developing resilience at local, national and transboundary level	• The outcome will contribute in lowering the excess demand for natural resources through fair and equitable sharing of water resources, especially at transboundary level
Outcome 3.3: A collaborative process is developed to ensure those instruments and strategies are accepted by the local organization and communities and adapted to the local context	• Local communities are only little involved in designing plans, policies and guidelines which would be easily adapted to the local context.	• Regular update on the newly developed or revised plans should be carried out in consultation with communities	• Local communities will benefit in term of new ways of resilient economic activities if their views are integrated for developing climate change adaptation instruments and strategies. • The participatory approach will help in creating new work opportunities.	• The participation and involvement of people will contribute to develop long-term sustainable products and services which will be beneficial in increasing personal and national growth.	• Local communities and agencies will mainstream ecosystem services and bio-diversity in local and national development plans and policies.

The final Environment and Social Risk Management plan (ESRMP) aligning with the Adaptation Fund ESP has been developed and is presented in the Annex 6. During implementation, theSocial and Environment risk management plan will be disseminated to the stakeholders, to select the appropriate measures to mitigate the side effects of the project activities, if any. A grievance mechanism has been provided in the ESRMP (Annex 6) to account for any social and environmental effects during the project implementation. If found, any issues or complaints of the communities will be directly reported to the funding and implementing agencies.

D. Describe or provide an analysis of the cost-effectiveness of the proposed project.

Until now, little focus has been put on determining the cost-effectiveness of climate change adaptation interventions across the Volta Basin as a whole. As a result, there is limited baseline information that can be used for comparative analyses of adaptation approaches which are sustainable and replicable across the entire Volta Basin.

In the Volta project, new solutions will be implemented to improve risk reduction and climate change adaptation. Special attention will be given to promote Community of Users, guidance material, decision-support tools, online training, social networks and crowdsourcing. All these solutions will be tailored according to the local needs and capacities, to account for social and cultural issues. The End-to-End Early Warning Systems will be tested with additional climate projections to study the impact of future scenarios on spatial and urban planning and their consequences on the socio-economic development.

The basin scale approach is a suitable way to identify and implement cost-effective measures as six countries have similar challenges related to climate change events (floods and drought) that will be addressed during this project. The Volta Basin region covers most area of the six countries with major river streams as well as dry areas. The important economical urban areas (in Burkina Faso, Ouagadougou and Bobo-Dioulasso urban area has a population 1,708,079 and 555,121 respectively, In Ghana, Tamale has a population of 562,919 and in Togo, Kara city has a population of 103,075) of the six countries are located on the Volta Basin. The existing network of transportation is important infrastructure for exchanges of services and goods. The proposed project's activities under each Component will promote improved coordination between regional and national institutions responsible for transboundary water management, disaster risk reduction and climate change adaptation for the Volta Basin region. By involving the six-countries, previous knowledge and funding, as well as current projects, can be considered to ensure minimum overlap and transfer of methodologies from one area to the other. Through the regional approach, the co-benefits will be increased compared to the national level as one set of resources generate productive outcomes for six countries, which individual national projects would have achieved using more resources (human, time as well as material resources). Working at regional level will allow the proposed project to reach communities of the six countries with new methodologies and tools. The development and maintenance of the End-to-End Early Warning System at the regional level and all related functionalities can be mutualized and shared depending on the individual needs and uses. The transboundary EWS dissemination strategies will determine the most efficient and effective ways to reach remote areas or last-mile and will have broader coverage, so as to facilitating early warnings to vulnerable populations. The developed methodologies can be tested at larger scale within the basin, or easily adapted to similar types of environments at local or national level, therefore creating a community of users jointly considering climate change perspectives will also foster the integration of risk and climate approaches.

A good number of multi-lateral Conventions (UNFCC, UNCBD, UNCCD and Ramsar convention on wetlands), regional and basin-wide Policies and Legislations with accompanying Strategies already exist in the basin to address some of the challenges of environmental degradation and climate change, although there are sometimes weaknesses with implementation[63]. The Volta project will ensure some of the goals of the conventions, policies and legislations are implemented or initiated. The project will be an incentive for the countries to carry on the implemented work or improve the existing projects through national funding.

[63] GWP and VBA, 2014. Final Report on the Assessment of the Current State of Water Management and Climate Change in the Volta Basin as part of the Establishment of an Observatory for Water Resources and related ecosystems. https://www.gwp.org/globalassets/global/gwp-waf_files/wacdep/brochure_assessment_wacdep_abv_en.pdf

The NMHSs of the six countries being Member of WMO and offices of GWP-WAF and VBA located on transboundary level are familiar with coordination and participation issues of the national partners through the previous projects such as Volta HYCOS (now integrated into VBA Observatory), UNEP-GEF project, PAGEV etc. The regional approach will bring the countries to work in a coordinated way and additionally, transboundary support and actions will allow the six countries to share data and information on weather, climate and water resources and avoiding disaster impacts on environment, social and economic services of the Volta Basin.

The regional approach will enhance cost effectiveness of capacity development as well as ensuring a certain level of generic scope of tools and methodologies developed for future application beyond the pilot testing sites. Centralizing the capacity building of the Hydro-Meteorological Agencies with the regional body will enhance cost effectiveness.

The regional project will not only lead to more innovative and resilient tools and services, but also to the development of new ways of adaptation thinking for communities as well as national policy makers.

The proposed project is directly related to the climate change adaptation and disaster risk reduction initiatives, utmost required for the Volta Basin countries; the solutions are participatory, cross-border, innovative and provide positive cost-benefit ratio.

Objective	**Component Cost (US$)**	**Number of Beneficiaries** (approximately from the six countries of Volta Basin)	**Proposed Benefits**	**Alternatives to proposed approach and cost**
Develop capacity and established frameworks at the local, national and regional levels to ensure risk informed decision-making	1 500 000	10, 000	By improved knowledge on two extreme hazards, vulnerability and climate-related risk, more efficient planning and investment decisions will be taken at all levels, on the basis of soft structural measures, to reduce human, environmental, material and livestock losses from sudden or slow onset of Floods and Drought.	Instead of adequate vulnerabilities, capacities, exposure and risks studies, adoption of structural flood reduction measures, such as the construction of dams or reservoirs to reduce the flow and overflow of river courses are alternative measures. Additionally, the time for dam construction will be highly depending on the political and economic condition of the countries. Environmental consequences of the structural measures will need to be assessed.
Develop concrete adaptation and environmentally friendly actions with an integrated approach	4 000 000	20,000	The End-to-End Early Warning System will be developed with compatible technologies and provide similar types of messages for both Floods and Drought. The beneficiaries will gain knowledge and tools to increase preparedness for extreme	Early warning systems are developed independently for both Floods and Drought and not coordinated at the basin scale. This approach will require more investment cost and time as it will need additional infrastructures and resources to manage the system. Furthermore,

			events. Additionally, the capacity development activities for the natural and nature-based solutions to Floods and mainstreaming gender in E2E-EWS-F and Flood Management will enable actual beneficiaries to improve their self- response whilst strengthening the sustainability of impacts.	uncoordinated efforts will decrease the benefits of the investments. The decision procedures that will be designed for each separate project will create difficulties when a joint system will be planned.
Strengthening policy and institutional capacity for integrated flood and drought management at the local, national and transboundary levels	1 000 000	1000 directly (several millions indirectly)	The policies on disaster risk reduction and environmental issues will be improved at local and national level. By concentrating additional efforts on two major natural hazards at transboundary level, the regional policies will be reinforced and more effective water management agreements will be implemented.	The alternatives to the riparian countries are to strengthen their own governance system to manage Floods and Drought events without taking additional roles and responsibilities at the transboundary level (compared to the current status of agreements signed with VBA).

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

The proposed Volta project aims at reinforcing the role of VBA and national agencies, especially NMHSs and focal point of GWP and VBA, in flood and drought management. GWP and WMO are working since many years with key partners[64] on that issue, taking into account national and regional strategies and plans. The Head of the six Meteorological Services, acting as WMO Permanent Representatives and their Hydrological Advisors, form a network of focal points with the Ministries ensuring that the activities of the Volta project will follow national strategies and action plans.

Transboundary /regional level

Consistency with climate change adaptation and sustainable development strategies of the Volta Basin Authority

Improving climate change adaptation and developing floods and drought early warning systems are part of the regional and national sustainable strategies supported by the riparian countries. The project aligns with the strategies and plans to develop transboundary water management framework for the Volta Basin. The Volta Basin Authority (VBA) has the mandate to harmonize

[64] A large group of experts institutions and agencies, called Support Base Partners (SBP), are contributing to the activities of joint GWP and WMO programmes on the Flood (30 SBPs) and on Drought (10 SBPs)

national policies addressing the management of the water resources of the whole basin, indeed uncoordinated policies threaten the sustainability of the natural resources, as well as the socio-economic development of the six countries. Additionally, VBA is developing the governance framework for data sharing and information exchange related to water resources management between the countries.

The Master Plan for Development and Sustainable Water Management (MPDSWM) developed by the Volta Basin Authority with support of GWP-West Africa is a detailed IWRM-based Development Plan that will provide an integrated basin perspective to the basin's development and management[65]. It will include the water development and management priorities selected by all basin stakeholders and ensure coherence in decision-making by incorporating the different national programmes and sectoral development plans.

The principles for MPDSM development are:

- Define the scope of opportunities for water resources development (irrigation, water supply, flood and drought management), their associated risks and the actions needed to optimize opportunities and minimize risks
- Define other water-related opportunities, environment and ecosystems, watershed management
- Provide a coordinated, participatory and transparent process that promotes sustainable development.

Some additional issues that are taken into consideration as part of the basin planning processes align with the objectives of the proposed Volta project:

- Establishing monitoring systems that will have the capability for early detection of water level changes;
- Promoting the development and improvement of models (climate and hydrological aspects) and scenarios for the basin;
- Investigating the effects of climate change on various sectors in the Volta basin and evaluating indirect increases in impacts on water resources;
- Conducting a climate vulnerability assessment of basin ecosystems;
- Encouraging the riparian states to promote and apply methodologies and standards for climate-proofing infrastructure projects and integrating climate considerations into EIA and SEA procedures;
- Providing a platform for sharing of research information on climate change in the basin;
- Integrating all knowledge, results and lessons learnt related to climate change threats in the VBA Observatory.
- Promote high-level exchanges, dialogue and cooperation to enhance trust and understanding within the national agencies with a view to improve water resources management at the transboundary level.

At transboundary level, VBA faces many development challenges to meet the increasing needs of climate change adaptation and poverty alleviation. The Volta project will provide additional capacity development and technical support to develop and implement the MPDSM at the transboundary level.

Country Level

[65] Outlines and Principles for Outlines and Principles for Sustainable Development Sustainable Development of the Volta Basin http://www.gwp.org/globalassets/global/gwp-waf_files/wacdep/brochure_outlines_principles_wacdep_abv_en.pdf

Burkina Faso

An inclusive and participatory process, adopted on 20 July 2016, the National Economic and Social Development Plan (PNDES) is implemented during the 2016-2020 period. The PNDES takes into account the lessons learnt from the assessment of the implementation of Burkina Faso's past socio-economic development strategies, and notably of the strategy for accelerated growth and sustainable development (SCADD). It is underpinned by a new dynamics of strong, sustainable and inclusive economic growth through the structural transformation of the economy. The plan seeks to "Build, along with the people, a country of democracy, economic and social progress, freedom and justice". The Volta project will also follow other plans and strategies, such as:

- Projet de Plan d'Action pour la Gestion Intégrée des Ressources en Eau du Burkina Faso 2016-2030, 2014;
- Programme d'Action National d'Adaptation à la Variabilité et aux Changements Climatiques, 2007;
- Cadre Stratégique de Lutte contre la Pauvreté, 2004.

Poverty–Environment Initiative (PEI)

Poor people depend on the environment for their livelihoods and well-being. Improved management of the environment and natural resources contributes directly to poverty reduction, more sustainable livelihoods and pro-poor growth. To fight poverty, promote security and preserve the ecosystems that poor people rely on for their livelihoods, pro-poor economic growth and environmental sustainability must be placed at the heart of our economic policies, planning systems and institutions. To tackle this challenge, the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UN Environment) joined hands and launched the Poverty-Environment Initiative. The Poverty-Environment Initiative is a global UN programme that helps countries to integrate poverty-environment linkages into national and sub-national development planning, from policymaking to budgeting, implementation and monitoring.

With both financial and technical support, UNDP and UN Environment assist government decision-makers and a wide range of other stakeholders to manage the environment in a way that improves livelihoods and leads to sustainable growth. The Initiative works with key government partners to raise awareness, influence policy making and strengthen the mainstreaming of poverty-environment into budget processes, sector programmes and sub-national planning. The overall aim is to bring about lasting institutional change and to catalyse key actors to increase investment in pro-poor environmental and natural resource management.

Burkina Faso National Climate Change Adaptation Plan (NAP)[66] and Burkina Faso National Adaptation Programme of Action (NAPA)

National adaptation programmes of action (NAPAs) provide a process for Least Developed Countries (LDCs) to identify priority activities that respond to their urgent and immediate needs to adapt to climate change; those for which further delay would increase vulnerability and/or costs at a later stage. Burkina Faso has identified major threats and priorities for Burkina Faso.
Climate Related Hazards:

- Strong decrease in water availability
- A drastic decrease and a deterioration of pastures
- Decrease of the biomass potential

[66] Burkina Faso National Climate Change Adaptation Plan (NAP)
http://www4.unfccc.int/nap/Documents/Parties/PNA_Version_version%20finale[Transmission].pdf

Moreover, in coherence with the action 4 “Strenghtening the capacities of water agencies and other stakeholders” of the Projet de Plan d’Action pour la Gestion Intégrée des Ressources en Eau du Burkina Faso 2016-2030, the project will strengthen policy and institutional capacity for integrated flood and drought management at the local, national and transboundary levels (component 3). Similarly, in light of Action 5 that supports a “National information system on water”, components 1.1. and 2.1 aim to develop a data collection and forecasting system (hydrological, meteorological and climatological) for the countries and the whole region. To achieve this goal, the project will, among other activities, improve the existing data collection tools in each country, strengthening the human and technical capacities of the relevant agencies.

Benin

The Poverty-Environment Initiative (PEI) of the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UN Environment) helps the national government of Benin to identify opportunities and priorities for adopting integrated approaches to include pro-poor climate change adaptation and environment management into national policy, plan and budgets. The Volta project will contribute to this goal by providing capacity development support to identify the priority areas and existing resources for adopting climate change adaptation and disaster risk reduction approaches. The other project activities will help to:

1) Achieve the goal of the Intended Nationally Determined Contributions (INDC) in the Volta Basin regions of the Benin by integrating Climate Change issues in development plans, training of rural development actors, communities and local authorities on climate issues and the promotion of local knowledge for Floods and Drought management.
2) Mitigating the effects of climate change on agricultural production through Flood and Drought Warning system and concept of Integrated Flood and Drought management as specified in the various strategies of the National Agricultural Investment Program of Benin (NAIP 2010-2015) and Growth and Poverty Reduction Strategy (2011-2015)
3) The project activities such as capacity development of key stakeholders (environmental NGO’s) to adopt Natural and Nature-based solutions for Floods will help in implementation of the National Environmental Management Program (NEMP 2) of Benin.

Ghana

National Environmental policies of Ghana

Several policies, bye-laws and regulations forbid the use of floodplains for infrastructure projects such as buildings, farming, mining etc.. The Environmental Assessment Regulation, LI 1652 of 1999 and the Strategic Environmental Assessment (SEA), drafted by the Metropolitan Municipal District Assemblies from the National Environmental Policy (NEP 1991), must protect the environment against such developments however they are not always fully enforced.

The EPA Act of 1994 (ACT 490) requires the preparation of an Environmental Impact Assessment for any activity with potentially negative impact on the environment. Based on the results of the assessment, the Environmental Protection Agency may issue an environmental permit for the developer. Environmental Protection Inspectors are supposed to be visiting floodplains often to control if they have been used for any development threatening the environment; they can impose to demolish or to stop them.

Ghana has adopted the Strategic Environmental Assessment (SEA) as a tool for mainstreaming environmental and climate change issues in all developmental projects or programmes including the Ghana Poverty Reduction Strategy (GPRS), the Ghana Shared Growth and Development Agenda (GSGDA) and thereby the District Medium Term Development Plans of the MMDAs in accordance with the National Development Planning commissions (NDPC) guidelines. The main

aim of the SEA is to enhance the integration of national policies and development needs at the grass-roots starting from the District Assemblies which is the lowest level of governance for a more coordinated and improved decision making process in Ghana. It is mandatory or a requirement to all institutions to screen development projects, plans, programmes and policies using the SEA, to predict the impact of their policies, plans and programmes on the environment. SEA is used at the planning stage while Environmental Impact Assessment (EIA) is used at the design and implementation stage for most of the Basin Flood Management processes.

Issues on floods and drought are handled under the National Climate Change Policy (NCCP) drafted by the Ministry of Environment, Science, Technology and Innovation (MESTI) and approved in 2013 by the Cabinet of Ghana. The Volta project will contribute to the implementation of the NCCP by focusing on 4 of its 7 pillars, namely: Governance and coordination, Capacity building, knowledge management and International cooperation by developing knowledge and coordinating efforts on climate change events. The National Climate Change Adaptation Strategy (NCCAS) specifically looks at

i. Ensuring a consistent, comprehensive and a targeted approach for increasing the resilience and decreasing the vulnerability of the population;
ii. Deepening the awareness and sensitization of the general population and policy makers in particular on their critical roles in enhancing national adaptation efforts;
iii. Strategically positioning the country to attract funding to meet its national adaptation needs;
iv. Strengthening international recognition to facilitate action; and
v. Facilitating the mainstreaming of climate change and disaster risk reduction into national development.

The national policies in Ghana are well advanced. However, guidelines to promote cross-border cooperation on extreme natural hazards, and particularly flood prevention, such as proposed in the Volta project, need to be improved with joint implementation of transboundary activities to enhance the cooperation.

Togo

The Volta project will contribute to the:

1) capacity development of local and national stakeholders to achieve the promotion of joint management of natural resources and the national policy on action for the environment of Togo.
2) priority measures identified in its Plan d'Action National d'Adaptation aux Changements Climatiques (NAPA) and Strategy for Accelerated Growth and Employment Promotion (SCAPE) 2013-2017, and contributes to the achievement of key objectives of the new program for sustainable development, following the MDGs.
3) National Strategy for Disaster Risk Reduction in Togo (December 2009) through the development of integrated flood and drought management resulting in enhanced preparedness for the climate change events.

Mali

The Volta project will fully reflects the priority measures identified by the Mali government in its NAPA and improve the work carried out for the Hyogo Framework for Action for 2013-2015 and the national strategies for disaster risk reduction which contributes to the development and success of the country achieving the key objectives for sustainable development, following the Millennium Development Goals (MDGs).

Mali's National Adaptation Programme of Action (NAPA) 2007 is aimed at addressing the need to develop a realistically achievable country-driven program of action for adaptation to climate change in key vulnerable sectors, such as agriculture, water resources, and coastal zone. The

Volta project will improve the potential adaptation measures for water resources management through the development and implementation of flood and drought monitoring and early warning systems. The low adaptive capacity of Mali to respond to climate change impacts will be improved with better management of water resources, subsequently lifting their socio-economic conditions.

This project will be consistent with other strategies of Mali which are:

1) The Strategic Framework for Growth and Poverty Reduction (SFGPR, 2012-2017)
2) National Environmental Protection strategy to develop and support the implementation of participatory natural resource management programs which will reduce the effects of degradation, desertification and/or drought;
3) The national strategy for disaster risk reduction through prevention and management of disaster risks.
4) National Policy on Climate Change of Mali (NPCC) which has following objectives:
    - Strengthen the adaptability and resilience of ecological systems, economic systems and social systems to the effects of climate change through the integration of adaptation measures in priority to the most vulnerable sectors;
    - Build capacity for prevention and risk management and natural disasters;
    - Contribute to the global effort to stabilize greenhouse gas emissions in the atmosphere, particularly by promoting clean and sustainable projects;
    - Promote national research and technology transfer for climate change; and
    - Strengthening national capacities on climate change.
5) National, Regional and Local Plans Related to Disaster Risk Reduction and Preparedness by developing strategies for the integration of the Reducing Disaster Risk (RDR) in adaptation strategies to climate change.

Cote d'Ivoire

Cote d'Ivoire adopted a sustainable development strategy whose main components are defined in parallel to its national plan to combat degradation of environment and poverty. Also, Cote d'Ivoire is advancing in the process to adapt National Adaptation Plan (NAP) identifying the key actions and financial needs to mainstream climate change adaptation (CCA). This project addresses livelihood (agriculture) and environment as a vulnerable sector to climate change and variability and will align with the implementation of national policies and programme focusing on disaster reduction and risk management, capacity building, training and institutional strengthening, data and information needs, public awareness, community participation and access to information, transboundary governance and international cooperation.

Additionally, the project will support Cote d'Ivoire National Strategy for Disaster Risk Reduction (DRR) by reducing the vulnerabilities and increasing the resilience to the extreme events such as floods and drought. There is a lack of capacity to undertake adaptive measures to address environmental problems and socio-economic costs of climate change and the project will develop the knowledge, skills and resources of the stakeholders.

F. Describe how the project meets relevant national technical standards, where applicable, such as standards for environmental assessment, building codes, etc., and complies with the Environmental and Social Policy of the Adaptation Fund.

The Volta project will be aligned with the requirements of the March 2016 Revision of the Environmental and Social Policy (ESP) of the Adaptation Fund (see Part II: L). The Adaptation Fund-accredited Implementing Agency, WMO, together with the VBA, GWP-WAF and relevant

national partners, will ensure that the project follows procedures outlined in the ESP. This includes the requirement that activities funded by the Adaptation Fund reflect local circumstances and needs and draw upon national actors and capabilities.

In addition, the project activities will be validated by national partners, including inter alia the Permanent Representatives of the National Meteorological and Hydrometeorological Services:

- Ministère des Travaux Publics et des Transports (MTPT) (Benin);
- Ministère des Transports (Cote d'Ivoire);
- Ministry of Communication (Ghana);
- Ministère des Travaux Publics, des Transports de l'urbanisme et de l'habitat (Togo);
- Ministère de l'Equipment, des Transports et du Désenclavement (Mali);
- Ministère des Infrastructures, du Désenclavement et des Transports (Burkina Faso).

The national partners have been consulted during the development of the full proposal to ensure that all activities comply with relevant national standards, as well as the environmental and other statutory laws and regulations of the six riparian countries. If required in the future, Environmental Impact Assessments of the field sub-project activities will be undertaken.

Other national laws on environmental and social assessment in each of the countries will be followed during the project design and implementation to ensure compliance and to complement with the ESP of Adaptation Fund. The following list of laws and regulations cover most of the fields that are included into the Volta project: environment protection and impact assessment, sustainable development, water resources management, risk and crisis management, public participation, labour, regional and local responsibilities.

Benin[67]:

- ✓ Law No. 98-030 of 12 February 1999: Framework Law on the Environment in Benin;
- ✓ Law No. 2010-44 of 21 October 2010: water management in the Republic of Benin;
- ✓ Law No 87-016 Act of 21 September 1987: Water Legislation in Benin;
- ✓ Decree No. 2001-190 of 19 June 2001: organization of the Public Hearing process in Benin;

Burkina Faso:

- ✓ Law N° 005/97 / ADP of 30 January 1997: Environment Legislation in Burkina Faso;
- ✓ Law No. 14/96/ADP of 23 May 1996: Agrarian and Land Reform and Decree No. 97-054/PRES/PM/MEF of 6 February 1997;
- ✓ Decree No. 2001-342 / PRES / PM / MEE1 of 17 July 2001: scope and content of the Environmental Impact Assessment (EIA) and the Environmental Impact Notice (NIE) procedures;
- ✓ Law No. 008-2014 / AN: Orientation on Sustainable Development in Burkina Faso;
- ✓ Law No. 002-2001 / AN of 8 February 2001: Orientation law on water management;
- ✓ Law No. 012-2014/ 2014: Orientation for the prevention and risk, crisis, humanitarian and disaster management providing the composition of the platform at the national level with defined roles
- ✓ Law No. 006-2013 / AN of April 2, 2013 on the Environment Code in Burkina Faso;
- ✓ Law No. 003-2011 / AN of April 5, 2011 on the Forest Code in Burkina Faso
- ✓ Implementing Decree 2015-1187 / PRES TRANS / PM / MERH / MATD / MME / MS / MARHASA / MRA / MICA / MHU / MIDT / MCT on conditions and procedures for carrying

[67] Legal documents extracted from Concept note submitted to Adaptation Fund https://www.adaptation-fund.org/wp-content/uploads/2016/08/PCN_FA_BOAD_ARAA_CLEAN-REVIEW-AOUT-2016.pdf for Benin, Burkina Faso, Ghana and Togo

out and validating the strategic environmental assessment , the study and the environmental and social impact notice

Cote d'Ivoire[68]:

- ✓ Law No O96-766 of 3 October 1996: Environment Legislation (to set up the rules and procedures regarding the impact of development activities on the environment) of Côte d'Ivoire
- ✓ Law No. 98-755 of December 12, 1998: Water Legislation

Ghana:

- ✓ The Environmental Assessment Regulations 1999, L.I. 1652 and its Amendment Regulations, 2002;
- ✓ The Water Resources Commission Act 1996, Act 522;
- ✓ The Local Government Act 1993, Act 462;
- ✓ The Lands Commission (LC) was established by Article 258 of the 1992 Constitution and the Lands Commission Act, 2008 (Act 767)
- ✓ Town and Country Planning Ordinance (Cap. 84) No. 13 of 1945;
- ✓ The New Labour Act 2003, Act 651;
- ✓ The State Lands Act 1962, Act 125;
- ✓ The Lands (Statutory Wayleaves) Act, 1963;
- ✓ The Rivers Act, 1903.

Mali:

- ✓ Act No. 02-006/AN-RM of 31/01/2006 relative to the water legislation. The water legislation stipulates in its article 2 the rules of use, conservation, protection and management of water resources.
- ✓ The law N ° 08-033/AN-RM of 11 August 2008: classified installations for the protection of the environment;
- ✓ Decree No. 06-258/P-RM of 22 June 2009: conditions for the implementation of the audit of the environment;
- ✓ The provisions of the legislation on environmental and social impact studies are based on the following principles:
  - The environmental assessment is an integral part of Programs and Projects and the results of the impact study are presented for approval by the administration;
  - The proponent is responsible for the completion of the study, of the constitution of the EIA documentation and provides costs;
  - The proponent also ensures the realization of measures of correction, reduction and/or compensation of the negative impacts of the Project, as well as the internal monitoring according to the required standards

Togo:

- ✓ Law N° 2008-005 30 May 2008: framework law on the environment;
- ✓ Decree No. 2006-058/PR of 05 July 2006 : list of jobs and activities subject to environmental impact assessment (EIA) and the main rules for this assessment;
- ✓ Order No. 18/MERF of 09 October 2006: terms and procedures of information and participation of the public in the EIA process;
- ✓ Order No. 013/MERF of 1 September 2006: regulation of the procedure, methodology and content of the environmental impact studies;
- ✓ Law N° 2007-011 of 13 March 2007: decentralization and local liberties.

[68] http://www.environnement.gouv.ci/

G. Describe if there is duplication of project with other funding sources, if any.

In the region, funding for environmental, disaster risk reduction and climate change projects has been, and still is, provided by UNDP, World Bank and other Development Banks, GEF, FAO, WWF, national development agencies (AFD, DANIDA), the European Commission, the Consultative Group on International Agricultural Research (CGIAR), the International Water Management Institute (IWMI), the Red Cross.

Several programmes and projects have already been screened for duplication and synergies: the currently endorsed concept note of the ADAPT-WAP project submitted by the Sahara and Sahel Observatory to the Adaptation Fund, CREWS-Burkina Faso, the Implementation Project of the Volta River basin Strategic Action Programme, the Flood and Drought Management Tools project (FDMT) in Ghana, the Oti River flood hazard assessment, the Climate and Development Programme (WACDEP), the WACA project on coastal floods, the West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL), Community Resilience Through Early Warning (CREW), the White Volta Warning and Flood Forecasting System, the Volta-HYCOS Project, the PAGEV 1 and 2 Projects for improving Water Governance in the Volta River Basin the GLOWA Volta Project. A summary of the main findings of this first survey based on existing reports, publication, and meetings with participants is presented in the following Table:

Projects	Objective	Possible Synergies
Africa Hydromet Program-Strengthening Climate Resilience in Sub-Saharan Africa: Burkina Faso country Project https://www.greenclimate.fund/documents/20182/574760/Funding_Proposal_-_FP074_-_World_Bank_-_Burkina_Faso.pdf/e2bcf102-a210-4ba2-a89e-fd15f2e30fdf	To strengthen the adaptive capacity and climate resilience of vulnerable communities and the economy of Burkina Faso by developing the capacity of national hydro-meteorological and warning services, which will in turn support adaptation planning for public and private sector users	The improvement or setting-up of the observation network, forecasting and early warning system proposed under this project will be valuable for the Volta project. The VoltAlarm EWS will use the input data and forecasting information delivered for the national part of the Volta Basin in Burkina Faso. The Volta Project will use the institutional capacity of NMHSs (hydro-meteorologists) incorporating training skills acquired for fulfilling Volta project activities such as development of risks maps, climate scenarios hydro-meteo EWS and revising flood and drought management policies and action plans.
Reversing Ecosystem and Water Degradation in the Volta River Basin (REWarD-Volta River Basin) (in preparation) https://www.thegef.org/project/reversing-ecosystem-and-water-degradation-volta-river-basin-reward-volta-river-basin	Reverse ecosystem and water degradation and support integrated ecosystem-based development in the Volta River Basin through strengthened transboundary governance and restoration and conservation of ecosystems for sustainable livelihoods.	The REWarD project is also planning to set-up an Early Warning System for droughts in the Volta Basin region. GEF review committee has proposed the UNEP-IUCN to collaborate with the WMO in establishing the EWS and sharing the work and resources under the Volta Project. Also, the WMO proposed project will build on the work proposed on maintaining the biodiversity and ecosystem goods and services in the Volta Basin by developing implementation partnerships and using the methodologies and approaches proposed by REWarD.

		IUCN and other national partnering institutions for this project will be serving as members of the Project Advisory/Steering Committee under the proposed Volta project
Increasing the Resilience of Vulnerable Communities in the Agriculture Sector of Mandouri in Northern Togo https://www.adaptation-fund.org/project/increasing-resilience-vulnerable-communities-agriculture-sector-mandouri-northern-togo-2/	To develop water management and irrigation technologies that reduces dependence on rainfall for agricultural production	Improved planning and management of water resources will help the communities in growing their livelihood and (agricultural) production. The Volta project will provide necessary information on floods and drought EWS and indicators respectively, making the beneficiaries have timely knowledge and awareness on the impending events. The resilience approaches and methodologies of Togo project could be shared and integrated in the pilot testing locations of other countries of the Volta project.
Integration Of Climate Change Adaptation And Mitigation Measures In The Concerted Management Of The WAP Transboundary Complex: Adapt-WAP Project (in preparation) https://www.adaptation-fund.org/wp-content/uploads/2017/04/ADAPT-WAP-CN-OSS-AF-April2017.pdf	The Adapt WAP project of the Sahara and Sahel Observatory (OSS) project is planning to establish a multi-risk early warning system (MREWS) over an area on the North-Eastern part of the Volta basin in Benin, Burkina Faso and Niger. The system aims at improving resilience of agricultural communities and vulnerable ecosystems.	Both projects will be able to learn from each other experiences and challenges, especially as OSS will be invited to participate to the advisory committee of the Volta project. A part of the results and methodologies of Adapt-WAP will be complementary to the Volta project as both projects aim at improving early warning: the type of information provided by the OSS multi-risk early warning system (MREWS) could be integrated into VoltAlarm and therefore extended to the scale of the whole Volta basin. The methodology for crop warnings proposed in Adapt WAP could be linked to VoltAlarm similarly to an experiment on one of the pilot sites. Adaptation solutions of Adapt WAP to improve the resilience of ecosystems and livelihoods could be integrated while developing Components 2 and 3, and some of them could be further transferred in the different regions of the basin. Additionally, OSS could take an active role into the dissemination of information with a wide range of stakeholders, including decision-makers of Flood and Drought Management.
Strengthening national capacities for EWS Service Delivery in Burkina Faso (CREWS – Burkina Faso) (2017-2019) http://www.crews-	CREWS project will improve the operational capacities in Burkina Faso to produce and deliver hydrometeorological services for flood early warning and risk information for agriculture and food security. Capacity development of the National Meteorological Service	The Volta project will fully benefit of the efforts of CREWS Burkina Faso in strengthening the hydrometeorological observation network in Burkina Faso and in developing monitoring and forecasting capacities. The coordination and transfer of knowledge will be facilitated as both projects are under the responsibility of WMO and

initiative.org/en/projects/burkina-faso-strengthening-national-capacities-early-warning-system-service-delivery	is part of CREWS, together with strengthening its cooperation with sectoral ministries and other stakeholders.	follow each other in time. The institutional strengthening during CREWS will be useful in developing capacities for floods forecasting and early warning systems and the trained experts could be used to disseminate knowledge and skills to the stakeholders of other countries in the Volta Basin. Moreover, the Monitoring and Evaluation tool of CREWS will be used to follow the development of the products and services delivered through the Volta project. In the future, other national components of CREWS in Mali and West Africa could provide support for developing a Flash Flood Guidance Systems (FFGS), a platform supported by USAID and WMO, which could further be linked to VoltAlarm.
The Implementation Project of the Volta River Basin Strategic Action Programme (2015-2019) http://documents.worldbank.org/curated/en/443971468171858975/pdf/PAD1287-PAD-P149969-GEF-R2015-0009-1-IDA-R2015-0101-1-Box391422B-OUO-9.pdf	The SAP implementation project objectives are to strengthen capacities of the VBA for transboundary water resources management and to implement priority actions of the Strategic Action Programme (SAP) resulting in direct environmental and livelihood benefits. The project components include the development of an agreement on the roles and responsibilities of the countries, called Water Charter, and activities of facilitate dialogue and communication,	The coordination between both projects/programmes will be facilitated through the involvement of VBA as executing entity in the Volta project. The Water Charter will clarify the contribution of the riparian countries with regards to transboundary water resources use, hydro-meteorological data and information sharing polices and plans and participation in decision making. The Volta project will implement and continue the activities of the Communication Strategy and Plan.
Flood and Drought Management Tools (FDMT) Project (2014-2018) http://www.flooddroughtmonitor.com and http://fdmt.iwlearn.org/	Funded by GEF through the United Nations Environment Programme (UNEP), the FDM project aims at developing methodologies and tools to produce information on risks and support decision-making for integrated water resources management. The Volta Basin is one of its three pilot basins.	The tools, methodologies and information supporting the FDMT website will be integrated into the design of the VoltAlarm platform. Linkage between the FDMT and the VCERs databases will be evaluated. The selection of indicators for drought onset will also be coordinated between both FDMT and the Volta project.
The Oti River flood hazard assessment in Ghana and Togo (2016-2017) http://www.worldbank.org/en/news/feature/2016/08/08/expanding-flood-resilience-in-the-volta-basin-with-expertise-and-support-from-japan	Supported by the World Bank and GFDRR and Japan, the project aims at increasing flood preparedness by setting up a Flood Early Warning system, developing flood hazard and risk maps, capacity development of local experts, and basic input into Emergency Preparedness Plans.	The Volta project will build on the experience gained while developing the hydrological and 1D/2D hydraulic models (digital terrain model, gauging sections and rating curves, real time data transmission etc.), the databases, the dissemination interface of the Flood Early Warning System (FEWS), and the capacity building activities. The assessment of the success criteria of the Oti project will be used, together with the expertise of WB, to define where similar flood risks maps, flood forecasting and early warning system could be developed for other sub-basins.

Water, Climate and Development Programme (WACDEP) in the Volta Basin (2011-2017) http://www.gwp.org/en/WACDEP/ABOUT/Outcomes	The goal of WACDEP is to promote water as a key part of sustainable national and regional development and contribute to climate change adaptation for economic growth and human security. Since 2016, GWP and WMO supported the initiative of the six riparian countries to assess their needs for integrated flood management and further build their capacities for developing bankable project proposal	Disaster risk reduction strategies, risk culture, availability of data and early warning systems have been identifies as major areas of concern. The fields of governance, organisation of actions between technical services and decision making institutions, as well as engagement of local partners must especially be developed. The Volta project is designed to fulfil these needs with the engagement of partners at transboundary, national and local level, while adding the dimension of the impact of climate change.
The West Africa Coastal Areas Management Program (WACA) (2015-on-going) http://www.worldbank.org/en/programs/west-africa-coastal-areas-management-program	Funded by the World Bank, the West Africa Coastal Areas Management Program (WACA) provides convening platform that helps countries access expertise and finance to sustainably manage growing coastal erosion and flooding problems. Countries already participating in the program include Benin, Côte d'Ivoire, Ghana, and Togo.	The Volta project will collaborate with WACA to gain technical expertise in identify the needs and proposing adequate early warning solutions for coastal floods to be possibly included in the future into the VoltAlarm system.
The West African Science Service Centre on Climate Change and Adapted Land Use (WASCAL) (on-going) http://www.wascal.org/	WASCAL is a research-focused program designed to help tackle the challenge of climate change in West Africa and thereby enhance the resilience of human and environmental systems to climate change and increased variability.	Link with the WASCAL Centre will be initiated to benefit of its infrastructures, databases and research capacities and experience in the field of vulnerability, capacities, exposure and risks related to Floods and Drought Events, as well as trends in global climate and land-use changes on water resources in the Volta basin.
Community Resilience Through Early Warning (CREW) in Ghana (2014-2016) http://www.gh.undp.org/content/ghana/en/home/operations/projects/environment_and_energy/crew.html	CREW developed drought and flood hazard, vulnerability and risk maps at national level and for 10 pilot areas throughout Ghana. National maps were developed with open source data sets for the current situation and future scenario in 2050. District maps were developed with a digital terrain model. A drought and flood early warnings system was developed in the 10 pilot areas. Training and communication at national and community level were organized to raise capacity of stakeholders on the maps and EWS.	The Volta project will benefit of the CREW methodologies, tools and database structure while developing the risk maps, the early warning system VoltAlarm, and the capacity building activities. Most of the results obtained during CREW should be integrated into the VCERs assessment for Ghana. The national masterplan for EWS implementation of CREW will also be useful to enlarge the methodology over the whole basin. The flood and drought EWS developed for the 10 pilot sites will be a source of knowledge, or even a transfer of methodologies, when developing VoltAlarm. The experience gained during the pilot testing will also be used when making the final selection the Volta project pilot sites in Ghana. Indeed, the trained groups of people of CREW could help to disseminate the knowledge and tools to other stakeholders of pilot testing areas.
The White Volta Warning and Flood Forecasting System	The World Bank with resources from the Global Facility for Disaster Reduction and Recovery (GFDRR)	Component 2 of the Volta project will build on the existing flood forecasting capacities and integrate the output of the early warning

(2012-2016) http://www.worldbank.org/en/news/feature/2014/10/01/drmhubtokyo-country-program-ghana-strengthening-flood-management-in-volta-basin	financed the development of a flood forecasting system on more than 800km of the White Volta River from the border with Burkina Faso to Lake Volta. This forecasting system is operational since 2012.	system on the White Volta into the global VoltAlarm system. The White Volta project provides experiences on the challenges, and lesson learnt during the implementation phase of a forecasting system and address also the issues of the sustainability of the flood forecasting and early warning system.
The Volta-HYCOS Project (part of the larger World Hydrological Cycle Observing System) (2006-2015) http://www.whycos.org/whycos/projects/under-implementation/volta-hycos	Volta HYCOS has been funded by the Fonds Français pour l'Environnement Mondial (FFEM) and the AFD between 2006 and 2009 and then by the African Water Facility (AWF) of the African Development Bank (AfDB) from 2011 to 2015. The project provided reliable water resources information through the improvement of hydrological data collection infrastructure and data management in the Volta basin member countries. The exchange of information on water resources facilitated national and regional development.	Through the coordination within WMO of the expert teams on hydrology and hydrometry, the Volta project will benefit of the existing HYCOS services and further improve the hydrological observations networks and the data collection procedures for flood and drought forecasting and early warning systems. The link with the WHYCOS system will ensure that the results of the Volta project will be embedded into global platforms and will be made available at larger scale.
PAGEV 1 and 2 Project for improving Water Governance in the Volta River Basin (2004-2011) https://www.iucn.org/sites/dev/files/import/downloads/pagev_annual_report_05_fr.pdf and http://cmsdata.iucn.org/downloads/pagev_ii.pdf	Both PAGEV projects improved water management practices and water governance in the region of Burkina Faso and Ghana. PAGEV 1 initiated policy dialogues by the establishment of multi-stakeholder platforms at community and national level to support ecosystem restoration. PAGEV 2 concentrated on the compilation of knowledge for decision support, capacity building on IWRM and improvement of the governance framework of the basin.	The Volta project will benefit of the PAGEV experience gained on participatory governance for the joint management of water resources. The transfer of knowledge will be facilitated through the participation of the VBA in the Volta project, which has been involved in PAGEV in particular through the Volta Observatory. The network of national agencies, decentralized institutions and civil society organizations involved into PAGEV will be a valuable resource when selecting partners and pilot sites for the Volta project

The GLOWA Volta Project funded by the Centre for Development Research (ZEF) (2000-2009) https://www.zef.de/projects/project-details.html?project=53&contact=1423&cHash=aa9e032807820a6d8d6db3c50a4dcdca	GLOWA promoted sustainable water use under changing land use, rainfall variability and water demands in the Volta Basin. Information and tools concerned: • Water Allocation System that allows incorporating the impact of possible future climate conditions and projected water demand of the Volta Basin countries • GLOWA Volta Geoportal, transferred to VBA • High-resolution Regional Climate Modelling • Predicting the Onset of the Rainy Season	Even though GLOWA is now about 10 years old, the Volta project will look for synergies with the experiences and services developed through the GLOWA project, such as the GLOWA Volta Geoportal which has been transferred to VBA, and the climate modelling which allowed to forecasts and deliver information about the incoming rainfall to farmers in the region to plan and avoid economic loss due to floods and drought. The communities trained during GLOWA could be efficient partners for the pilot testing of the Volta project

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

Components 1, 2 and 3 include dedicated outputs related to the documentation and dissemination of knowledge generated through the proposed activities. The dissemination of knowledge and good practices will enhance the learning achievements and could further facilitate the replication of success stories by government agencies and communities facing similar issues in other regions or globally. Different ways are planned to ensure proper coordination and to widen the dissemination of the project outputs to a larger circle of institutions and communities in the six riparian countries of the Volta Basin.

1) **Knowledge Management and Experience sharing**
   - ✓ Development of e-learning module(s) for capacity building of key stakeholders. Online learning and training will be an option for those (e.g. representatives, local agencies, etc.) who cannot attend events, conferences and workshops. The modules will be accessible to the project stakeholders and to a certain extent to the general public and local organizations.
   - ✓ As solutions should be co-designed, co-developed and co-implemented in a trans-disciplinary, multi-stakeholder and participatory context, a “Living lab” could be also created in the frame of the proposed Volta project. In this “Living lab”, citizens, organizations, policy-makers and other stakeholders will be involved in a multidisciplinary approach where each participant could contribute with his knowledge and experience about the Floods and Drought Management and/or EWS. Discussions and exercises in groups, round tables and/or presentations could be implemented to stimulate discussions, as well as to develop and test innovative solutions in real world conditions.
   - ✓ The project also envisage to create a Community of Users (CoU) to coordinate a collaborative effort between civil society, community groups, private companies, research institutions, international organizations, and public sector to exchange knowledge, share expertise and discuss about best practices.
   - ✓ The contribution to the Community of Practice on Flood Management and End-to-End Early Warning Systems which is being created in the framework of the activities of the WMO Commission for Hydrology.

2) **Outreach to the wider public**
   - ✓ Facebook, LinkedIn and Twitter will serve as a wider dissemination strategy to update information, specially targeting the young generation.
   - ✓ Mass media channel such as radio services will also be one effective information dissemination strategies as it is widely used in the Volta countries.
   - ✓ Leaflets and panels (in the buildings of the partners and on the pilot sites) highlighting the lessons learned and success stories will be shared with stakeholders and in social media for the general public, emphasizing the importance of the project activities and achievements.
   - ✓ Other dissemination tools such as videos, comic books and infographics will be used to reach a wider non-specialized public, using a non-technical language and, if necessary, local language of the member countries. The comic books and case studies could be turned into videos with a storyboard avoiding scientific terms. With the contribution of WWF, the content of the Flood Green Guide could be divided by themes or chapters to develop a series of 2-5 minutes' video that could be part of training materials.
   - ✓ The APFM Support-Base Partner UNESCO-IHE will be contacted to develop IFM decision-support games such as SimBasin, highlighting the importance of Nature Base Solutions to improve flood mitigation strategies.

3) **Technical reports/documents and dissemination of the project results:**
   - ✓ The project activity reports (both in English and French, and when needed in local language) will be disseminated via a web portal, briefs to stakeholders, press releases, national and climate change and disaster risk reduction forums, scientific publications and development of awareness raising tools (digital storytelling, video, success stories etc.)

4) **Post-project completion assessment**
   - ✓ A post-project assessment activity will be conducted with the government representatives and focal point of communities to determine the lessons learned, impacts and sustainability. The assessment report will be prepared and shared with relevant organisations for any follow-up activities.

5) **Crisis communication**
   - ✓ Presently, communications between agencies occur always through phone calls, emails and short messaging service. Automatic systems are not in place to monitor the activities of all others and trigger an emergency alert. The development of a communication procedure between the partners and the decision-makers will be one of the solutions provided on the VoltAlarm platform
   - ✓ The use of social media such as Whatsapp, Facebook and Twitter for communication between the institutions will also be given some attention[69].

6) **Organisation and participation to conferences and other events**
   - ✓ Workshop involving partners, key stakeholders, end-users, beneficiaries and international partners will be organized about once a year to present the progress of the project and to ensure a larger communication outside of the basin, the exchange of information, collection of feedback and coordination of activities.
   - ✓ The participation to conferences, meetings, workshops and trainings of the project partners will provide the opportunity to discuss information and findings about Integrated Floods and Drought Management-EWS approach and tailored materials for the different stakeholders in the Volta basin.

[69] Need assessment report of the Ghana, 2016 (unpublished)

7) **Dissemination of results through external institutions**
   - ✓ Development and humanitarian agencies, NGOs and other actors in charge of the implementation of projects could use the flood and drought management products and develop actions in their field of competence (e.g. identification of community-based flood management solutions for populations living in small catchments of the basin).
   - ✓ Similarly, researchers and other public institutions could work on the base of the actions developed under the Volta project, to further engage in the development of adaptation measures (e.g. assessing climate change impacts and solutions in specific locations).
   - ✓ Through collaboration with the national institutions responsible for technological transfer, private companies working on innovative solutions will be contacted to develop national projects that integrate our identified solutions and disseminate them within their areas of work/sectors.

8) **Integration of best practices into the WMO, GWP and VBA communication and guidance materials**
   - ✓ The success stories and progress of the Volta project will be published using the communication media of the implementing and executing entities
   - ✓ New guidance material in the line of the APFM Tools series http://www.floodmanagement.info/tools/ could be drafted to promote the results of the Volta project, as well as the case studies on the basis of the pilot testing.

I. Describe the consultative process, including the list of stakeholders consulted, undertaken during project preparation, with particular reference to vulnerable groups, including gender considerations, in compliance with the Environmental and Social Policy of the Adaptation Fund.

The potential stakeholders and partners of the project were identified and consulted not only during the development of the pre-concept and concept note but since several years through the GWP and WMO projects and activities in the region.

Already in 2013, the Country Water Partnerships (CWP) of Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali and Togo contacted the GWP-WMO Associated Programme on Flood Management (APFM) to assess their needs for capacity building on the IFM concept and for support in preparing projects on flood management. A first consultation was organized:

- ✓ at institutional level, it included city mayors, representative of associations of municipalities, stakeholders from the Meteorological Services, the General Directorate for Water Resources, from the Civil Protection Services and focal points for flood management and early warning systems[70],
- ✓ at community level, NGOs, universities and representatives of flood-prone communities (women, elderly, youths) have been directly consulted by the international consultants of the countries to gather the required information on flood management
- ✓ Additionally, stakeholders (local policy makers, development and humanitarian agencies, private companies etc.) from the past and on-going projects were regularly involved in consultative missions to assess the shortcomings, sharing of the resources, understand the short-term and long-term impacts.

[70] As stated in the Annexes of the country Needs Assessment reports (Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali, Togo) , 2016, Unpublished GWP report

Through various studies and discussions, needs assessment reports were drafted by the national consultants in 2016 for each riparian country highlighting major issues and priorities of actions for flood management.

Other key stakeholders were consulted in the framework of the GWP-WMO current activities in the Volta basin, such as the GWP Water, Climate and Development Programme (WACDEP), the African Network of Basin Organizations (ANBO). Later, the submitted draft need assessment reports of the six countries were reviewed by APFM. All this information was used to design the Volta project "Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin".

Both Executing Entities of the programme, GWP-West Africa and VBA, have been a critical facilitator during the consultation process functioning in close partnership with the Ministry of Environment, Ministry of Development, and Ministry of Water resources management working together in many development projects in the six countries.

Before summer 2017, GWP-West Africa and VBA were consulted during the development of the pre-concept note for the Adaptation Fund and finally the draft pre-concept was shared with the WMO Permanent Representatives of the six countries who contacted the Designated Authorities for their feedback and approval.

In the fall of 2017, APFM conducted a joint workshop in partnership with GWP-West Africa and VBA in Burkina Faso during November 20th-24th 2017 involving representatives and other stakeholders of the Volta Basin. The purposes of the consultation workshop were to:

- ✓ Introduce the project concept;
- ✓ Receive preliminary comments and suggestions;
- ✓ Collect information regarding Volta basin background, climate change variabilities, flood and drought events, environment, social and gender policies and other observations by the local stakeholders;
- ✓ Consult on the proposed activities to be carried out in the framework of the project and pilot site selection for the testing or demonstration of adaptation interventions;
- ✓ Exchange on the long-term sustainability of the project activities;
- ✓ Consult on the multi-level engagement, roles and responsibilities of potential national, sub-national and local partners working in climate, water, ecosystem and development sector.
- ✓ Introduce the role of women and youths in the project activities and benefits thereafter;
- ✓ Foster synergies and add-ons to other similar projects (completed or ongoing)
- ✓ Discuss the need for knowledge, skills and tools sharing through multi-media communication aimed at the other beneficiaries and actors outside the project locations;

Some 40 experts of the six countries were invited to the November 2017 consultation workshop, jointly organized by GWP/WAF, VBA and WMO, including representatives of:

- ➢ Ministries in charge of Water, Environment and Sustainable Development in the six countries (MCVDD/Benin; MINEF, MINSEDD, ME-ONEP/Cote d'Ivoire; WRC/Ghana; MEADD, MEE/Mali; MERF, MAEH/Togo)
- ➢ Meteorological services (ANAM/Burkina Faso, SODEXAM/Cote d'Ivoire, METEO Mali)
- ➢ Ministry in charge of civil protection (CONASUR/Burkina Faso),
- ➢ Regional authority (ALG/Burkina Faso)
- ➢ Country Water Partnerships (Benin, Burkina Faso, Cote d'Ivoire, Ghana
- ➢ Transboundary basins commissions/organizations,
    - o the Water Resources Coordination Centre/ Economic Community of West African States (ECOWAS),

- the West African Economic and Monetary Union (UEMOA)
- l'Organisation pour la Mise en Valeur du Fleuve Sénégal (OMVS)

- International Union for Conservation of Nature (IUCN)

to gain an overall understanding of the context and integrate each of the vulnerable sectors into the decision-making (see complete list of participants in Annex 1)

The major outcomes of the workshop are: i) the representative of the participating countries expressed strong interest and consensus for the Volta project, as it will not only benefit the local communities and beneficiaries, the property and livelihoods to be safeguarded from the extreme weather events, but also institutional and agencies which value the consistency of the project with local and national development priorities; ii) information available at VBA (Volta Basin maps, shape files, project reports etc.), suggestions and comments were received and have been incorporated into this concept note; iii) the countries will provide support and participation to the adaptation measures and capacity development activities; iv) the countries expressed interest in continuing the activities after the project period, taking ownership for sustainability and v) the countries agreed to work in coordination and collaboration with different actors and stakeholders at national and transboundary level. The inputs of the stakeholders were integrated in the various components and activities to be implemented under the proposed project.

Lately, technical meeting were organised with the teams of on-going projects to discuss the transfer of knowledge from these projects to the Volta project:

- HKV consultants, Netherlands[71] were consulted to exchange about their experience of working in Ghana with local communities and the Ghana National Disaster Management Agency (NADMO) on the project "Community Resilience Through Early Warning (CREW)" between 2014-2016. The consultation provided information on the activities, pilot test sites, challenges, etc. of the CREW project. HKV consultants are interested to provide additional information and technical support during the next phase of the programme development, APFM is planning to develop in the next stage:
  - ✓ An advisory committee which will be set up with representatives of the major on-going and planned projects to share exchange of experience and methodologies, and to define coordination activities.
  - ✓ An expert group will be created to discuss technical issues and provide advice to the executing entities.
- Similarly, the International Water Association (IWA) was also consulted about their experience from the Flood and Drought Management Tool (FDMT) project in the Volta Basin. The discussion helped in understanding the FDMT project activities, available tools for the flood and drought management. Moreover, the Volta project was presented during the recently concluded training workshop on "Flood and drought tools for basin planning" held at the WMO secretariat on 14th December 2017. The participants from various international organizations such as IWA, United Nations Economic Commission for Europe (UNECE), DHI and some 15 transboundary basins authorities over the world provided constructive comments and suggestions to the FDMT tool which could be integrated into the Volta project activities. A second round of training with consultation was organized on 31st May 2018 at WMO premises. The training on FDMT tool was delivered by HKV in partnership with IWA and was attended by 10 basin planners to divulge the functioning and usefulness of FDMT on-line tool for decision-making and development planning.

A new series of consultations was carried out during the final proposal preparation phase to verify and validate the roles and responsibilities of the executing entities, and to agree about the budget distribution and the work schedule within the project partners. The national partners (check Annex

[71] https://www.hkv.nl/en/

5 for the list of people consulted) were contacted to discuss about their future involvement in the project activities. Subsequently, they provided the name of agencies, universities or organizations that would contribute and support the implementation of the project activities. The work resources of these contributing and supporting agencies will be used for organizing and participating in various activities such as training/workshops and performing actual tasks under the project. This approach will help in developing capacities of national and local staffs to gain knowledge and skills for floods and drought management and climate change adaptation measures. A validation meeting with the participants of several national agencies in Benin was organized during early August 2018 on the request of the Benin National Designated Authority for Adaptation Fund. The WMO presented the project and further received some suggestions or recommendations on the synergies between the proposed Volta project and the national development activities.

An additional major activity which was conducted during the same period is related to the assessment of the potential social and environmental impacts of the proposed project activities aligning with the Environment, Social and Gender policies of the Adaptation Fund. The consultation allowed reaching the general population and communities through semi-structured interviews, focus-group discussions or workshops during field visits, focusing on the minority groups, women, marginalized and vulnerable groups and indigenous people (selection of members has been through age, gender, social position and other aspects) prone to extreme hydrometeorological events and to the effect of climate change. The consultation process has provided information on acceptance of programme activities by the communities and on their willingness to take roles and responsibilities in the Environment and Social Risk Management Plan (ESRMP). Special attention has been given to generate consensus from every stakeholders to allow active participation of women and other vulnerable groups in all proposed activities ensuring successful implementation and sustainability of the project.

The community-related consultation also provided the opportunity to get feedback from 273 individuals consisting of marginalized, vulnerable and women groups (check the minutes of meeting and list of participants in Annex 4) about the existing early warning system and the future high-fidelity prototype of VoltAlarm early warning system envisaged by WMO and national partners (attached in Annex 2). The proposed functionalities (language, type of information, forms of warning etc.) and benefits of the VoltAlarm service were discussed with the participants so that their views, suggestions will be acknowledged and incorporated in the final design and development of the web-based early warning system.

Total consulted citizens (Individuals of vulnerable, marginalized and minority communities including women) through focus-group discussions and semi-structure interviews: 273;
Number of female: 105, Number of male: 168
From associations and NGO's (including women groups): 70 out of 273

Additionally, the consulted members suggested further requirements for enhanced floods and drought management at the local level (check Minutes of meeting under Annex 4) including better sourcing; access and delivery of the early warning information to every section of the communities (potentially have last-mile connectivity), timely support to vulnerable individuals, rain-gauge and river-gauge instruments for local forecasting, loudspeaker (megaphone) and radio for early warning information dissemination.
Some of the main outcomes of the citizen consultations are summarized as below:

- Riverine floods in the downstream agriculture areas are generating negative impacts. There is a need to develop capacities of the population to manage the agricultural

production between the floods in order to provide food and revenue for the population. They require timely information on the climate change events and variabilities and adaptation measures.

- Agricultural production has changed since the floods, the former production (made of ignam and sorgho) was linked to little expenses and no fertilizers, now the production is made of corn associated to fertilizers and the need of rain before the flood
- Flood events are occurring faster than before and the ancient way to deal with the events is not appropriate anymore and also more dangerous for population and livelihood.
- A new mode of early warning communication system is required for increasing self-help capabilities, preparedness and response measures. Internet connectivity is available with mobile phones or using local radio network for communication.
- Access routes to the health and education centres are inundated during the flood events.
- People requested to provide support for developing economy such as Honey-comb conservation training as this could preserve the Honey for long time and generate income for the people.
- Gender sensitive approach of the proposed project will provide capacity development and sustainable functioning of women associations in the countries
- Any activity related to water and soil conservation will be welcome in order to improve agricultural productive
- The farmers are ready to test any new technologies or tools for better adaptation to the climate change and variability.

Their suggestions on local community-based flood and drought management have been included as part of activities under the component 2.

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

Climate changes have been severely affecting the Volta Basin countries with regular and large-scale floods and drought events especially impacting agriculture and ecosystems. The government of the six riparian countries are developing and implementing various strategies and action plans to be better prepared to these extreme events, with technical and financial support from partners and agencies.

The Adaptation Fund will support the Volta project to expand on, and complement existing projects, in accordance with the development priorities of the countries in the urban and rural areas. The yearly flood and drought events have reduced community capabilities and their investments in socio-economic growth, such as houses, assets, livestock, food security etc. The proposed programme will provide benefits to both communities and agencies and opportunities to work in a coordinated and collaborated way achieving long-term adaptation measures for Flood and Drought management. The need for concrete adaptation measures to extreme events is an important requirement for the six riparian according to the initial consultation by WMO and GWP with the stakeholders of the Volta Basin. The Volta project includes the following components for developing adaptation measures and capacities:

Component 1: Develop capacity and establish frameworks at the local, national and regional levels to ensure risk informed decision-making

Baseline situation (without any support from the Adaptation Fund)

In general, 80 percent of the land and natural resources in the Volta Basin region are prone to Floods and Drought events. The hydrological and meteorological characteristics of the Volta Basin and the projected climate change impacts on socio-economic vulnerabilities have not been adequately addressed and incorporated into development planning and other land use practices over the years. The government agencies of the countries also lack adequate information about the increasing risks related to extreme events, resulting in improper planning and decision-making for flood and drought management. Therefore, private and community infrastructures and natural resources are continuously exposed to climate variability, resulting in damage and degradation of adaptive capacities.

Impact due to the proposed project (with the support of Adaptation Fund)
The Volta project plans detailed assessments of vulnerabilities, capacities and exposure to Floods and Drought events in the Volta Basin countries and the development of the related risk maps. Moreover, the project will help in the development of risk management framework and capacities of the stakeholders (especially policy-makers, disaster managers etc.) to take risk informed decision-making for Floods and Drought events. In addition, the project will bridge the gap in adaptation measures to integrate future scenarios (economic, urban, climate, environment, etc.) into current knowledge (risks mapping, hydrometeorological features) and practices to improve the future planning and design of concrete adaptation measures or interventions. For this purpose, synergies will be created between country level projects or programmes on climate change adaptation to develop integrated Flood and Drought management strategies and approaches at regional level.

Component 2: Develop concrete adaptation and environmentally friendly actions with an integrated approach

Baseline situation (without any support from the Adaptation Fund)
Presently there is no systematic measurement practices appropriate for Floods and Drought forecasting over a large part in the Volta Basin (at the exception of the White Volta and Oti basin). The available instruments such as radars, sensors and gauges provide information but there is no timely availability of Flood and Drought forecasting and warning information to the communities prone to these hazards. The existing Flood and Drought preparedness and response measures at local, national and regional level are ineffective, due to the lack of technical capabilities of various national agencies working on Floods and Drought management. Without AF support, the situation will not change, or even deteriorate, and the population in the six Volta Basin riparian countries will continue to remain highly exposed to extreme weather, water and climate events and face consequent damages. Additionally, local actors and flood prone communities lack knowledge and tools for mainstreaming Gender and developing natural and nature-based solutions for flood management, however they have useful traditional solutions and adhoc experiences which need to be captured and improved in new Flood and Drought management strategies.

Impact due to the proposed project (with the support of Adaptation Fund)
The Volta project will support the development and implementation of VoltAlarm, an End-to-End Early Warning System for both Floods and Drought resulting in tailored hydrometeorological information services for the agencies, communities and the general public. The AF support will be used to strengthen data collection, transfer and management from the existing instruments on the Volta Basin and from external sources (NWP, global platforms, satellite data etc.): this is a mandatory step towards a robust and appropriate network for forecasting and early warning information. The GIS-based early warning information system will be developed for the beneficiaries at all level made of simple colour coded graphs and risks zoning, as proposed in the VoltAlarm prototype. The EWS will improve the stakeholder's capacities to take decisions and

prepare for reducing impacts and if required, implement alternative practices. These systems will be more efficient with improved coordination between the hydrometeorological services, the other concerned departments at local and national levels and the communities prone to floods and drought. The capacity development activities, such as Gender mainstreaming for End-to-End Early Warning Systems for Floods and Integrated Flood and Drought Management through natural and nature-based solutions will help in developing pro-active approaches to account for climate change variability.

Component 3: Strengthening policy and institutional capacity for integrated flood and drought management at the local, national and transboundary levels

Baseline situation (without any support from the Adaptation Fund)
Although the Volta Basin countries have recognized the need to adapt to climate change variability, the existing governance structure at the transboundary and national levels does not provide coordination and collaboration in water and natural resources management. The policies, guidelines or plans for collecting and sharing data and information related to hydrometeorological conditions are not yet enforced to improve preparedness to extreme events. The shortage of policies, plans and strategies at local, national and transboundary level for the management of short- to medium-term disaster risks exposes the Volta Basin population to non-sustainable socio-economic conditions.

Impact due to the proposed project (with the support of Adaptation Fund)
The AF support will allow to develop an enabling environment between local, national and international actors and stakeholders. Systematic coordination between six riparian countries will facilitate the achievement of the common objective to develop concrete risk reduction and climate adaptation measures. Additionally, the project will develop capacities of beneficiaries to review or develop new policy frameworks to integrate climate risks to land, water, environment, livelihood with development plans and practices at local, national and transboundary level on the Volta Basin.

K. Describe how the sustainability of the project outcomes has been taken into account when designing the project.

Project sustainability will be achieved through close collaboration and capacity building of stakeholders at all levels i.e. local, national and transboundary ensuring their long term commitments for climate change adaptation activities and services. The participatory consultative process during the project preparation phase ensured that the stakeholders' needs are properly addressed. Individuals of communities (adults, elderly, women and youths) will be involved in identifying their expectations and contributions to implement effective Floods and Drought management in the Volta basin. The wide curriculum of trainings covering aspects ranging from hazard and risk mapping, water balance, hydrological outlooks, community based flood management, roving seminars for farmers on agro-meteorology, integrated drought management to End-to-End Early Warning Systems for flood management etc. will provide technical support and new decision-support tools for the operational centres. The joint activities of the partner organisations, such as requirements specifications, installation of equipment in the NMHSs and provision of new information to the public, field work in the pilot testing locations will also foster exchanges, create groups of users and form trainers, who will take up project ownership in the future and prolong the project efforts.

For the outcomes of component 1: Long term sustainability will be developed by facilitating participatory stakeholder engagement and knowledge exchange between local communities and government agencies. By showing if, how and when, the risks for Floods and Drought events will change over short and longer periods in the Volta basin, the stakeholders will become aware of the value of the vulnerability, capacity, exposure and risks assessment activities, the related alteration of the risks factors for Floods and Drought and their impact on their daily life. The NMHSs will provide in-kind support (staff and resources) to complete activities proposed under the Volta project, such as development of flood and drought risks maps and how they are impacted by climate scenarios. Hence, the periodical assessment of the VCERs will need to be developed by the national agencies to update the associated Flood and Drought risk maps of their communities in order to be prepared for climate related extreme events. Local communities will, therefore, be incentivized to continue implementing and maintaining the various outputs under component 1 upon which their lives and livelihoods depend. This will encourage project sustainability at both the community and government/agencies levels.

For the outcomes of component 2: Long term maintenance of the operation tools and methodologies for the activities under component 2 will be sought through commitment of the countries to provide sufficient resources for the sustainability of the new system. The Volta Basin Authority (VBA) one of the executing agencies of the project will be highly involved in the development and operation of the VoltAlarm Early Warning System for Flood and Drought during the course of the project and subsequent to its completion. VBA has provided commitment to ensure that the VoltAlarm Early Warning System (EWS) will be integrated into the day-to-day operations of the Volta Basin Observatory. Doing so will ensure the long-term sustainability and operation of the software platform and related databases. Following the project's completion, the VBA will ensure the on-going maintenance and updating of the system regardless of the availability of other sources of funding (check the Annex 7). It is anticipated that VBA will also propose to include operational and maintenance costs in other on-going and future projects that will be linked to the early warning system developed under the Volta project.

The long term sustainability of this achievement is also dependent on the VBA receiving the meteorological, hydrological and climatological data and related products from the National Meteorological and Hydrological Services (NMHSs) of Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, and Togo. **The NMHSs have already provided support letters to ensure the long-term transfer of information from the national databases to continue operations of the VBA EWS coordination unit (see Annex 7 for the commitment letters)**. WMO will build on lasting collaborations with the Volta basin countries, as the pilot project AOC-HYCOS and the subsequent Volta-HYCOS programme were endorsed 15 years ago by the six countries. The Flood forecasting and Early Warning Systems (EWS) for Floods and Drought, as envisaged in the VoltAlarm prototype, will be developed and used by the actors of national agencies, especially the representatives of NMHSs, VBA, the Country Water Partnerships and national disaster management authorities. The long term share of duties and responsibilities for the Flood forecasting and EWS will be taken up by VBA in collaboration with the NMHSs, with support at governmental level in the Ministries. Additional institutions involvement will be discussed during the capacity development activities of component 2.1.

Regarding component 2.2, the involvement of vulnerable groups, will be assisted with the coordination of WMO and GWP-WAF on issues related to gender mainstreaming and natural and nature-based solutions for Floods. In the future, APFM will provide technical assistance to the countries agencies to develop bankable project proposals to get funding for local projects (a first pilot site in Mandouri region of Togo has already been identified during the project drafting and field visits to test the methodologies of FGG and in particular for the future implementation of the natural and nature-based solutions for Floods). Moreover, other funding sources, such as the National Environment and Climate Fund of Benin (FNEC) could finance national projects for the

additional themes identified during or after the completion of the proposed Volta project in order to gain long term sustainability of the project outputs. A large dissemination of the project results will be ensured by the involvement of a large network of partners (NMHSs and related agencies, country partners of GWP-WAF, VBA partners).

For the outcomes of component 3: The involvement of VBA and OSS is extremely valuable to ensure the temporal dimension of component 3, and specifically the sustainability and long-term effects of data sharing policies, sustainable development plans and practices and code of conducts at the local, national and transboundary scales. VBA will extend its operational role and maintain the project results on the longer term, therefore contributing to the implementation of the Volta basin Strategic Action Programme (SAP). Major institutions in charge of coordination and civil defence activities from national to local level will be integrated while detailing, and later implementing, the programme components: such as for example NADMO and the Water Resource Commission in Ghana, the General Directorate of Water Resources (DGRE), the Permanent Secretariat of the Action Plan for Integrated Water Resources Management (SP-PAGIRE), CONASUR and CONEDD in Burkina Faso, and the similar institutions in the four other countries of the basin. They all will integrate some of the innovation and methodologies of the Volta project into their procedures after contributing to the training and operational activities.

The methodologies adopted and trained resources (both agencies and communities) project are expected to be a support for other actors and stakeholders in developing floods and drought risks maps, climate change scenarios and GIS-based early warning system of their respective countries (regions outside of the Volta Basin). Furthermore, through the collaborative process with external entities, including among others OSS, other Basin Authorities, economic commissions, international organizations etc. the Volta project results, experiences and success stories will be further disseminated into the whole West African region, as illustrated in Figure 14.

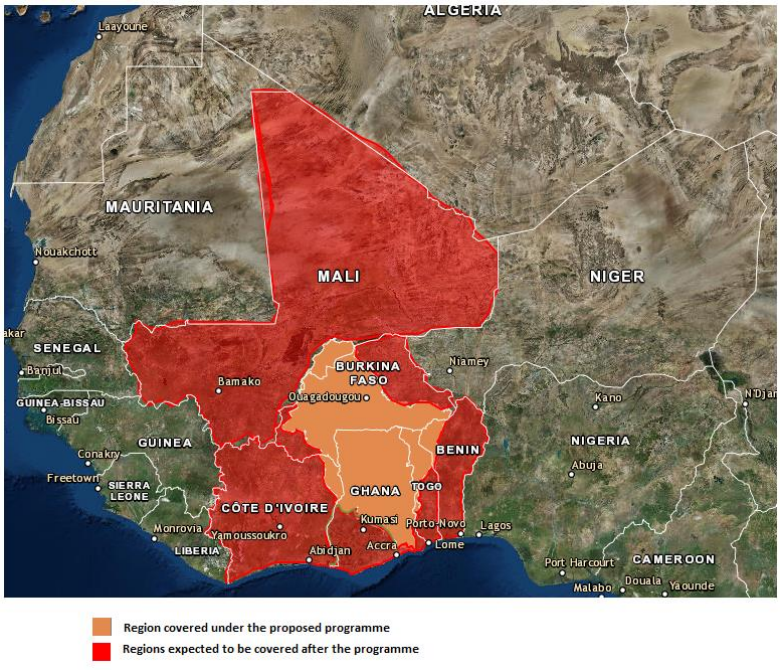


Figure 14: Areas of transfer of knowledge to provide long-term sustainability

Funding organisations will be invited to follow the project success stories, as an example, the National Environment and Climate Fund of Benin (FNEC), as financing instrument of national environment and climate projects, FNEC will be able to contribute to the identification and

implementation of community centred climate change adaptation and green infrastructures solutions on the Benin territory. FNEC could provide assistance in the strengthening of regional and national institutions during the continuous monitoring and reporting of the project activities. FNEC will be able to contribute to the governance structure of the project, either directly by participating to the advisory basin committee, or by proposing experts from the thematic groups. In the future, FNEC could also finance national projects for the additional themes identified during or after the completion of the proposed Volta project in order to gain long term sustainability of the project outputs.

L. Provide an overview of the environmental and social impacts and risks identified as being relevant to the project.

The entire project activities were screened for any environmental and social risks according to the 15 principles outlined in the AF's Environmental and Social Policy. As noted in the following table, all principles are applicable in the countries and for all sites of the Volta Basin region. Specific principles were analyzed on a case-by-case basis during various field visits and in view of the exposure to one or both floods and drought hazards. It is also noted that when a specific risks is applicable and triggered, this could leads to other risks as well. One of the evidence-base for such types of indirect primary and dependent/secondary risks is provided by the lessons from development-related displacement commented by Alex de Sherbinin et al (2014). It is stated that resettlement is a complex process with many risks, most notably those cited by the Impoverishment Risks and Reconstruction model: loss of land, employment, shelter and access to common resources, economic marginalization, increased morbidity and mortality, food insecurity and negative cultural and psychological impacts[72]. In the Volta Basin, the Bui and Akosombo Dam construction, major structural measures, led to resettlement process by the government. People livelihood and living conditions have been severely impacted as they were not planned and participatory[73].

This type of highly impacting risks is not part of the proposed project on the Volta Basin as all the measures follow the principles of integrated water resources management and contribute to increased preparedness measures. Nevertheless, the development of risk maps can alert the national agencies and communities about the locations possibly at risk during flood or drought events. The national agencies might then consider moving or relocating people, or people on their own could decide to move to safer places in urban or rural areas. This can be considered as primary indirect risks. Moreover, secondary or dependent risks such as fight for water, land and food resources and social and cultural conflicts with the existing people at the new location might become a challenge to the relocating families. The national agencies or people should be made aware of this kind of risks and their impacts. The proposed project will raise awareness or knowledge for such risks and potential safeguard measures with prior and informed consent of the stakeholder. National responsible agencies will be provided with decision support tools for developing and implementing a resettlement plan which upholds the rights and enhances, or at least restores, the living standards of the relocated people due to the effects of extreme climatic events. For safeguard actions, a set of standards or procedure will be made available that specifies the desired outcomes and the specific requirements to be achieved through means that

[72] Planned Relocations, Disasters And Climate Change: Consolidating Good Practices and Preparing For The Future , UNCHR http://www.unhcr.org/53c4d6f99.pdf

[73] https://brage.bibsys.no/xmlui/bitstream/handle/11250/265387/542562_FULLTEXT01.pdf?sequence=1

are appropriate to the nature and scale of the activity and commensurate with the level of environmental and social risks and/or impacts.

By improving accessibility to early warning, capacities and knowledge-base, the Volta project with AF resources will increase the evidence-base available for future initiatives that aim to promote climate change adaptation and improve water management both at national and transboundary level.

According to Environmental Impact Assessment (EIA) acts or guidelines of the Volta Basin countries, most of the components/activities of the proposed Volta project do not come under or belong to the category A of projects that require full EIA study under AF policies. Some of the activities such as development of floods and drought risks, climate scenarios and Volta EWS might have indirect social and environmental impacts and EIA and SIA study have been conducted depending on the severity and intensity of the hazards on any particular locations. Combined mitigation measures are presented for such risks (Check Annex 6) and they will be further validated with the national partners during the inception meeting.

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law	No further assessment is required. The project will ensure that the existing national and transboundary laws, policies and guidelines of Volta Basin will be followed during the implementation of adaptation measures or in capacity development activities. The project will not require any prior environmental and construction legal and regulatory permission as there are no physical or structural construction planned in the project activities. If required international laws on data sharing protocol among different countries will be consulted. During the design of the project especially component 3.1: both regional and national stakeholders will be consulted to update data sharing protocol/laws between the six countries.	
Access and Equity	No further assessment is required. The project activities will provide impartial and equitable access to project benefits. The project design is developed to allow representative of vulnerable groups in every capacity development trainings/workshops. The selected participants will be expected to disseminate the training knowledge to other members of communities or organisations so that everyone will have fair and equitable access to all project benefits. The selection of beneficiaries	However, the project has capacity development activities to which only small percentage of the communities will be able to participate. The project will ensure that these representatives of communities will further disseminate the information to wider groups.

	will also be made in consultation with local practices, traditions and access to social facilities. Pilot testing in each country will provide opportunities to involve all stakeholders including vulnerable groups.	
Marginalized and Vulnerable Groups	No further assessment is required. The project will contribute to the reduction of existing inequalities for EWS for floods and drought, particularly those affecting marginalized or vulnerable groups dependent on agriculture or living in urban areas. The EWS system for floods and drought will be available through technological sources. The members of communities and local agencies will be provided with adequate knowledge and explanations about the systems to use it for their own benefits. Community-based flood and drought management activities will support the participation of marginalized and vulnerable groups and their appropriation of projects benefits.	There is a risk that vulnerable and marginalized groups will have insufficient knowledge and access to technological devices such as mobile phones or lack of good cellular connectivity specially required for component 2.1 of the proposed activities. To avoid the exclusion of marginalized and vulnerable communities, local radio channels and traditional practices will be implemented to reach these groups especially women, girls, elderly, physically challenged individuals.
Human Rights	No further assessment is required. The proposed activities are or will not be against any of the established international human rights. Moreover, the proposed project will promote the basic human rights of access to water, food and information. The project will provide opportunity for every individual to give their views, perceptions and needs in developing better climate change adaptation measures.	
Gender Equity and Women's Empowerment	No further assessment is required. The proposed project will improve the gender equity and women empowerment through the WMO developed tool: Training Manual for mainstreaming gender in End to End Early Warning system for Floods and integrated Flood Management through a participatory design approach. This will help in increasing the participation of women, girls and other vulnerable groups in Flood and Drought management activities as well as decision making processes.	The proposed project is targeting region where men occupy the majority of the leadership positions. Women participation to disaster preparedness and decision making is often limited due to cultural and social norms. There is therefore a risk that women will not benefit equitably from the proposed adaptation measures and capacity-development interventions. Planning of the participative activities will ensure that women and representative of women associations will be sufficiently well represented
Core Labour Rights	No further assessment is required. The project will be implemented and managed in compliance with the countries designated labour laws. No individual will be hired without pay and	

	the payment will be according to the countries labour legislation/laws. Children's labour will be forbidden and it will not be accepted from other project partner agencies. Local communities will be involved in the adaptation measures but will not be exposed to any risk of accidents. Core labour rights will be respected and considered in project design and implementation.	
Indigenous Peoples	No further assessment is required. The indigenous population in the region will be consulted and involved during the design and implementation of the project activities. The traditional knowledge of indigenous people on Flood and Drought will be useful when preparing the risk maps, the early warnings and information dissemination.	There is a risk that the traditional use of water resources; irrigation system and land use pattern will be challenged. Therefore, a detailed analysis will be carried out by local and national agencies to understand the traditional use of natural resources especially regarding to water and land use.
Involuntary Resettlement	There are no activities proposed in the project which will create direct involuntary resettlement of communities. However, the risks of displacement of the population after the mapping of floods and drought risk areas could be possible as some areas could be classified as high risk for the loss of life. On the basis of evidence-based and scientific information, the agencies will propose new prevention plan to prohibit future settlement in the high risk areas.	A built-in safeguard approach will be defined for minimizing the negative effects of involuntary settlements. In case of involuntary resettlement, the population will be informed of their rights in a timely manner, made aware of grievance mechanism, consulted on their options and, offered technical, economically resettlement alternatives or fair and adequate compensation. The displaced population will face challenge in terms of acquiring resources for living (house, food and livelihood) and social integration with the new communities. The project will ensure that activities, especially with the local administrative services provide support in terms of strategies or actions in case of population displacement
Protection of Natural Habitats	There are no potential direct risks to the protection of ecosystems and its natural habitats and biological diversity through the project activities. There is a possibility of indirect risks through the revised policies and plans at national and transboundary scale decreasing the protection level of critical habitats, Natural and nature-based solutions will be promoted using the Flood Green Guide by WWF, but they will not be implemented in the course of the Volta project as they would need detailed ecological assessment.	The existing and new policies, plans and activities to protect natural habitats will be screened with the stakeholders to ensure that the critical habitats are legally protected through convention on wetlands such as RAMSAR, Iran, 1971. and consultation with authoritative sources like IUCN, UNESCO as well as indigenous communities. Furthermore the activities under output 1.2.3 will consider native species characteristics and critical values for defining environmental thresholds.

Conservation of Biological Diversity	There will be no direct risks associated with the conservation of biological diversity as the project activities will not involve any physical action on natural resources and introduce any known invasive species. The project activities (activities under output 1.1.1, 1.2.1, 1.2.2, 1.2.3, 2.1.3, 2.1.4) will provide opportunities to improve the understanding of natural processes in relationship with the water cycle. Nevertheless, the project activities could trigger changes of agricultural and irrigation practices and use of pesticides. Also, The outcomes (flood and drought risks maps, EWS information) of the project might lead to encroachment on the protected areas, buffer zones and natural habitats.	The project activities will ensure that the principles of the Convention on Biological diversity (CBD) which has been signed by the six countries between 2011 and 2017[74] will be followed and supported. Furthermore, the National Biodiversity Strategy and Action Plan of the countries will provide valuable information and methodologies, opportunities to disseminate information as well as coordination at the national level and for the transboundary level. The project will promote planning for activities of biodiversity conservation, such as reforestation, nature based solutions through an assessment at pilot sites with national concerned agencies. The project will promote capacity building and peer learning to strengthen the efficient management of natural resources, including aquatic species, animals and forests.
Climate Change	No further assessment is required. The proposed project activities will not result in any greenhouse gas emission to the atmosphere and deforestation, so there will not be any impact to climate change. Furthermore, the project does not only increase the flood and drought adaptation capacity and resilience of the local population but also contributes to develop better governance structure, policies and plan at both national and regional level for climate change adaptation.	Actions to increase the resilience of populations are to be expected at the local level (development of agricultural perimeters, support of disadvantaged groups to income-generating activities.)
Pollution Prevention and Resource Efficiency	No further assessment is required. The project activities are not expected to result in water, air and soil pollution.	The project will create awareness through risks maps and also provide technical support to the water management committee in the clearance or collection of household waste that fills the rivers and are often source of floods and spreading of polluted waters. The project (through component 2 and 3) will strengthen the technical and organizational capacities for the rational use of water at both national and transboundary level with clear guidelines, policies and action plans.
Public Health	No further assessment is required. The project activities should not have negative effect on public health. On the contrary, it will contribute to prevent the population from natural disasters, to improve income for getting access to	The project will identify the communities at risks which are prone to inundation and provide awareness of best practices for health related safety during various capacity building activities. The project will promote planning for a

[74] https://www.cbd.int/nbsap/about/latest/default.shtml

	health facilities, etc. Nevertheless in case of disaster, the displacements of the populations can be sources of epidemics due to the lack of hygiene	health surveillance program to deal with the disasters. The project will regularly promote, inform and sensitize the populations on diseases related to the presence of flood water (malaria, typhoid fever, Amoebiasis, Cholera etc.);
Physical and Cultural Heritage	No further assessment is required. The project does not have any activity related to affecting physical and cultural heritages. The purpose of the project is to develop better management of water resources and have traditional and cultural integration among the individuals.	Participatory design and mapping approach under output 2.2.3–will involve local communities and authorities to identify areas of physical and cultural significance and ensure that community-based flood and drought management activities will not negatively impact them.
Lands and Soil Conservation	No further assessment is required. The project will promote the conservation of soil and land resources, especially through the selection of natural and nature-based solution with environmental-friendly solutions.	The project will contribute to improve agricultural practice and help to build the capacity of farmers and technicians.

PART III: IMPLEMENTATION ARRANGEMENTS

A. Describe the arrangements for project implementation.

WMO, as Implementing and Executing Entity, will be involved at several levels into the project activities and supervision, allowing to benefit from international as well local presence:

- ➢ The WMO Field Office for North, Central and West Africa, will coordinate with national authorities, especially their National Meteorological and Hydrometeorological Services (NMHSs).
- ➢ The Technical Support Unit (TSU) of the Associated Programme on Flood Management (APFM) and the Integrated Drought Management Programme (IDMP), both hosted in the Climate and Water Department of WMO, will ensure as Executing Entity have close contact with both regional Executing Entities (VBA and GWP-WAF).
- ➢ Other WMO teams in the Climate and Water Department, especially the Global Framework for Climate Services (GFCS), Climate Prediction and Adaptation Branch, Flash Flood Guidance System, HydroHub project, will contribute to the activities and extend the reach of the project

The Volta basin project will benefit of the knowledge base and network of some 50 Support-Base Partners (institutions involved into Environmental issues, Disaster Risk Reduction, capacity building, community aspects and research, NGOs, National Services) of the two WMO and GWP associated programmes targeting Integrated Flood Management (APFM since 2001) and Integrated Drought Management (IDMP since 2013). Next to their possible contributions to the Advisory committee, they will be contacted to participate to the requirements specifications, or possibly to the development of some part of the activities depending on their field of competences.

At the regional transboundary level, two Executing Entities, to the side of WMO, will fulfil the coordination and relationships with the institutions and stakeholders on the basin:

- The Volta Basin Authority (VBA) will be the focal point for data sharing and dissemination through its Observatory, and for transboundary coordination and links with the national structures
- The Global Water Partnership West Africa (GWP-WAF) through its Country Water Partnerships (CWP) will foster the integration of communities and local stakeholders, while connecting with national policy makers.

VBA will take over a part of the tools developed during the Volta project and maintain the service, ensuring the long-term sustainability of the tools, procedures and methodologies of the project. VBA has still not achieved that level of maturity to act as reference for issues related to data sharing in the region, and its involvement in the project will contribute to increase its credibility vis-à-vis to NMHSs and strengthening its transboundary facilitation role. At the same time, the involvement of VBA will also allow to identify synergies with other major development partners such as the African Development Bank, and possible gaps not covered by national investments at each country level.

Since 2009, VBA is developing the VBA Observatory, with the goal of providing an operational tool, with communication and information capacities. The VBA observatory must help facilitating effective decision-making (management of water and environment & governance) between the six riparian countries. Furthermore, through regularly collection of data from gauging stations and data and information with its members, the VBA observatory will also support countries into applying the transboundary data sharing protocol. The proposed Volta basin project is an opportunity for the VBA Observatory to strengthen its role into data and information sharing of national and regional

databases on hydrology, and also to provide assistance in analysing how this information could be useful for delivering impact-based forecasts of Floods and Drought.

Through its capillary network in the region among water practitioners, GWP West Africa will ensure strong diversification of partnership in the beneficiary countries and will facilitate the organization of locally-based activities. Its inclusion among the executing entities will ensure a geographically spread distribution of activities related to the project. The network of GWP country partners (in the order of several dozen related to the project activities) will disseminate and mainstream the project results at local level.

At national level, WMO can count on the support of the Permanent Representatives and their Hydrological Advisers of the NMHSs, forming a network of technical assistance to disseminate the project results towards the related Ministries in charge of Water Resources, Hydraulics, Environment and Civil Defence, and international level within the 191 WMO member countries and territories. The NMHSs are also envisaged as focal points for the technical activities to take an active role in the project implementation.

In the last preparation phase of the project, the focal points of the six countries were contacted (check Annex 5) to provide the names of core agencies, organization or universities who will be participating and fulfilling the tasks. The countries provided the information together with their capacities (human resources, equipment's, risk maps etc.) and requirements (funding, logistical support, IT equipment's, technical trainings, and awareness tools to reach citizens). For example, in Cote d'Ivoire, there is a need for support in revising the documents related to the existing operational procedures of the meteorological and hydrological services, development of multi-hazard risk maps and EWS with bulletin board. Additionally, there is availability of historical hydro-meteo information which will be useful for the project activities. The main participating agencies will be SODEXAM (Meteorological services), DGIHH (Hydrological services). The proposed project will take into consideration the existing information, resources and infrastructures available in the country and try to support the needs of the Cote d'Ivoire. Similarly, for other countries, the contributing partners, these available information and requirements are provided under Annex 5. The list of the national agencies responsible for each activity will be refined before the inception meeting.

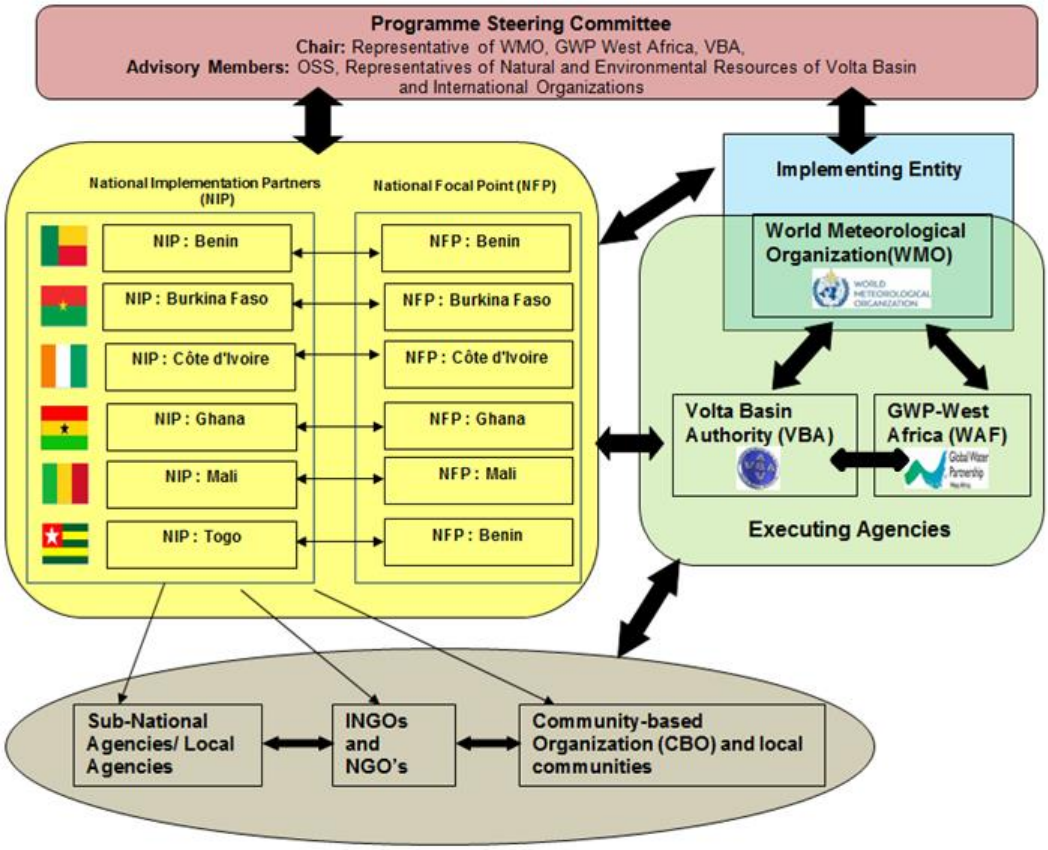


Figure 15: Organisational management structure

Strong relationships will be established with the Sahara and Sahel Observatory (OSS) promoting management of transboundary water resources and the implementation of Multilateral Environmental and Gender Equity Agreements, notably those addressing desertification, biodiversity and climate change. OSS has been, and is being, implementing several projects in the region of West Africa. Exchanges of information will be organized between the OSS projects and the Volta project to help identifying common synergies and further developing and sharing resources useful for structural or non-structural measures on climate change adaptation. OSS representatives will participate into expert groups and advisory project committee. A scheme of the management structure of the Volta project is illustrated in Figure 15.

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

Financial and project risks measures will be assessed as an on-going process throughout the design and implementation of the project. The potential risks identified are:

Type of risk and how it affects the project	**Risk impact on the project goal** (low, medium, high)	**Probability of occurrence** (low, medium, high)	**Mitigation measure(s)**
Acceptance of the project Even though detailed needs assessments have been conducted since 2013, the support of the stakeholders can differ in the six countries. This results in differential levels of acceptance and slows down of the inception phase of the project.	Medium	Medium	- During the preparation phase of the project, all relevant stakeholders (government, agencies, departments and communities) will be/are clearly identified, so that they fully share the vision and goal of the project and are aware of their contribution to the project, hence fostering ownership over the process. - MoU will be signed with the participating stakeholders. - Roles and responsibilities of the implementing agencies and executing agencies will be defined in the initial stages of the project so that all the activities are completed in a coordinated way.
Physical risks Administrative barriers hinder sharing of social and topographic data. This result in difficulties to implement components 1 and 3.	Medium	Low	The executing and implementing entities will ensure from the National Focal Points and National Implementation Committee that the required data and information are shared. Furthermore, VBA is mandated for regional exchange of information and can request the enforcement of the agreements.
Technical/quality risks Component 2 of the project is too technical and not adapted to specific area or countries. This results in low commitment and interest from stakeholders	Medium	Low	The project activities will be first reviewed by experts of WMO, GWP-WAF and VBA, eventually with the support of NFP and NIC, local decision-makers and participants from community to understand the expectations and suggestions from the participants. The feedbacks and suggestions from the participants will be integrated.
Restructuring of government officials Restructuring in the government work structure may cause possible shifts of responsible persons at local and national levels to a different location. This can result in delays and loss of support.	Low	Medium	Alternative persons from the departments will be involved in most of the activities so that implementation of project activities will not be hampered at any time.

Financial/resources risks Inadequacy of the financial management system: procurement system, financial availability, monitoring, reporting and auditing system, etc. Availability of project resources This will result in slowing down the project activities	Low	Low	During implementation, project and financial monitoring/reviews will be conducted to ensure efficient management of project resources.
Human resources/capacity risks Lack of skills or human resources availability Adequacy between existing and required experience and skills This results in slowing down the project activities	Medium	Low	- The project benefits from the deployment of professionals/staffs by the implementing and executing agencies (WMO/GWP WAF/VBA) who are selected by a panel of experts. Their ToRs are developed based on the project needs and in collaboration with the hosting institutions. - National support is obtained at the level of the governmental agencies to ensure sufficient human resources
Documentation/Reporting risks Lack of available tools and templates for developing reports and progress report Delays of reporting by the partners This results in delays in the reporting process and financial access to funding	Low	Medium	Appropriate tools/templates and reporting structures and procedures will be put in place by WMO to ensure proper documentation and reporting so that donor agencies and steering committee receive timely reports.
Political risks Interference from the local/national political parties This will result in delaying the project activities	Low	Low	The project will adhere to the goals, laws, and policies of the respective programme countries. Whenever and wherever required, permission of national consensus of the countries will be shown.
Gender neutral approach Techniques and technology developed are not accepted by all groups of the communities. This decreases the gender equality compliances	Low	Medium	The project includes gender sensitive approach in all activities. Wherever required non-technological or traditional methods will be adopted to reach and get participation from every group of the communities.

WMO and its advisory group (Commission of Hydrology (CHy) task team and working groups) will provide support to the project team and executing agency for conducting regular risk monitoring and evaluation of the project activities, and the results will be tracked and reported in WMO's internal monitoring system. In addition to this, a dedicated Monitoring and Evaluation (M&E) team will be formed, to ensure essential budget and resources are allocated to execute the M&E framework.

C. Describe the measures for environmental and social risk management, in line with the Environmental and Social Policy of the Adaptation Fund.

In the final preparation phase, an Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) study (in line with the Environmental and Social Policy of the Adaptation Fund)

was conducted for screening the proposed project activities against the15 principles of the Environmental and Social Policy of the Adaptation Fund. The EIA and SIA has been undertaken taking to account for the existing legislation or practices in place of the six countries, along with the Volta Basin or transboundary laws on Environment and Social including Gender.

A local consultant with more than 10 years of experience in conducting Environment and Social Impact assessment (check Annex 6 for the ToR, responsibilities and deliverables) was hired to carry out EIA and SIA in the six countries of the Volta Basin region. The methodology of the study includes field visits to the vulnerable locations of the Volta Basin region, semi-structured interviews or focus-group discussions with the agencies (national meteorological and hydrological services (NMHSs), environment, water resources and irrigation, civil authorities etc.) and citizens (representatives of communities prone to floods and droughts, associations or self-help groups etc. - check Annex 6 for the complete list of the people consulted).

The risks identified for the 15 environmental and social principles of the Fund in relation to the project activities have been described in the section L, Part II and concrete mitigation actions have been proposed for each category of the risks. A detailed report on the Environment and Social Impact Assessment (ESIA) and the associated Environment and Social Risk Management plan (ESRMP) are available in the Annex 6. Other minor risks related to the project implementation and results are included in the below Table with their appropriate response measures.

Activities under components 1 and 2 are medium risk and will not require any further environmental screening or assessment. Component 3 activities will be brought forward through consultative processes with agencies, community and representative groups to improve flood and drought management at the national and transboundary level and will increase community resilience, promoting gender equity and utilizing traditional knowledge as a basis for planning the adaptation measures.

A cross analysis of the actions planned by the project and the field investigations at the level of the national portions of the Volta Basin regions in the 6 countries, made it possible to identify positive and negative impacts of the integrated flood and drought management project. These environment and social impacts are classified as positive or negative. The analysis of these impacts will allow to propose mitigation, compensation or improvement measures according to the impact categories.

Description of the risks	Category (Low, Medium, High)	Impact Type (Negative)	Mitigation/Response Measures
The results or outcome (false alarm, not sufficiently accurate risk maps and threshold levels) of the proposed initiative might occur after floods and droughts events;	Low	The citizens and agencies will show less preparedness interests for the future events	The agencies and citizens will be consulted and provided with the short and long-term benefits of the project activities and highlight the lesson learnt and the ways in which it could be improved over the time.
The lack of coordination between the various stakeholders at different levels in flood and drought management;	Low	The potential benefits of the project activities will be lower than expected	The project partners will ensure the NMHSs are involved into coordination at all level.
Insufficient data on areas at risk of flooding or	Medium	Flood and drought risks maps will not be available for	The data availability will be ensured through the

drought.		the areas or probably inaccurate	involvement of agencies and communities and building synergies with the on-going or future national and international projects (CREWS, World Bank) on floods and drought management
The multiple recurrence of floods or drought events in some areas of the basin	Medium	The measures proposed through or implementation of the Volta project activities will be hampered due to the involvement of agencies in response and recovery activities.	The project partners will provide support to manage and collect all the new information for drafting the (Return of Experience) report.

These mitigation and response measures are designed to avoid or minimize negative impacts, or where necessary, manage dependent risks.

Based on the Risk Screening exercise and in line with the Environmental and Social Policy of the Fund, Components 1 and 2, because of the characteristics of their activities, are categorized as medium risk (Category B). The integration of flood and drought management within the proposed adaptation measures will be at a smaller scale initially, co-designed and developed with the agencies and communities, appropriate to cultural and social norms. Once the activity is successful at the national levels, it will be integrated at the transboundary level. If they are designed and implemented as proposed, there is less possibility of producing negative social and environmental impacts. Component 3 in general is categorized as less risk (Category C), which is to revise and develop new policies, strategies and action plans to better integrate the communities needs and their participation at all level of projects, which therefore categorizes the overall risk ranking for this project, as **Category B**.

An environment and social risks screening checklist (a set of indicators or well-established procedure will be developed to identify risks from the early stage - designing and planning phase of the project activities) will be provided and completed by the national project coordinators (in consultation with the stakeholders) for each disaster risk reduction and adaptation activity planned under component 1 and 2. This will help in identifying preparedness measures for any unforeseen risks. In case of any risks encountered during the implementation period, the ESRMP will be executed, ensuring that the small-scale risks are mitigated in the shortest possible time with locally-accepted measures.

Responsibilities of the Actors for Environmental and Social Risks monitoring for Project and sub-projects activities as well as for implementing adequate measures through ESRMP

Actor involved	**Responsibility/Assignments for risks identification and monitoring under sub-projects/project**	**Supporting Entity**	**Responsibility/Assignments for implementing measures**
WMO (The project coordination unit)	Development of Environment and Social Management systems (ESMS) comprising • Identifying (Screening in compliance with ESP of AF	-External Consultant -Other executing agencies -National	- Ensure safeguard action are defined in compliance with the national regulations and implemented for the activities which can create social and

	and national laws) environment and social risks for the sub-projects • Preparation of ESIA and ESRMP for the sub-projects prior to the start of the sub-projects activities • Regular monitoring and dissemination of the ESIA and ESRMP (with grievance mechanism) for the sub-projects and projects.	Environment and Social agencies of each country -Task team (formed under activity 1.1.2.5)	environmental risks -Supervise the implementation of the response activities under the ESRMP in coordination with the bodies responsible for the management of water, environment and social welfare of each country - Monitor the progress of the risks minimizing actions or measures with the executing partners - Carry out further assessment for the risks which have been encountered to avoid similar cases in other activities
VBA	• Support for the study • Contact lists of people to consult for ESIA in the countries • Inception and validation meeting of the ESIA report • Distribution and awareness of the ESIA and ESRMP report to the stakeholders	-Other executing agencies -National Environment and Social agencies of each country	-Follow-up of the study and implementation of the activities of the ESRMP in relation to the bodies responsible for the management of water and environment of each country - Monitor the progress of the risks minimizing actions and measures with the help of checklists or consultation
GWP	• Support for the study • Contact lists of people to consult for ESIA in the countries • Inception and validation meeting of the ESIA report • Distribution and awareness of the ESIA and ESRMP report to the stakeholders	-Other executing agencies -National Environment and Social agencies of each country	-Follow-up of the study and implementation of the activities of the ESRMP in relation to the bodies responsible for the management of water and environment of each country - Monitor the progress of the risks minimizing actions and measures with the help of checklists or consultation
National Meteorological and Hydrological Services (NMHSs)	• Provide support for the study • Divulge information on the potential risks which could result • Inception and validation of the ESIA report	-External Consultant -Executing agencies	-Identify potential risks which could result from the activities at the very initial stages especially at the design or planning stage -Monitor the implementation of the activities during and after the completion
The Environment, Water, Civil Protection and Forest service	• Provide support for the study • Divulge information on the potential risks which could result • Inception and validation meeting of the ESIA report	-External Consultant -Executing agencies	-Contribute to the positive actions of natural resources protection (water, ecosystem and human life) -Adhere to the compliance of the implementation actions under the ESRMP -Monitor the implementation of the activities during and after the completion

Local administration (city halls, Prefectures, governorate, agriculture, breeding, etc.)	• Provide support for the study • Contribution to identification of the safeguard action through evidence-based knowledge • Divulge information on the potential risks which could result	-Executing agencies	-Implementation of supportive actions to the populations in order to leverage the impact
Associations and NGO	• Provide support for the study • Implementation of awareness-raising	-Executing agencies	-Implementation of supportive actions to the populations in order to leverage the impact
Task team	• Provide support for the study • Implementation of awareness-raising	-Executing agencies	-Monitor the implementation of the activities and their updates during and after the completion

Grievance Mechanism for the stakeholders

The Grievance mechanism has been developed (check under ESRMP in Annex 6) for the beneficiaries of the project to address or report any complaints or discrimination directly to the Designated Authorities, Implementing entity (WMO) and funding agency (Adaptation fund). The participants have been made aware of this Grievance Mechanism during several consultation carried out in the project preparation phase. There are several means (using emails, social media or through posts) through which one can report the concerns they may have or find during activity design and implementation phase. A dedicated telephone number will be available 24*7 so that the concerns are reported anytime and can be addressed in a short time. In addition, complaints/grievances books will be provided at the level of the focal point of VBA, GWP, the main towns of rural communities, the sub-prefectures, prefectures office. At the end of every activity, there will be a feedback mechanism through short survey questionnaire to receive comments or suggestions from the participants (individually or in groups) so as to improve the shortcomings in future activities. The response and feedback to any concerns will be carried out in a transparent and effective manner, making sure that the identity of the person will be kept confidential, if requested.

These grievance mechanisms will be made available to all communities (or additional mechanism will be identified during the course of the project) especially to consider the special needs of different groups as well as have gender sensitive approach in the project area.

At the Implementing Agency level, the grievance mechanism will be regularly monitored for the complaints from the beneficiaries or stakeholders who will share their feedbacks directly through the post mail, phone, fax or email using the below details.

World Meteorological Organization
Associated Programme on Flood Management /Integrated Drought Management Programme
7bis, avenue de la Paix
Case Postale No. 2300
CH-1211 Geneva 2, Switzerland
Tel.: + 41 (0) 22 730 81 11
Fax: + 41 (0) 22 730 81 81
E-mail: wmo@wmo.int, floodmanagement@wmo.int ; droughtmanagement@wmo.int.

Moreover, the form at https://public.wmo.int/en/about-us/contact-us can be filled for reporting and to receive prompt action or fulfil the needs of the beneficiaries.

The complaints can also be directly submitted to the secretariat of Adaptation Fund at the following address:
Adaptation Fund Secretariat/Board
c/o Global Environment Facility
MSN P-4-400 1818 H Street NW
Washington DC 20433 USA
Tel: +1.202.478.7347
Fax: +1.202.522.3240
Email: afbsec@adaptation-fund.org

The complaints reported or received will be handled by the project coordination and management unit, who will investigate firstly through an on-site visit. The visiting committee may invite other relevant agencies (local/national/transboundary) to participate in the investigation. During the investigation, the root causes of the risks or issues will be identified and the concerned individuals or agencies responsible for correcting or resolving the issue will be assigned. The committee will produce a report of its findings such as causes of issues, involvement of concern agencies, time taken to resolve, recommendations and actions. Complainants may request or will be sent a copy of the reports related to the complaint. All the complaints (if received any) and measures taken will be stored in a database of the project coordination and management unit and will also be reported to Adaptation Fund along with the yearly progress report.

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

Monitoring and Evaluation (M&E) measure the overall progress and impact of the project activities through Key Performance Indicators (KPI). They will be monitored regularly to identify the achievements or insufficiencies, therefore supporting the development of additional strategies to achieve the targets. M&E tool will be made available for project activities, as well as programme management.

Monitoring and evaluation arrangements for the project activities
A monitoring and evaluation system will be developed to support the project management and decision-makers team in designing, implementing and adjusting the program activities. The overall (short, medium and long term) impact of the planned activities will also be assessed using the resources, methodologies or tools etc. The monitoring and evaluation arrangements will have a gender disaggregated system of data collection (baseline and target to be achieved as established in the context of the results framework of the project) and reporting for each of the project outcomes and component.
The M&E arrangements will be structured and organized at various level of institutional set-up such as:

Institutional level	Responsible Actors	Baseline Data before the start of the activity, (gender-inclusive data)	Indicator	Target based on project-result framework	End-Result with means of verification
Local level	Project	- No of	-No. of local	- Planned	Updated M&E

Monitoring and Evaluation Activities	Manager, Local Staff of Agencies (NMHS, Water Resources, Disaster Management), National External M&E expert	participants (including women) has previously attended capacity development workshops/trainings or involved in consultation - Access to the Hydro-meteorological, climate related data and information	staff and community members selected and trained for responding to impacts of, climate-related events	number[75] of people who now have better resilience to climate change events and variabilities - Pilot tests are organized and conducted as planned	checklists with the local project progress reports (LPPR) through semi-structure interviews or focus-group discussions, field visits consultation, activity report
National level Monitoring and evaluation activities	Project Manager, National staff, International M&E expert	-No of participants (including women) has previously attended capacity development workshops/trainings or involved in consultation -information from national assessment on vulnerability, capacity, exposure and ecosystem services conducted previously -number of people having received early warning information for floods and drought	-Percentage of targeted population are aware of predicted adverse impacts of climate change on ecosystem sustainability, and of appropriate responses - Data and information for risks maps and climate scenarios are available and collected -number of people receives early warning information	-Planned number of people with reduced risk to extreme weather events -Planned number of citizen and agencies staffs are trained on various activities of the project -70-80% of floods and drought events are foreseen as planned and adequate preparedness measures are taken by the beneficiaries	National project activities progress reports (NPPR) through semi-structured interviews or focus-group discussions, hardware and software procured, installed or developed, activity report, field visit monitoring
Regional Level Monitoring and Evaluation (mid-term and terminal evaluations)	Project Coordinator, National agencies director, Member of Advisory	-National level data and information are shared to the region level	-National level data and information are available and integrated at the scale of Volta Basin	- Availability of flood and drought risk maps and climate scenario	Regional project activities progress reports (RPPR) through semi-

[75] The accurate target for each of the separate activities will be determined with the local agencies and communities representatives.

	committee, International M&E expert	- Availability of EWS for the Volta Basin region before the project - number of awareness campaign conducted or tools developed	-Progress in the development of early warning systems - Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis	-Designed and development of VoltAlarm EWS. -Percentages of population in Volta Basin have access to or receive early warning system information. Revised or new policies, plans or guidelines on climate change adaptation and disaster risk reduction	structure interviews or focus-group discussions, hardware and software procured, installed or developed, activity report

The monitoring and evaluation assessment of the activities will be conducted regularly with the local, national and regional agencies and communities after which a report will be prepared to track progress made since the start of the project's and in particular from the previous reporting period. The reporting includes, but is not limited to, on the following:

Report content	Additional Description
Progress on the project's objective and outcomes – each with indicators, baseline data and end-of-project targets;	aggregated, gender disaggregated, percentage of change
Project outputs delivered per outcome (quarterly, half-yearly and yearly);	Activities completed for each output in the reporting period as compared to planned
Lessons learned/good practice and challenges;	Check or assess the real benefits to the stakeholders or challenges encountered
Progress on work plan and expenditure reports; and	Update on the work plan and use of funds
Project risk and adaptive management.	Any grievance or risk encountered during the period, any measures taken
Any other information as required	

Monitoring and evaluation arrangement for Project Management

The Project Management Unit (PMU) will be made available with monitoring and evaluation tools of project activities and resources. The PMU under the implementing agencies will ensure that the executing agencies have adequate resources and capacity to measure and monitor results at the local, national and transboundary level. The quarterly monitoring and annual evaluation reports of the executing agencies along with the financial statements and resource management will be submitted to the implementing agencies and further to the Adaptation Fund Secretariat for the review.

Monitoring and Evaluation reports for project activities and management:

Quarterly report	Monitoring will be carried out after each quarter and reports will be prepared with key results achieved, issues encountered or potential problems and proposed solutions.
Annual Report	Annual report will be prepared to monitor the progress in the time period of twelve months. This will be useful to monitor progress made in different activities. The annual report will be presented by the project leader to the project steering committee to assess the overall progress and provide their suggestions or feedbacks.
Mid-term Assessment Report	The project will conduct the mid-term review after two years of kick-off to get the feedback of project stakeholders and external experts.
Final Evaluation or Project Termination Report	Two months prior to the completion of the project, an independent evaluation will be conducted to check the overall impact of the project. The final evaluation report will be developed and presented to the Adaptation Fund secretariat, project steering committee and other stakeholders.

The M&E activities with their budget are shown in the table below:

Monitoring & Evaluation Activity List	Accountable Parties (short name)	Timeline																Budget (USD$)
		2019				2020				2021				2022				
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Design, development and review of the Monitoring and Evaluation tools	WMO/GWP-WAF/VBA	■																8000
Monitoring the project activities and outputs (quarterly)	GWP-WAF/VBA	■		■		■		■		■		■		■		■		30000
Improvement or additional changes in the Monitoring tool	WMO		■															2000
Monitoring the activities and reporting the project outputs (every six months)	WMO/GWP-WAF/VBA		■		■		■				■		■		■			20000
Mid-term Evaluation of the project activities and assessing the progress	WMO/Members of Project advisory committee with the support of GWP-WAF/VBA								■									15000
Improvement or additional changes in the Evaluation tool	WMO									■								4000

Final evaluation and reporting (before the completion of project)	WMO/GWP-WAF/VBA																	15000
Final Project Audit	WMO/ Members of Project advisory committee with the support of GWP-WAF/VBA																	12000
Total Cost for M&E																		106000

Additionally, M&E tools for both project activities and project management following the Adaptation Fund (AF) and WMO standards will be developed and made available to the national stakeholders participating in the Inception meeting. This will be useful also to finalize and agree on the baseline data and end line targets of the project activities.

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

The results framework of the project defines the key performance indicators (KPI) and means of verification for every component and its activities. The KPI will be used during the monitoring and evaluation to assess the progress and divulge any scope for improvements. The national agencies from the each of the six country have been identified (check Annex 5 for the list of agencies who will be participating) and will be involved in the implementation of each activities.

Table: Project Result Framework

Objectives	Components related activities	Overall Baseline situation	Key performance Indicator (with Gender disaggregated)	Target to be achieved	Methods of Verification	Assumptions for each outcome
The Volta project will strengthen community resilience through integrated approach for flood and drought management and support to decision-making. It will also improve livelihood and minimize loss of lives through the establishment of an end-to-end early warning system as well as capacity development on climate change adaptation measures The project will further develop synergies between	**Component 1:** Assessment of the VCERs, development of the floods and drought risk maps (pluvial and fluvial) and integration of climate scenarios into the action plans. **Component 2:** Support to develop early warning systems for floods, and drought. Capacity development for strengthening knowledge and awareness related to climate change adaptation measures (Flood Green Guide and gender mainstreaming). **Component 3:** Revision of the transboundary governance plans, policies and guidelines and their links with the national climate	Number of floods and drought disasters without adequate and integrated management Increasing growth of populations losing interest in agriculture based economic activities Lack of investment for concrete measures developing resilience to climate change Insufficient understanding of VCERs, shortage of hydro-meteo infrastructures and resources Lack of participation of Volta Basin countries at the national and transboundary level for flood and drought management	• Degree of improvement in populations' resilience to floods and drought events • Quantitative details for the reduced number of the deaths and damage to assets and environment •Local /national agencies and communities are trained on climate change adaptation measures for floods and drought and mainstreaming of gender • Percentage of households (including female-headed households) with improved livelihoods or economic benefits	• Development of the risks map and end-to-end web-based early warning systems for floods and drought events. • 70% of floods and drought events are foreseen and adequate preparedness measures are taken by the beneficiaries • Climate scenarios are mainstreamed into national plans and decision-making tools. • More than 1000 individuals from communities, agencies and organizations are trained	• Web-based monitoring system for floods and drought • Monitoring and evaluation reports • Field visits reports • Success stories from the pilot testing • Workshops and trainings participation lists, • Multi-media channel report • Community of Users • Amendment to plans, policies and guidelines documents.	Availability of Resources (information, infrastructures, human resources etc.) Selection and participation of people from the agencies and communities who have shown interest to participate Representatives of the national hydrological and meteorological agencies use the products and services delivered in future work or projects. Political conditions of the countries and support for the transboundary organization (VBA)

the beneficiary countries by supporting the transboundary governance helping in participatory management of water and natural resources while contributing to climate change adaptation strategies.	adaptation agreements.	Unavailability of IT equipment's, trained resources for data and information management and sharing.	•Policies and guidelines at national and transboundary level for flood and drought management are better integrated and action plans are developed.	through various workshops and are expected to disseminate knowledge and tools to other stakeholders. • National and transboundary agencies are trained and water and natural resources policies and guidelines are developed		
Component 1: Develop capacity and established frameworks at the local, national and regional levels to ensure risk Informed decision-making						
Outcome 1.1 Improved knowledge of risks, climate change impacts and risk management capacities through knowledge sharing and participatory mechanisms	Desk study, Field study, Finding information from the available reports, documents etc.	The existing reports and documents doesn't have information on Floods and Drought risks mapping for the Volta Basin and its consequences on human and natural resources.	Development of Flood and Drought risks maps for the Volta Basin region	Availability of Flood and Drought risks maps for risk-informed decision making	Web-based risks maps, Field visit reports, and Monitoring and Evaluation reports Social media posts/reports	Beneficiaries will implement the techniques and tools which are disseminated and used in other regions Active involvement of stakeholders and availability of information
Output 1.1.1 Inventory of information on vulnerabilities, capacities, exposure and risks (VCERs) for floods and drought	Conduct a study and meetings to gather available information on vulnerabilities, capacities, exposure and risks (VCERs) in the Volta Basin	There is a lack of updated and integrated information on Floods and Drought related VCERs for the Volta Basin region	Percentage of baseline information on vulnerabilities, capacities, exposure and risks will be made available for the	The existing data on vulnerabilities, capacities, exposure and risks will be collected and made available	Reports with information on vulnerabilities, capacities, exposure and risks of the Volta Basin region.	

in the Volta Basin is conducted			Volta Basin region	for developing risks maps.	Communication documents	
Output 1.1.2 Database of VCERs, floods and drought related risk maps are developed	Data management and analysis; Select and develop database which contains data related to VCERs, hydrological and meteorological at the local/ national /regional level. Volta Basin regions classified under Flood and Drought probability Index	No database and risk maps are available for Floods and Drought events at the Volta Basin region The Volta Basin lacks updated classifications of the regions according to Flood and Drought risks.	Progress in terms of developing the database and risk maps (zones) on VCERs of Volta Basin (Percentage of basin surface area) The data from different countries will be made compatible highlighting the missing data and information of respective countries	The VCERs database and flood and drought risk maps (risk zones) for the Volta Basin will be developed with the available data; Metadata of VCERs will be available	Technical report of the activity, Monitoring and Evaluation reports, Meeting reports Software and database	
Output 1.1.3 Capacity of stakeholders to use Floods and Drought risk maps is enhanced	Conduct workshops/training session to disseminate the knowledge on VCERs and Flood and Drought risk maps	The risks related to Floods and Drought are not well identified and are not taken into account by the different actors of Volta Basin	Number of workshops are organized for the dissemination of knowledge on VCERs and Flood and Drought risk maps Number of women trained	Atleast one workshop per country will be organised to disseminate knowledge on VCERs database and Flood and Drought risk maps 1 transboundary level consultation workshop with National Focal Point (NFP)	Reports of consultation workshops Feedback report of the workshops Guidelines for organizing consultation workshops and documentation	

Output 1.1.4 Reports and communication documents on vulnerabilities, capacities, exposure and risks (VCERs) and Floods and Drought risk maps of the Volta Basin are available	Produce draft report of vulnerabilities, capacities, exposure and risks (VCERs) and Flood and Drought risk maps in Volta Basin region.	Report on the VCER and Flood and Drought risk maps are not available for various actors concern by climate change adaptation and disaster risk reduction	Progress in the development of the VCER and Flood and Drought risk maps report	First report on VCER and Flood and Drought risk maps is made available for the six countries	Report on VCERs and Flood and Drought risk maps	
Outcome 1.2 Bridging the gap in Adaptation measures to integrate future scenarios (economic, urban, climate, environment etc.) into current practices and knowledge	Develop future scenarios (socio-economic, urban, climate, environment etc.)	There is no prediction about the role of future scenarios on socio-economic, urban, climate and environmental conditions	Developing future scenario for the climate change variability and Floods and Drought events	Future scenarios are developed for the climate change variability and Floods and Drought events	Technical report of the activity Social media reports	Past data and informations are provided by the government agencies The output's will be considered along with inputs on the uncertainties and other sources of information
Output 1.2.1 Scenarios for socio-economic and environment development along with the climate change projections are collected	Past and future data and information on climate change are collected for developing future scenarios	There is no availability of future scenarios for socio-economic and environmental development related to the climate change projections	Progress in acquiring data and information on socio-economic, climate change projections for developing future scenarios	Data and information on climate change projection and environment development is available	Database and reports on climate change projections, Monitoring and evaluation report.	
Output 1.2.2 Projected impacts on water resources, urban	The qualitative or modelling data is analysed to assess the future scenarios	Lack of methodology to understand the impact of Flood and	Progress in terms of analysis of qualitative or modelled data	The future scenarios are developed and presented to	Project Technical reports, Periodic field	

development and bio-diversity and agricultural areas are analysed on the basis of future scenarios		Drought events on risks;	output	the stakeholders	survey, Monitoring and Evaluation reports	
Output 1.2.3 Impact on environmental indicators is evaluated for current and future scenarios	A tool-kit with environmental information for future risk management	Lack of strategy and action plans for managing environmental risks in the Volta Basin	Progress in terms of impact assessment, designing measures and identification of actors	A tool-kit is designed and developed for assessing environmental risks for current and future scenarios	Project technical reports, Monitoring and evaluation report	
Outcome 1.3 Risk Management strategies in short, medium and long term to be integrated into development plans (economic, social, environmental aspects)	Capacity development activities to disseminate risk management strategies	A knowledge tool to integrated risk management strategies into development plans is unavailable for the policy-makers of the Volta Basin countries	Participation and training of the relevant stakeholders (Number of women involved) on risk management strategies and action plan	Capacity development of relevant stakeholders and assigning roles and responsibilities	Project technical reports, Monitoring and evaluation report	Training/ Consultation workshops will provide staffs with the capacity to integrate climate resilience strategies into development plans or actions.
Output 1.3.1: Guidance documents for stakeholders are developed to raise awareness about the future scenarios	Desk study, Finding information from the future scenarios, documents etc.	There are no reports or guidance documents available for future scenarios of climate change projections on socio-economic and environment in the Volta Basin region.	Guidance document on future scenarios for the Volta Basin region will be developed for the transboundary level	Availability of Guidance document for risk-informed decision making on future scenarios due to the climate change projections.	Guidance document Social media posts/reports	

Output 1.3.2: Capacity of stakeholders to use future scenarios and to develop action plans is enhanced	Capacity development activities with the national level policy-makers	National stakeholders lack knowledge and tools to mitigate or manage risks due to Floods and Drought events.	Number of workshops are organized for the dissemination of risk management strategies and action plan for their integration into development plans	Atleast one workshop per country will be organised 1 transboundary level consultation workshop with National Focal Point(NFP) An action plan is available with roles and responsibilities of the relevant actors	Reports of consultation Workshops including list of participants Feedback report of the workshops	
Component :2 Develop concrete adaptation and environmentally friendly actions with an integrated approach						
Outcome 2.1 Improved flood and drought forecasting instruments and Early Warning Systems (EWS) and coordination at the transboundary level to reduce disaster risks in vulnerable communities	Floods and Drought Forecasting and Early Warning Systems	There is lack of forecasting and early warning systems for both Floods and Drought Agencies and populations are unaware of the relevance and utility of the Forecasting and EWS and how to use it	Progress in the establishment of Forecasting and EWS for Floods and Drought Number of beneficiaries (male and female – data disaggregated by gender) and regions are identified for forecasting and EWS	The Flood and Drought forecasting and EWS is operational At least 70 % of the Volta Basin region covered by Forecasting and EWS and there are used. More than 60% of the women have direct access to the EWS information	Project technical reports, Monitoring and Evaluation reports of EWS Social media reports	Government agencies, ministries are committed to actively participate in the design and development of EWS and to use the delivered information to address the impacts of climate change and variability

Output 2.1.1 Needs and existing resources of national and regional agencies staffs for web-based EWS are defined	Desk studies, meetings with the local/national agencies staffs of National Hydrological Services(NHS) and other stakeholders	There is a lack of skills and knowledge on the forecasting and early warning systems among the local and national staffs	Number of meetings and consultation workshops organised and conducted to understand capacities and needs of the NHS and other stakeholders	Meeting and consultation workshop are organised at the national and transboundary level	Consultation meeting reports Including list of participants	
Output 2.1.2 The operational centre for the VoltAlarm Early Warning System is established in synergies with the NMHSs and the Volta Basin Authority	Identification of the needs (rooms, equipment's, resources etc.) and establishment of the operational centre	There is no Early Warning System for Floods and Drought covering the entire Volta basin region	Progress in the identification of need and procurement of the resources (equipment's, staffs etc.)	The operational centre is established in consultation with NMHSs and Volta Basin Authority	Monitoring and Evaluation reports Inauguration and running of the operational centre	
Output 2.1.3 The historical and real-time hydrological data from the gauging stations are collected and the procedure to link with the meteorological data is defined	Hydro-meteo data for Volta Basin region are collected for forecasting and EWS	Hydro-meteo data are not available timely and as well not managed	Percentage of data collection, storage and management of each country	Compatible data are available from the respective countries for flood and drought forecasting and EWS	Data collection report, Data management unit is set-up at VBA Data sharing agreements between Meteo, Climate and Hydro services	
Output 2.1.4 Thresholds for Floods and Drought risk levels are selected for the various parts of the Volta	Desk study (Modelling and Analysis) to identify the thresholds for Floods and Drought risk levels linked with the environmental	Thresholds levels for the Floods and Drought risks linked with the environmental thresholds is not available for the	Progress in the development of thresholds levels for Floods and Drought risks linked with the environmental	Availability of the thresholds for Floods and Drought risks linked with the environmental thresholds in	Project technical reports Communication documents	

Basin and linked with environment thresholds	thresholds	Volta Basin region	thresholds	the Volta Basin region		
Output 2.1.5 The procedure for producing impact based forecasts for the sub-basins and vulnerable areas on a daily basis is defined	Data Modelling and Forecasts for Floods and Drought events based on risks maps	Adequate Floods and Drought Modelling and Forecasts are not available at the local and national levels in the Volta Basin region	Percentage of operationalization of Floods and Drought forecasting at the local and regional centres.	Modelling and Impact based forecasting of Floods and Drought are available at the local and national centres of the Volta Basin region.	Project technical reports Monitoring and Evaluation reports of the modelling and forecasting services	
Output 2.1.6 The web-based Early Warning dissemination interface for VoltAlarm is designed	Web-based Early Warning dissemination strategies for floods and drought are designed and developed.	Currently there are no forecasting and early warning techniques available for the communities and agencies of the Volta Basin region, which can be interpreted easily	Progress in the design and development of the early warning dissemination tool Percentage of the population (men, women, elderly, and youths) understanding the added-value of the early warning system	The web-based Early Warning dissemination interface is co-designed and developed so that the early warning information will reach more than 70 % of the communities in the Volta Basin prone to floods and drought events	Early warning design and development report Monitoring and Evaluation reports	
Output 2.1.7 Knowledge and awareness about VoltAlarm within the user groups are increased	Capacity development of stakeholders	Lack of knowledge on forecasting and EWS for Floods and Drought	Number of workshops are organised and conducted to develop capacities of the participants Percentage of the	Atleast 1 workshop per each country is conducted and participants (communities and agencies) have increased	Report of technical workshop Feedback report of the workshop	

			population understanding the added-value of the early warning system	knowledge and awareness.	Monitoring and evaluation report	
Outcome 2.2 Demonstration of the added value of the E2E EWS VoltAlarm through a series of pilot testing during monsoon and dry seasons	Pilot testing at Floods and Drought prone regions of the Volta Basin	Lack of medium and long-term adaptation measures with early warning system.	Pilot-tests are organised to assess the impact of tools and models developed	Atleast one pilot locations of each countries have been tested with developed tool and models	Pilot-tests technical report, Monitoring and evaluation report Social media reports	Selection of pilot sites with flood and drought events Agencies and communities continue to use the information provided by EWS and knowledge gained in the pilot tests Dissemination of the knowledge from pilot-sites to the entire region of the Volta Basin
Output 2.2.1 Pilot testing for a number of areas over the basin during the monsoon and dry seasons is performed	Forecasts and EWS for Floods and droughts are implemented during the monsoon and dry seasons	Agencies and Communities have limited knowledge about the forecasting and EWS for both Floods and Drought	Progress in the pilot testing (identification and selection of pilot tests, monitoring during the floods and dry season etc.) of forecasting and EWS Participation of various actors and stakeholders working for Floods and Drought	Pilot testing in atleast one locations of each riparian countries More than 80% of the participants benefits from the pilot-testing to understand their roles and responsibilities beneficiaries	Pilot-tests technical report, Monitoring and Evaluation List of participants to the pilot tests	

			management			
Output 2.2.2 Feedback from the series of pilot testing is collected	Assessing coordination and collaboration of actors and stakeholders Capacity development and communication outreach of stakeholders	Lack of coordination and collaboration between the actors and stakeholders.	Workshops are organised and conducted to develop capacities of the participants Development of the communication material	Atleast 1 workshop per each country is organised Success stories, best practices, lesson learnt are shared through various social media channels so as to reach broader audience.	Feedback report of the workshop Monitoring and evaluation report Booklet (Voices from the field) and communication documents	
Output 2.2.3 Development and implementation of community-based flood and drought management	Capacity development Identify, implement and evaluate the appropriate measures	Need for local flood and drought systems empowering the communities for enhanced hazard management	Progress in the identification and implementation of the local systems Number of people contributing and benefiting from the local systems	Atleast one local community in each country has measures and is using the tools and methodologies.	Community-based management manual Field visits reports Feedbacks from the stakeholders	
Outcome 2.3 Strengthened awareness of vulnerable people on hydrometeorological risks, prevention, preparedness, and response strategies through education programs using	Capacity development of stakeholders for hydro-meteorological risks management and green infrastructures	Lack of tools and awareness on mainstreaming gender and natural and nature-based solutions for flood management	Workshops are organised and conducted to develop capacities of the participants Number of women, youths are trained	Atleast 1 workshop per each country is organised 1 workshop is organised with national focal points of countries	Report of technical workshop Feedback report of the workshop Monitoring and evaluation report	In future, the countries are expected to plan, design and build natural and nature-based solutions for DRR and climate change adaptation measures after adequate EIA and

participative solutions						SIA studies. Participation of women, elderly and youths in the training/workshops and also in future activities of the End-to-End Early warning System for flood forecasting and flood and drought management, in general.
Output 2.3.1 Knowledge and capacity development using the Flood Green Guide (FGG)	Capacity development for natural and nature- based solutions for flood events	Lack of knowledge on natural and nature-based solutions for Floods	Number of workshops organised and conducted to develop capacities of the participants Number and type of local and national staffs selected for the training Number of women trained	Atleast 1 workshop per each country is organised	Report of technical workshop Feedback report of the workshop Monitoring and evaluation report	
Output 2.3.2 Capacity development based on the Training Manual for mainstreaming gender in the E2E-EWS-F and flood management .	Capacity development for mainstreaming gender in the E2E-EWS-F and flood management.	Lack of knowledge on mainstreaming gender in forecasting and early warning system for Floods	Workshops are organised and conducted to develop capacities of the participants Percentage of women participating in the workshops	Atleast 1 workshop per each country is organised	Report of technical workshop Feedback report of the workshop Monitoring and evaluation	

			with dialogue and advocacy Percentage of women with physical, social, political and economic empowerment		report	
Component 3: Strengthening policy and institutional capacity for integrated flood and drought management at the local, national and transboundary levels						
Outcome 3.1 Decision support and policy development for strengthening resilience at the local, national and transboundary levels of the Volta Basin	Decision support system and governance for the Volta Basin region	Unavailability of decision support system and policies for developing resilience to Floods and Drought	Workshops and meetings are organised	A decision support system framework and governance policies are established with the stakeholders	Reports of workshop and meeting Monitoring and evaluation report	The stakeholders of the project continue to show dedication towards revising, developing, adopting policies and action plans for better climate resilience and implement interdisciplinary approaches at national and regional level to integrate, tools techniques and practices
Output 3.1.1 The transboundary governance plans, policies and guidelines about long term flood and drought management are evaluated	(Desk study/Research) Transboundary governance related to water resources management, data and information sharing, development plans etc. Development of	Lack of strategic framework and information at the transboundary level for the management of water resources , floods and drought event	Desk study and meetings are organised and available baseline data and information is shared as supporting details Number of policies, plans and	The transboundary level information for water resources management, floods and drought management is available	Reports of the desk study	

	strategic framework for strengthening resilience and coping capacities		guidelines to be revised	Strategic framework at the transboundary level is available in consultation with the stakeholders		
Output 3.1.2 Awareness of policy-makers from the six countries on the key long-term strategies for floods and drought management and environmental impact is strengthened	Capacity development	Lack of knowledge and tools for the key stakeholders to manage flood and drought events at the transboundary level	Number of workshops organised and conducted to develop capacities of the participants (decision-makers, policy-makers) Number of women participating in the workshops	One workshop at the transboundary level is conducted. The present information gap and key long-term strategies are identified and disseminated	Reports of technical workshop Feedback report of the workshop Monitoring and evaluation report	
Output 3.1.3 Experiences of local communities on key long term strategies for floods and drought management are collected	Meetings/Consultation workshops with the direct and in-direct beneficiaries of the project	Lack of involvement of key-stakeholders in the development of key long term strategies for floods and drought management	Progress in the organising meetings or consultation workshops at local level Number of women, elderly, and youths consulted	More than 20 meetings or consultation takes place at various local region of the Volta Basin region. The discussion outcomes are drafted to improve the existing policies, plans etc.	Consultation or meeting reports	

Outcome 3.2 Strengthened capacities of actors and decision makers at national and transboundary level on long term risk management policies, plans and strategies	Capacity development of the stakeholders at national and transboundary level	Lack of knowledge, policies, plans and guidelines for the key actors to manage risks	Workshops are organised and conducted to develop capacities of the participants	The available policies, plans and guidelines are used and key long-term strategies are implemented	Reports of technical workshop Feedback report of the workshop Monitoring and evaluation report	Training/ Consultation workshops will provide decision-makers with the capacity to integrate climate resilience strategies into long term development plans or actions.
Output 3.2.1 Strengthened implementation of the revised, or new, climate adaptation plans (NAPA, NAP, NDC), policies and guidelines (on data and information exchanges) on issues related to risk reduction and Early Warning System (EWS)	Capacity development of the stakeholders from local/national and regional.	Limited knowledge and implementation of action plans, policies and guidelines for the risk management	Number of transboundary consultative workshop organised with the policy-makers and advisors	One transboundary consultative workshop is conducted with participants from each country of Volta Basin Climate adaptation plans (NAPA, NAP, NDC), policies and guidelines (on data and information exchanges) on issues related to risk reduction and Early Warning System are revised or developed and shared with the stakeholders for their	Reports of technical Workshop Monitoring and evaluation report	

				approval		
Output 3.2.2 Improved integration of national policies on long term risk reduction and climate adaptation into the transboundary Strategic Action Programme	Consultation meeting with the policy-makers of the six countries	There is lack of integration of national policies on long term risk reduction and climate adaptation into the transboundary Strategic Action Programme	Consultative meeting are organised so that new or existing plans, polices and guidelines on climate change adaptation and disaster risks management are integrated into the transboundary SAP.	Improved integration of national policies on risk reduction and climate adaptation into the Transboundary Strategic Action Programme (SAP) resulting in better management of water resources and flood and drought events at the national and transboundary level	Consultation meeting report	
Outcome 3.3 A collaborative process is developed to ensure those instruments and strategies are accepted by the local organization and communities and adapted to the local context	Collaboration with the stakeholders and direct and in-direct beneficiaries	Lack of consultation and collaboration with the direct and in-direct beneficiaries on the instrument and strategies for climate change risk management	Collaboration meeting is organised with the stakeholders (including community representatives, associations and civil authorities) Number of men, women, elderly, and youths consulted	One meeting in each of the Volta Basin countries is conducted and measures and plans are adopted to the local context	Consultation Meeting report	Relevant entities are willing to sustain long-term public consultation initiative, awareness strategies and to share experiences within national and across countries.
Output 3.3.1	Collaborative	Communities	Number of	Meetings are	Consultation	

Collaboration with local communities and organizations in defining the procedures and measures to manage risks and to adapt to climate change	workshop with the communities and organizations	knowledge and experience are not involved in the development of the policies and action plans for managing risks and climate change adaptation	meetings organised with the communities and organizations Number of men, women, elderly, and youths consulted	conducted and participants are provided with opportunities to share their views and perceptions on the policies and action plans Communities and organizations involvement in the designing and implementation of action plans is drafted	Meeting report Monitoring and evaluation report List of the consulted stakeholders	
Output 3.3.2 Collaboration with local communities and organizations in finalising the policies, plans and further adopting to manage risks	Participative consultation with the communities and organizations	Communities are not consulted and involved in the refining of the policies and action plans for managing risks and climate change adaptation	Number of meetings organised with the communities and organizations Number of men, women, elderly, and youths consulted	Meeting is conducted and approval or necessary changes suggested by the participants are considered	Consultation Meeting report Monitoring and evaluation report	

F. Demonstrate how the project aligns with the Results Framework of the Adaptation Fund

The Volta project will be in coordination with the Strategic Results Framework of AF

Project Objective(s)[76]	**Project Objective Indicator(s)**	**Fund Outcome**	**Fund Outcome Indicator**	**Grant Amount (USD)**
The Volta project will reduce vulnerabilities and strengthen community resilience through integrated approach for flood and drought management in the six Volta Basin countries, namely Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo; while providing support for decision-making in environmental and economic development against the climate change and variability	• Degree of improvement in populations' resilience to floods and drought events and increased capacities of national agencies on climate change • Staffs of the local /national Hydrological services and community representatives are trained on climate change adaptation measures for floods and drought events • Policies and guidelines at national and transboundary level for flood and drought management are better integrated and action plans are developed.	Assist developing-country Parties to the Kyoto Protocol that are particularly vulnerable to the adverse effects of climate change in meeting the costs of concrete adaptation projects and programmes in order to implement climate-resilient measures. Outcome 1: Reduced exposure at national level to climate-related hazards and threats	1. Relevant threat and hazard information generated and disseminated to stakeholders on a timely basis	7,920, 000
Project Outcome(s)	**Project Outcome Indicator(s)**	**Fund Output**	**Fund Output Indicator**	**Grant Amount (USD)**
Outcome 1.1: Improved knowledge of risks, climate change impacts and risk management capacities through knowledge sharing and participatory mechanisms	Flood and Drought risks maps for the Volta Basin region are developed which provide support for disaster risk preparedness and management	Output 1: Risk and vulnerability assessments conducted and updated at a national level	1.1. No. and type of projects that conduct and update risk and vulnerability assessments	1,142,500
Outcome 1.2: Bridging the gap in adaptation measures to integrate future scenarios (economic, urban, climate, environment etc.) into current practices and knowledge	Building awareness of future risks and impacts on economic, urban, climate, environment etc. due to climate change and variability	Output 6: Targeted individual and community livelihood strategies strengthened in relation to climate change impacts, including variability	6.1.1. No. and type of adaptation assets (physical as well as knowledge) created in support of individual or community-livelihood	175,500

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

			strategies	
Outcome 1.3: Risk management strategies in short, medium and long-term to be integrated into development plans (economic, social, environmental aspects)	Capacity development of relevant stakeholders for integrating risk management strategies into development plans with assigned roles and responsibilities	Output 7: Improved integration of climate-resilience strategies into country development plans	7.2. No. or targeted development strategies with incorporated climate change priorities enforced	182,000
Outcome 2.1: Improved flood and drought forecasting instruments and Early Warning Systems (EWS) and coordination at the transboundary level to reduce disaster risks in vulnerable communities	At least 70 % of the population in Volta Basin region has Forecasting and EWS and it is been utilized.	Output 2.2: Targeted population groups covered by adequate risk reduction systems	2.2.1. Percentage of population covered by adequate risk-reduction systems	1,649,000
Outcome 2.2: Demonstration of the added value of the E2E EWS VoltAlarm through a series of pilot testing during monsoon and dry seasons	Atleast one pilot locations of each Volta Basin countries have been tested with developed tool and models	Output 2.2: Targeted population groups covered by adequate risk reduction systems	2.1.2. Capacity of staff to respond to, and mitigate impacts of, climate-related events from targeted institutions increased	1,628,000
			2.2.1. Percentage of population covered by adequate risk-reduction systems	
Outcome 2.3: Strengthened awareness of vulnerable people on hydro-meteorological risks, prevention, preparedness, and response strategies through education programs using participative solutions	More than 300 participants are trained on hydro-meteorological risks, prevention, preparedness, and response strategies. These participants disseminate knowledge and tools to other stakeholders.	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	723,000
Outcome 3.1: Decision support and policy development for strengthening resilience at the local, national and transboundary levels of the Volta Basin	Strengthened plans, policies and guidelines documents with necessary amendments.	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	644,400
Outcome 3.2: Strengthened capacities of actors and decision makers at national and transboundary level on long term risk management policies, plans and strategies	Locals/national/regional stakeholders integrate risk management policies, plans into national and transboundary development plans.	Output 7: Improved integration of climate-resilience strategies into country development plans	7.1. No., type, and sector of policies introduced or adjusted to address climate change risks	209,600

Outcome 3.3: A collaborative process is developed to ensure those instruments and strategies are accepted by the local organization and communities and adapted to the local context	Risk management instruments and strategies is adapted and applied at the local level	Output 7: Improved integration of climate-resilience strategies into country development plans	7.2. No. or targeted development strategies with incorporated climate change priorities enforced	146,000

G. Include a detailed budget with budget notes, a budget on the Implementing Entity management fee use, and an explanation and a breakdown of the execution costs.

The total budget of the Volta project is estimated to USD 7.92 million to support implementation over the six riparian countries. Funding for project management is evaluated to USD 750,000. Additional funding of USD 670,000 is included to cover the expenses of the Implementing entity.

	Budget Plan													
Output	**Expected Output Description**	**Activities under Output**	**Type of Expenditure**	**Budget Notes**	**No of Units**	**Cost per unit**	**Total cost for the activity**	**Cost per each output**	**Cost for each outcome**	**Cost for each component**	**Y1 ($)**	**Y2 ($)**	**Y3 ($)**	**Y4($)**
Component 1: Develop capacity and established frameworks at the local, national and regional levels to ensure risk informed decision-making														
Outcome 1.1: Improved knowledge of risks, climate change impacts and risk management capacities through knowledge sharing and participatory mechanisms														
Output 1.1.1	**Inventory of information on vulnerabilities, capacities, exposure and risks (VCERs) for floods and drought in the Volta Basin is conducted**	1.1.1.1 Conduct a desk study and field visits (compilation of existing evidence-based past data (topographic maps, satellite images etc.), studies of extreme events, reports of disasters, etc.) to gather available information on VCERs and identify gaps or additional needs	Desk study and consultation meeting	1 and 2	7	11000	77000	368,000	1,142,500	1,500,000	77000			
		1.1.1.2 Develop an action plan to complement gathered information on the VCERs and fulfil technical gaps (maps, satellite data requirements)	Desk work	3	1	22000	22000				22000			
		1.1.1.3 Organize workshops/meetings with the relevant stakeholders working on risk management to select priority areas for community consultations	National Training/ Workshop	4	6	28,000	168,000				168,000			

		1.1.1.4 Conduct pilot field studies (focus group discussion and semi-structured interviews) with communities to identify the multi-dimensional drivers of vulnerability and risk (social, economic, ecological, cultural, political and infrastructural determinants of vulnerability) in the Volta Basin areas highly exposed to different hydrometeorological hazards	Field Visits- 10 field visits in each of the six country	5	60	1600	96000				96000			
		1.1.1.5 Draft the field studies reports and the Volta-atlas	Desk work	3	1	5000	5000				5000			
Output 1.1.2	**Database of VCERs, floods and drought related risk maps are developed**	1.1.2.1 Assess the available IT equipment (computers, servers, databases, etc.) andIT/GIS expertise at the VBA observatory, the NMHSs services and other relevantservices (e.g. Geographical Institute, Civil security, etc.). Purchase additionalequipment if necessary	Assessment study	6	6	2150	13000	490500			13000			
		1.1.2.2 Create the Volta Basin information exchange IT network by connecting the VBA	Equipment's procurement	7	1	10000	10000				10000			

		observatory and the national services												
		1.1.2.3 Develop the database and create the links with the existing databases for the collected information on VCER including the main driving hydro-meteorological parameters for floods and drought events (e.g. precipitation, water levels, temperature, soil moisture, soil type, etc.)	Other Contractual Service for Database(example: MCH database), software and server installation	8	7	41900	293300				293300			
		1.1.2.4 Develop web-based flood and drought risk maps using the VCER database and existing maps developed in Ghana through the past projects funded by the World Bank and the Global Environment Facility (see part G for more information)	Training/Work shop and development of web-based flood and drought risk maps	4	6	28200	169200				169200			
		1.1.2.5 Assign roles and responsibilities to the agencies and organisations forming a task team to regularly complement and improve the database and risk maps and also to monitor and report on the new updates	Technical Assistance	9	1	5000	5000					5000		

Output 1.1.3	**Capacity of stakeholders to use Floods and Drought risk maps is enhanced**	1.1.3.1 Organize training workshop for local professionals (hydrologists, disaster managers, GIS experts etc.) to convey knowledge and improve skills needed for using risk maps	National Training/ Workshop for 3-4 days	4	6	37000	222000				122000	100000		
		1.1.3.2 Organize joint workshops or fields visits for stakeholders to deliver knowledge on VCERs and Floods and Drought risk maps of Volta Basin and to gather feedbacks and suggestions for improvement	Field Visits	5	45	750	37000	274000				37000		
		1.1.3.3 Take advantage of community meetings to raise awareness of a larger number of Floods and Drought risk maps' beneficiaries, to discuss the potential indirect risks and to identify safeguard actions	Outreach and Communication	10	1	15000	15000					15000		
Output 1.1.4	**Reports and communication documents on vulnerabilities, capacities,exposure and risks (VCERs) and Floods and Drought risk maps of the Volta Basin**	1.1.4.1 Produce technical report on the added value, success and challenges of VCERs and Floods and Drought risk maps for the stakeholders and Adaptation Fund project technical	Desk work	3	1	7000	7000	10000				7000		

	areavailable	committee												
		1.1.4.2 Develop documentation for raising public awareness (infographics, videos, mobile phone applications, educational tools for children and students, etc.)	Outreach and Communication	10	1	3000	3000					3000		
Outcome 1.2: Bridging the gap in adaptation measures to integrate future scenarios (economic, urban, climate, environment,etc.) into current practices and knowledge														
Output 1.2.1	**Scenarios for socio-economic and environment development along with the climate change projections are collected**	1.2.1.1 Gather all available information on climate change scenarios from best scientific studies and global databases for the Volta basin and select the most relevant datasets	Desk work with Scientific Advisor Support on Climate Change	1 and 11	1	11000	11000	30000	175500		11000			
		1.2.1.2 Gather the data on input for socio-economic scenarios of the Volta Basin region over the next decades	Desk work with Consultation support	1 and 12	1	8000	8000				8000			
		1.2.1.3 Organize the data on climate and socio-economic predictions for further integration with VCERs and risk maps developed	Desk work	1	1	11000	11000				11000			

		under outcome 1.1												
Output 1.2.2	**Projected impacts on water resources, urban development, environment and agricultural areas are analysed on the basis of future scenarios**	1.2.2.1 For areas covered with hydrological and hydraulic models (White Volta, Oti for example) perform a series of runs using the future socio-economic and climate scenarios to determine changes in VCERs and risk maps	Desk study with Advisor support	1 and 13	1	11000	11000	31000			11000			
		1.2.2.2 For areas not covered with numerical models, carry out a first qualitative assessment of the possible evolution of VCERs and risk maps under future changes	Desk study with assessment studies	1 and 6	1	16000	16000					16000		
		1.2.2.3 Draft report with the methodologies and tools used for studying the impacts of future scenarios	Desk work	3	1	4000	4000					4000		
Output 1.2.3	**Impact on environmental and ecosystem services indicators is evaluated for current and future scenarios**	1.2.3.1 Define indicators related to environment conditions	Desk study with consultation support	1 and 14	1	15500	15500	114500			15500			
		1.2.3.2 Collect and process information for various environmental indicators	Desk study with consultation support	1 and 14	1	8000	8000					8000		

		1.2.3.3 Select thresholds and carry out analysis for current and future climate scenarios	Desk study with consultation support	1 and 14	1	18000	18000					18000		
		1.2.3.4 Identify 2 to 3 areas (Ramsar Bagré dam for example) with appropriate dataset onecosystem services to test the methodology	Field Visits with technical consultation support	5 and 14	1	18000	18000					18000		
		1.2.3.5Draft report with the methodologies and tools used for studying the impacts of environmental flow	Desk work	3	1	5000	5000					5000		
		Activity 1.2.3.6 Drafting an integrated basin-wide wetland policy to promote ecosystem services sustainability (aquatic/terrestrial transition zone (ATTZ)) and capacity building of relevant stakeholders.	National Consultation Workshops with Stakeholders	15	1	16000	16000					16000		
		Activity 1.2.3.7 Support for developing bankable national projects for promoting sustainable aquatic/terrestrial transition zone (ATTZ) for the depended bio-diversity	Desk work with technical advice	3	1	34000	34000					34000		
Outcome 1.3: Risk management strategies in short, medium and long-term to be integrated into development plans (economic, social, environmental aspects)														

Output 1.3.1	**Guidance documents for stakeholders are developed to raise awareness about the future scenarios**	1.3.1.1 Design and develop the guideline presenting the whole process of risk maps development and future impacts on VCERs assessment with examples of implementation on high vulnerable urbans and agricultural areas	Desk work	3	1	7000	7000	12000	182000			7000	
		1.3.1.2 Develop supplementary means of communication to reach a wider population (infographics, leaflets for schools, etc.)	Outreach and Communication	10	1	5000	5000					5000	
Output 1.3.2	**Capacity of stakeholders to use future scenarios and to develop action plans is enhanced**	1.3.2.1 Organize trainings and workshops with stakeholders (representatives of communities, local policy-makers and decision makers) to disseminate the information on future climate and risk changes and to obtain additional qualitative input on potential impacts for social, economic ad environmental development	National Training/ Workshop	4	6	25000	150000	170000				150000	
		1.3.2.2 Design capacity building courses for NMHSs improving their competencies to periodically perform scenarios and assessments	Desk work	3	1	10000	10000					10000	

		1.3.2.3 Develop safeguard action plan for risk management at medium and long term with the output from workshops and consultations with the stakeholders	Desk work	3	1	10000	10000					10000		
Component 2: Develop concrete adaptation and environmentally friendly actions with an integrated approach														
Outcome 2.1: Improved flood and drought forecasting instruments and Early Warning Systems (EWS) and coordination at the transboundary level to reduce disaster risks in vulnerable communities														
Output 2.1.1	**Needs and existing resources of national and regional agencies staffs for web-based EWS are defined**	2.1.1.1 Select the participants (hydrologists, meteorologists, IT and GIS experts, etc.) within the NMHSs and flood or drought related services (Defence, Agriculture, etc.)	Desk work	3	1	32000	32000	298000	1649000	4000000	16000	16000		
		2.1.1.2 Develop the curriculum on the basis of the capacity building documentationdeveloped by GWP and WMO for their programmes on flood and drought management taking into account hydro-meteorological and socio-economicconditions of target areas	Desk work and Field visits to perform need assessments at various locations (total of 20 target areas) of the Volta Basin region	3 and 5	1	195000	195000				100000	95000		
		2.1.1.3 Organize the training sessions at the transboundary level (with participants from each riparian country) including theoretical trainings and practical exercises	Regional Training/ Workshop	16	1	71000	71000					71000		

Output 2.1.2	**The operational centre for the VoltAlarm Early Warning System is established in synergies with the NMHSs and the Volta Basin Authority**	2.1.2.1 Define the needs related to facilities (rooms for developers, operational shifts, crisis communication, air conditioning, etc.), equipment (hard and software, including real-time connections), technical capacities, human resources (for daily activities and with additional resources during crisis)	Infrastructures Assessment study	17	1	21000	21000	535000			10000	11000		
		2.1.2.2 Buy, install and test the equipment needed to create and use the VoltAlarm EWS	Equipment/ software	18	1	146000	146000				30000	40000	76000	
		2.1.2.3 Develop capacity of the operational team in charge of VoltAlarm at the national services and at VBA (hydro-meteorological forecasters, IT specialists, communication officers, on-call teams, etc.) in continuous monitoring of the Web-based EWS	Regional Training/ Workshop	16	1	61000	61000					30000	31000	
		2.1.2.4 Write the operational manual including procedures and responsibilities	Desk work	3	1	17000	17000					10000	7000	
		2.1.2.5 Run and maintain the VoltAlarm system	Contractual Service for the website development/	19	1	290000	290000				150000	50000	90000	

			software											
Output 2.1.3	**The historical and real-time hydrological data from the gauging stations are collected and the procedure to link with the meteorological data is defined**	2.1.3.1 Make an inventory of the gauging stations with real-time data transfer (or pseudo real-time) in the Volta Basin and prepare descriptive sheets for each station (location, equipment, data series, etc.)	Desk work	3	1	56000	56000	325000			56000			
		2.1.3.2 Perform a field/desk study to check the availability and quality of the data and information related to runoff, rainfall and other relevant meteorological and agrometeorological data	Field Visits	5	60	174000	174000				40000	134000		
		2.1.3.3 Develop the database of hydro-meteorological parameters, or interconnect with existing platforms	Desk work	3	1	32000	32000				32000			
		2.1.3.4 Organize training for the NMHSs staff related to data collection, calibration and maintenance of equipment following WMO standards	Regional Training/ Workshop	16	1	63000	63000				63000			

Output 2.1.4	**Thresholds for Floods and Drought risk levels are selected for the variousparts of the Volta Basin and linked with environment thresholds**	2.1.4.1 Use topographic data, VCERs database, Floods and Drought risk maps to markout the boundaries of the basin, sub-basins, highly vulnerable areas	Desk work with consultation support	1 and 14	1	18000	18000	145000			5000	13000		
		2.1.4.2 Describe the thresholds for flood events and for drought period based on VCERs and risk maps for various risk levels (level 0: no risk, level 1: very low, level 2 : low, level 3: moderate, level 4: high) through consultations with technical services and local representatives supported by evidence-based experiences	Desk work with capacity building	20	1	67000	67000					67000		
		2.1.4.3 Define the values of the thresholds for floods and for drought events for each zone or area close to a gauging station, in relationship with past events	Desk work	3	1	30000	30000					30000		
		2.1.4.4 Link the environment threshold with the threshold of flood and drought	Desk work	3	1	30000	30000					30000		

Output 2.1.5	**The procedure for producing impact based forecasts for the sub-basins and vulnerable areas on a daily basis is defined**	2.1.5.1 For the areas with available forecast models in the sub-basins (e.g. White Volta, Oti), create the procedure to use the outputs of the existing models within the network of centers producing VoltAlarm (NMHSs and VBA)	Desk work with Technical Assistance	1 and 21	1	30000	30000	140000				30000	
		2.1.5.2 For the areas not covered with hydrological models, develop charts and graphs (with various standard icons and images) to define the flood and drought indicators using hydro-meteorological data from past events	Capacity development with Technical Assistance	1 and 20	1	44000	44000					44000	
		2.1.5.3 Write the software to collect the meteorological and hydrological forecasts and to calculate the daily warning levels for each of the sub-basin and vulnerable areas	Technical assistance	9 and 19	1	44000	44000					44000	
		2.1.5.4 Design and develop the interface to gather all individual warning levels on the main system at the VBA observatory	Desk work	19	1	22000	22000					22000	

Output 2.1.6	**The web-based Early Warning dissemination interface for VoltAlarm is designed and developed**	2.1.6.1 Organize consultations with the end-users from national and regional agencies and from communities to gather their expectations related to their future use of the prototype proposed on Figure 10 (background maps, zooms, types of graphs, location of evacuation centre, hospital, emergency centre, first-aid, etc.)	Regional Consultation workshop	22	1	87500	87500	140500				37500	50000	
		2.1.6.2 Develop and test the web-based dissemination interface	Desk work	3	1	25000	25000					10000	15000	
		2.1.6.3 Write the user guide to convey all available knowledge on the interface to the various groups of users (forecasters, IT staff, decision-makers, etc.)	Reporting and Documentation	23	1	28000	28000						28000	
Output 2.1.7	**Knowledge and awareness about VoltAlarm are increased within the user groups**	2.1.7.1 Carry out trainings and capacity development workshops with the NMHS professionals, local/national agencies and users of the web-based EWS	Regional Consultation workshop	22	1 (4-5days)	65500	65500	65500				10000	55500	

		2.1.7.2 Gather feedbacks, suggestions and scope for improvements from the workshop participants												
		2.1.7.3 Organize a workshop to discuss with the trained participants how similar risk maps and early warning systems can be developed for areas outside of the Volta Basin												
	Outcome 2.2: Demonstration of the added value of the E2E EWS VoltAlarm through a series of pilot testing during monsoon and dry seasons													
Output 2.2.1	**Pilot testing for a number of areas over the basin (Figure 8) during the monsoon and dry seasons are performed**	2.2.1.1 Finalize the selection of the pilot tests areas with the concerned agencies and communities on the basis of the draft list	Desk study with field visits	1 and 5	10	1800	18000	1182000	1628000			18000		
		2.2.1.2 Organize meetings on each of the pilot areas to assign the roles and responsibilities of the different groups of stakeholders during the tests and present the coordination and collaboration mechanism enabling first responders to receive and use efficiently the early warning information	Consultation Meeting	2	10	38000	380000						380000	

		2.2.1.3 Identify the good practices, challenges and limitations of products and services during the Flood and Drought events at each of the pilot testing locations	Field Visits and demonstration of EWS	24	10	75000	750000						750000	
		2.2.1.4 Raise awareness about the pilot testing using multi-media channels	Outreach and Communication	10	1	11000	11000						11000	
		2.2.1.5 Develop an action plan to further improve products and services after the pilot testing	Desk work	3	1	23000	23000						23000	
Output 2.2.2	**Feedback from the series of pilot testing is collected**	2.2.2.1 Organize national consultative workshops (participants from local/national agencies involved in Floods and Drought management) to share the knowledge (new methodologies, concepts and tools for effective forecasting and dissemination of early warnings) from the pilots tests	National Consultation meeting	15	6	28000	168000	212000				20000	148000	
		2.2.2.2 Collect feedbacks from the workshop participants highlighting their views and perception of developed products and services												

		2.2.2.3 Draft the series of reports on the experiences from the pilot testing and provide a summary of recommendations	Reporting and Documentation	23	1	25000	25000							25000
		2.2.2.4 Develop communication materials to disseminate the results of the pilot testing and describe the added value of VoltAlarm	Outreach and Communication	10	1	19000	19000							19000
Output 2.2.3	**Development and implementation of community-based flood and drought management**	2.2.3.1Conduct participative community consultations to identify and select the appropriate local measures or equipments(non-structural preparedness tools)	Local Consultation meeting	25	6	10000	60000	234000				60000		
		2.2.3.2 Develop and install the local measures as identified with the communities under activity 2.2.3.1	Equipment/ software	26	6	5000	30000						30000	
		2.2.3.3 Capacity building and formation of local community flood and drought management committees	Local Consultation meeting	25	6	5500	33000						33000	
		2.2.3.4 Development of community-based flood and drought management manuals including safety and safeguard measures for preservation of natural habitats,	Project Outreach Tool	27	6	6000	36000						36000	

		land and soil conservation, biological diversity												
		2.2.3.5 Organize meetings to share knowledge and experience of added-value of local measures or equipments	Local Consultation meeting	25	6	12500	75000						25000	50000
Outcome 2.3: Strengthened awareness of vulnerable people on hydro-meteorological risks, prevention, preparedness, and response strategies through education programs using participative solutions														
Output 2.3.1	**Knowledge and capacity development using the Flood Green Guide (FGG)**	2.3.1.1 Development of Training Curriculum of the FGG	Desk work	3	1	22000	22000	384000	723000		22000			
		2.3.1.2 Organize dedicated short courses (at least one per country) on the FFG approaches and concepts for targeted beneficiaries to disseminate knowledge on natural and nature-based solutions for flood management	National Training/ Workshops	4	6	48000	288000					100000	188000	
		2.3.1.3 Collect feedbacks from the workshop participants on their views and perception of FGG tools												
		2.3.1.4 Recommend actions to increase the use of natural and nature-based solutionsand environmentally friendly methodologies with the involvement of	Desk work	3	1	13000	13000						13000	

		localpopulation and aligning with the adaptation fund ESP principles												
		2.3.1.5 Conduct workshops to provide support for developing bankable project proposals (submission to the internal and external agencies in future) on natural and nature-based solutions for the flood events.	Regional Training/ Workshop (4-5 days)	16	1	61000	61000							61000
Output 2.3.2	**Capacity development based on the Training Manual for mainstreaming gender in the E2E-EWS-F and flood management**	2.3.2.1 Finalization of Training Manual for mainstreaming gender in the E2E-EWS-F and flood management after review from expertise groups (E2E-EWS-F and Gender) such as OPACHE, ICIMOD etc.	Desk work	3	1	32000	32000				32000			
		2.3.2.2 Organize and conduct workshops (at least one per country) on the Training Manual for mainstreaming gender in the E2E-EWS-F and flood management with potential participants from NMHSs, local policy-makers, civil authorities, women and community based organizations etc.	Regional Training/ Workshop (3-4 days)	16	6	47000	282000	339000				100000	182000	

		2.3.2.3Collect feedbacks from the workshop participants on their views and knowledge sharing on mainstreaming gender in E2E-EWS-F and IFM with other stakeholders												
		2.3.2.4 Recommend actions that would improve the participation of women and vulnerable groups into flood management and early warning	Checklists and awareness	28	1	25000	25000						25000	
Component 3: Strengthening policy and institutional capacity for integrated flood and drought management at the local, national and transboundary levels														
Outcome 3.1 Decision support and policy development for strengthening resilience at the local, national and transboundary levels of the Volta Basin.														
3.1.1	**The transboundary governance plans, policies and guidelines about long term flood and drought management are evaluated**	3.1.1.1 Conduct a desk study, and hold meetings with partners, to identify the status of climate and future socio-economic changes in the transboundary governance plans, policies and guidelines for flood and drought management	Desk study with consultation meeting	1 and 2	1	44400	44400	114400	644400	1000000	20000	24400		
		3.1.1.2 Develop a short report underlining the strengths together with the identified gaps and additional needs related to climate	Desk work	3	1	22000	22000				22000			

		and development impacts												
		3.1.1.3 Propose long-term actions for strengthening resilience and capacities at transboundary level to be implemented by VBA and the other regional agencies	Regional Consultation meeting	22	1	48000	48000				10000	38000		
3.1.2	**Awareness of policy-makers from the six countries on the key long-term strategies for floods and drought management and environment impact is strengthened**	3.1.2.1 Describe the network of the relevant policy-makers responsible for floods and drought management as well as other related fields (health, agriculture, ecosystem, forestry, soil and land management)	Desk work	3	1	27000	27000					27000		
		3.1.2.2 Organize and conduct national workshops to identify the gaps and needs in policies and plans with special attention on safeguard actions for minimizing direct and indirect risks arising from the project activities, and to highlight the key long-term strategies for floods and drought management	National Consultation meeting	15	6	41000	246000	303500				246000		

		3.1.2.3 Collect feedbacks and recommendation at national level and needs for interconnection with transboundary policies												
		3.1.2.4 Present the recommendations to the policy-makers and ministries	Consultation Meeting	2	1	30500	30500					30500		
3.1.3	**Experiences of local communities on key long-term strategies for floods and drought management are collected**	3.1.3.1 Draft a report with evidence-based experiences at local level	Desk work	3	1	22500	22500	226500				10000	12500	
		3.1.3.2 Organize and conduct local workshops to get a wider input of communities on possible solutions and arrangements for improving socio-economic developments	Field Visits	5	12	17000	204000						204000	
		3.1.3.3 Collect feedbacks and recommendation at local level and provide input on the needs for relationships to national policies												
Outcome 3.2 Strengthened capacities of actors and decision makers at national and transboundary level on long term risk management policies, plans and strategies														
3.2.1	**Strengthened implementation of the revised, or new, climate adaptation plans (NAPA, NAP, NDC), policies and guidelines**	3.2.1.1 Organize and conduct workshops to disseminate the revised, or new, plans, policies and guidelines on	Regional Consultation meeting	22	1	52600	52600	57600	209600				52600	

	(on data and information exchanges) on issues related to risk reduction and EWS	climate adaptation measures in the Volta Basin.												
		3.2.1.2 Collect feedbacks, suggestions and recommendations from the workshopparticipants on the links between activities of National Programmes and the Volta basin project												
		3.2.1.3 Identify roles and responsibilities of the individual organizations and define the coordination mechanism to improve the implementation of the climate change adaptation measures	Desk work	3	1	5000	5000						5000	
3.2.2	**Improved integration of national policies on long term risk reduction and climate adaptation into the transboundary Strategic Action Programme**	3.2.2.1 Launch national consultations in the six countries to gather feedback on the effective coordination between national and transboundary policies in the framework of floods and drought management and climate adaptation	National Consultation meeting and reporting and documentation	15 and 23	6	24000	144000	152000						144000

		3.2.2.2 Draft a report with recommendations from the consultations												
		3.2.2.3 Organize the dissemination of the report to policy-makers	Outreach and communication	10	1	8000	8000							8000
Outcome 3.3 A collaborative process is developed to ensure those instruments and strategies are accepted by the local organization and communities and adapted to the local context														
3.3.1	**Collaboration with local communities and organizations in defining the procedures and measures to manage risks and to adapt to climate change**	3.3.1.1 Conduct a desk study and consultation of local stakeholders to gather examples of best practices for flood and drought risk reduction and climate adaptation related measures	Desk study and local consultation meeting	1 and 25	1	26000	26000	45000	146000				10000	16000
		3.3.1.2 Develop capacity building documentation for local communities with the help of the local stakeholders	Reporting and Documentation	23	1	8000	8000							8000
		3.3.1.3 Draft report on recommendations from local communities	Desk work and Reporting and Documentation	3 and 23	1	11000	11000							11000

3.3.2	**Collaboration with local communities and organizations in finalizing policies and procedures to manage risks and to adapt to climate change**	3.3.2.1 Prepare a framework of safeguard actions for community involvement on long term disaster risk reduction with local stakeholders	Desk work	3	1	12000	12000	101000						12000
		3.3.2.2 Conduct community-based workshops with agencies, local communities and organizations to prioritize adaptation measures	Local community-based workshops	29	6	13000	78000							78000
		3.3.2.3 Collect feedbacks, suggestions and recommendations												
		3.3.2.4 Propose action plans at local and national levels to increase local participation	Desk work	3	1	11000	11000							11000
									Total	**6,500,000**	**1640000**	**1936400**	**2480600**	**443000**

Approximate distribution of the Total cost (USD) that will be devoted to each country and at regional level during the project period

Benin	**Burkina Faso**	**Cote d'Ivoire**	**Ghana**	**Mali**	**Togo**	**Regional/Transboundary**
700,000	1,200,000	700,000	1,200,000	700,000	700,000	1,300,000

Budget notes:

Budget Note	Budget Type cost	Budget Cost Description
1	Desk study	Incidental expenses of local/national agencies staffs for completing the proposed study;
2	Consultation Meeting	- Travel cost of national staff and DSA (2 person) for desk or field meetings (outside of home location) , -Logistical expenses for organizing meetings to complete the proposed study or assessment.
3	Desk work	-Costs includes fee for national or international consultant, (National consultant rate: 50-120 $ per day and International consultant rate: 250-400 $ per day, considering the experience and skills required) -Technical assistance from expertise for the development of user guide, -outreach and communication for designing and layout - Material costs including the purchase of topographic or satellite maps, satellite data etc.,
4	National Training/ Workshops	-Trainer/Facilitator travel (economy class tickets via train/flight) and per diem (200-300 $ per day) -Travel and DSA of local/national participants and project staff (total of 25-35 participants) - Incidental expenses such as stationery, printers etc. - Outreach and Communication material -Logistical costs to organize the meeting such as training centre rent, transportation cost to the training centre, WIFI etc.
5	Field Visits	-Cost of local/national staff travel and DSA for conducting field survey and meeting with the stakeholders, -Technical support cost of the international or national expertise -Logistical expenses to organizing meetings -Incident expenses including stationery and related costs
6	Assessment study	- Cost of Technical assistance (rate: 200-300 $ per day) - Travel cost of national staff and DSA (2 person) for field visits , - External consultant fee (rate: 50-100$ per day)
7	Equipment procurement	Procurement and installation of equipment's (including Server, UPS, personal computers, communication network equipment's)
8	Other Contractual Service	- Contracts with specialized institutions/agencies for supervision or technical support and oversight of the quality of flood and drought management activities Includes expert service fee for technical assistance, installation and maintenance of equipment's or infrastructures.
9	Technical Assistance	Expert fee for technical support to the project activities (rate: 100-300$ per day)
10	Outreach and communication	- Cost of Communication Support officer for the development of reports and outreach materials (infographics, posters, flyers) -Development of social media page and other medium (radio, television) to reach maximum users or/and -Knowledge repository and management of the project website
11	Advisor support	Subject matter expertise in climate change and variabilities (national advisor rate: 100-300 $ per day or international advisor rate: 200-350 $ per day)
12	Consultation support	Consultation support with subject matter expertise in Socio-economic conditions of Volta Basin (mainly from one of the Universities of Volta Basin Countries) daily rate: 100-200$ per day (to be hired for 10 days)
13	Operational Hydrological and Hydraulic advisor support	Subject matter expertise in operational Hydrology and Hydraulic (national advisor rate: 100-300 $ per day or international advisor rate: 200-350 $ per day)
14	Consultation support on environment and ecosystem services	Consultation support with subject matter expertise in environment and ecosystem services (daily consultant rate: 150-250$ per day (to be hired for 10-15 days)
15	National Consultation meeting	-Travel and DSA of local/national participants and project staff - Incidental expenses such as stationery, printers etc. - Outreach and Communication material -Logistical costs to organize the meeting such as meeting hall, transportation cost to the meeting hall
16	Regional Training/ Workshops	-Trainer/Facilitator costs and per diem (200-300 $ per day) -Travel and DSA of national participants and project staff (total of 25-30 participants) - Incidental expenses such as stationery, printers etc. - Outreach and Communication material -Logistical costs to organize the meeting such as training hall, transportation cost to the meeting hall, WIFI etc.

17	Infrastructures Assessment study	-Travel and DSA of national staffs of various agencies in the Volta Basin countries - Consultant and technical support cost (including Travel cost) for the development of assessment matrix, performing the assessment and compilation of collected data (daily rate of international consultant: 250-300$ per day) - Reporting and documentation cost
18	Equipment	Cost related to procurement and installation of equipment's (including Server, UPS, personal computers, communication network equipment's) (With licensed software if required) 1 PC costs: 2000 $ 9 PCS: (2000*9=18000)-each country 1 PC and 3 at VBA office (Transboundary level) 1 Server: 8500$ so 7 Server will cost: 59500$ 1 UPS: 3000$ so one each at six countries will cost :6*3000=18000$
19	Website development	-Development of the website through the contractual services to the third party and service support for the project period; -Cost also includes Network and server to host the website
20	Capacity Building workshop	- Desk work by national staff to develop risk levels and charts/graphs with the help of GIS consultant (International GIS expert rate: 250-300$ per day) - Technical expertise assistance for threshold and risk levels -Travel and per diem cost of the participants from national agencies and community representatives for the capacity development workshop - communication and outreach material to reach wider audience
21	Technical support to VoltAlarm EWS	-Technical assistance to the NMHS staffs to integrate existing or new open-source models with the database for impact-based forecasting - Travel cost related to the consultation meeting with the open-source model companies or organization - Contractual services to the companies or organization for technical support and training.
22	Regional Consultation meeting	-Travel and DSA of national participants and project staff - Incidental expenses such as stationery, printers etc. - Outreach and Communication material -Logistical costs to organize the meeting such as meeting hall, transportation cost to the meeting hall
23	Reporting and Documentation	-Cost of Technical assistance (rate: 200-300 $ per day) and consultant fee (check budget note 3 for rate) for compiling the reports prepared by local/national staff - Cost of information officer for designing and layout - Outreach costs such as printing of flyers, infographics, reports etc.
24	Demonstration of EWS	-Local field coordinators to be hired for the pilot testing of EWS (3-4 persons for each pilot sites with daily rate of 50-100$) -Travel and DSA of supporting national staff and technical advisors -Incidental expenses related to organizing meeting at the pilot locations (meeting room, miscellanous expenses)
25	Local Consultation meeting	-Travel and DSA of the project staff - Logistical arrangement for the consultation meeting (meeting centre) - Local language translator cost (daily rate is 30-30$ for the duration 30 days)
26	Equipment's for local data collection	-Rain gauge and river level measurement instruments -EWS information dissemination system (loud speakers, radio services, fuel for vehicles used for information dissemination) - Material costs for developing awareness
27	Project Outreach tool	-Consultant cost to develop local community-based flood and drought management manual in French and English language - Communication officer costs for design and layout - Awareness costs using flyers, posters etc to promote in other areas and decision-makers
28	Checklists and awareness	-Development and testing of checklists and tools for M&E through national external consultant - Outreach and communication cost - Post project assessment and success stories
29	Local community-based workshops	-Travel and DSA of the project staff - Logistical arrangement for the consultation meeting (meeting centre) - Local language translator cost (daily rate is 30-50$ for the workshop durations)

Implementing Entity Fee Breakdown			
Activities	**Responsibilities**	**Total USD ($)**	**Notes**
Overall coordination and management with Adaptation Fund Secretariat	Project Coordinator (P3) - 180000 USD per year	360,000	1.
Management of project implementation with the Executing agencies and project development with the Advisory Committee			
Financial management, including accounting and grant management to Executing entities and third parties		50,000	
Information and communication management		40,000	
Quality assurance including internal and external audits	2 times in a year- each at 8000 USD	64,000	2
Participation of WMO staff and advisor committee members to the project activities		50,000	3
Monitoring and Evaluation		106,000	4
Total		**670,000**	

Note 1:
The total contract for the project staff to be hired will be for the project period (4 years). The staff cost is for two years of the project. The other 50% (2 years) will be covered under the Executing Agencies fee of the project

Note 2:
-Ensure compliance with internal and external audit requirements
-Set out financial reporting (in compliance with WMO and Adaptation Fund standards)
-Ensure accountability and incorporation of lessons learned

Note 3: The travel and DSA costs of the participants from WMO and project advisory board to attend meeting or check the implementation of specific project activities

Note 4: Cost related to travel and daily allowances for the participants of M&E team including reporting and documentation. The M&E arrangements and responsibilities is provided under section III.D

Executing Fee Breakdown				
Entity	**Execution activity**	**Role**	**US$**	**Notes**
WMO	Project personnel	Project Coordinator (P3)-180000 USD per year	360,000	The staff cost is for two years of the project.
VBA		Project Manager at the VBA (transboundary level)- 50%- (48000 USD per year i.e. 100 %)	96,000	The other 50% will be covered by Technical Assistance for the project

				activities
GWP-WAF		Assistant Technical manager (35000 USD per year)	140,000	
VBA/GWP-WAF	Administration Costs		30,000	
VBA/GWP-WAF	Communication costs		20,000	
VBA/GWP-WAF	Inception Meeting		60,000	Planned for launching the project with the country partners and stakeholders
VBA/GWP-WAF	Advisor/steering committee meetings		44,000	The meeting is planned to be organized yearly through face-to-face or remotely at Volta Basin countries.
	Total		**750,000**	

H. Include a disbursement schedule with time-bound milestones.

Project Disbursement Matrix

	Upon signature of Agreement	**One Year after Project Start (a)**	**Year 3**	**Year 4**	**Total**
Scheduled date	January 2019	January 2020	January 2021	January 2022	
Project Funds	1640000	1936400	2480600	443000	6500000
Implementing Entity Fees (8.5%)	167500	167500	167500	167500	670000
Executions costs (9.5%)	187500	187500	187500	187500	750000
Total	**1995000**	**2291400**	**2835600**	**798000**	**7920000**

[a)] Use projected start date to approximate first year disbursement

Component/ Output/ Activities	Description	Timeline (I = milestones)															
		2019				2020				2021				2022			
		Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4
Component 1	Develop capacity and established frameworks at the local, national and regional levels to ensure risk informed decision-making																
Outcome 1.1	Improved knowledge of risks, climate change impacts and risk management capacities through knowledge sharing and participatory mechanisms																
Output 1.1.1	Inventory of information on vulnerabilities, capacities, exposure and risks (VCERs) for floods and drought in the Volta Basin is conducted																
Output 1.1.2	Database of VCERs, floods and drought related risk maps are developed																
Output 1.1.3	Capacity of stakeholders to use Floods and Drought risk maps is enhanced																
Output 1.1.4	Reports and communication documents on vulnerabilities, capacities, exposure and risks (VCERs) and Floods and Drought risk maps of the Volta Basin are available																
Outcome 1.2	Bridging the gap in adaptation measures to integrate future scenarios (economic, urban, climate, etc.) into current practices and knowledge																
Output 1.2.1	Scenarios for socio-economic development and climate change projections are collected																
Output 1.2.2	Projected impacts on water resources, urban development and agricultural areas are analysed on the basis of future scenarios																
Output 1.2.3	Impact on environmental and ecosystem services indicators is evaluated for current and future scenarios																
Outcome 1.3	Risk management strategies in short, medium and long-term to be integrated into development plans (economic, social, environmental aspects)																
Output 1.3.1	Guidance documents for stakeholders are developed to raise awareness about the future scenarios																

Output 1.3.2	Capacity of stakeholders to use future scenarios and to develop action plans is enhanced	
Component 2	Develop concrete adaptation and environmentally friendly actions with an integrated approach	
Outcome 2.1	Improved flood and drought forecasting instruments and Early Warning Systems (EWS) and coordination at the transboundary level to reduce disaster risks in vulnerable communities	
Output 2.1.1	Needs and existing resources of national and regional agencies staffs for web-based EWS are defined	
Output 2.1.2	The operational centre for the VoltAlarm Early Warning System is established in synergies with the NMHSs and the Volta Basin Authority	
Output 2.1.3	The historical and real-time hydrological data from the gauging stations are collected and the procedure to link with the meteorological data is defined	
Output 2.1.4	Thresholds for Floods and Drought risk levels are selected for the various parts of the Volta Basin	
Output 2.1.5	The procedure for producing impact based forecasts for the sub-basins and vulnerable areas on a daily basis is defined	
Output 2.1.6	The web-based Early Warning dissemination interface for VoltAlarm is designed	
Output 2.1.7	Knowledge and awareness about VoltAlarm within the user groups are increased	
Outcome 2.2	Demonstration of the added value of the E2E EWS VoltAlarm through a series of pilot testing during monsoon and dry seasons	
Output 2.2.1	Pilot testing for a number of areas over the basin during the monsoon and dry seasons is performed	
Output 2.2.2	Feedback from the series of pilot testing is collected	
Output 2.2.3	Development and implementation of community-based flood and drought management	
Outcome 2.3	Strengthened awareness of vulnerable people on hydro-meteorological risks, prevention, preparedness, and response strategies through education programs using participative solutions	

Output 2.3.1	Knowledge and capacity development using the Flood Green Guide (FGG)	
Output 2.3.2	Capacity development based on the Training Manual for mainstreaming gender in the E2E-EWS-F and flood management	
Component 3	Strengthening policy and institutional capacity for integrated flood and drought management at the local, national and transboundary levels	
Outcome 3.1	Decision support and policy development for strengthening resilience at the local, national and transboundary levels of the Volta Basin	
Output 3.1.1	The transboundary governance plans, policies and guidelines about long term flood and drought management are evaluated	
Output 3.1.2	Strengthened awareness of policy-makers from the six countries on the key long-term strategies for floods and drought management	
Output 3.1.3	Experiences of local communities on key long-term strategies for floods and drought management are collected	
Outcome 3.2	Strengthened capacities of actors and decision makers at national and transboundary level on long term risk management policies, plans and strategies	
Output 3.2.1	Strengthened implementation of the revised, or new, climate adaptation plans (NAPA, NAP, NDC), policies and guidelines (on data and information exchanges) on issues related to risk reduction and EWS	
Output 3.2.2	Improved integration of national policies on long term risk reduction and climate adaptation into the transboundary Strategic Action Programme	
Outcome 3.3	A collaborative process is developed to ensure those instruments and strategies are accepted by the local organization and communities and adapted to the local context	
Output 3.3.1	Collaboration with local communities and organizations in defining the procedures and measures to manage risks and to adapt to climate change	

Output 3.3.2	Collaboration with local communities and organizations in finalizing policies and procedures to manage risks and to adapt to climate change																

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

A. **Record of endorsement on behalf of the government**[77] *Provide the name and position of the government official and indicate date of endorsement. If this is a regional project, list the endorsing officials all the participating countries. The endorsement letter(s) should be attached as an annex to the project proposal. Please attach the endorsement letter(s) with this template; add as many participating governments if a regional project:*

République du **Bénin** - Mr Euloge LIMA, Directeur de la Gestion des Risques et de l'Adaptation aux Changements Climatiques, Ministère du Cadre de Vie et du Développement Durable	Date: August 03 2018
Burkina Faso – Mr Ambroise KAFANDO, Director General of Cooperation, Ministry of Economy, Finance and Development	Date: July 25 2018
République de **Côte d'Ivoire** – Mr Jean Douglas ANAMAN, Head of Adaptation Unit at National Climate Change Programme, Ministry of Urban Sanitation, Environment and Sustainable Development	Date: August 01 2018
Ghana – Mr Fredua AGYEMAN – Director for Environment, Ministry of Environment, Science, Technology & Innovation	Date: August 06 2018
République du **Mali** – Dr SEYDOU KEITA, Technical Advisor, Ministère de l'Assainissement , de l'Environnement et du Développement Durable	Date: July 25 2018
République du **Togo** – Mr Thiyu Kohoga ESSOBIYOU, Director of Environment, Ministry of Environment and Forest Resources	Date: August 03 2018

[77] 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.

MINISTERE DU CADRE DE VIE
ET DU DEVELOPPEMENT DURABLE
REPUBLIQUE DU BENIN

01 BP 3502 - 01 BP 3621
Cotonou
Tél. : + 229 21 31 80 45
dgec_mcvdd@cadredevie.bj

N°____06___AND-FA/MCVDD/SA

03 août 2018

Letter of Endorsement by Government

To:

The Adaptation Fund Board

c/o Adaptation Fund Board Secretariat

Email: Secretariat@Adaptation-Fund.org

Fax: 202 522 3240/5

Subject: Endorsement for Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin Basin

In my capacity as designated authority for the Adaptation Fund in Benin, I confirm that the above regional program proposal is in accordance with the government's regional priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change of Benin.

Accordingly, I am pleased to endorse the above project program proposal with support from the Adaptation Fund. If approved, the project program will be implemented by World Meteorological Organization (WMO) and executed by World Meteorological Organization (WMO), Volta Basin Authority (VBA) and Global Water Partnership (GWP) West Africa.

Sincerely.

Euloge Lima
Adaptation Fund National Designated Authority
Direction Générale de l'Environnement et du Climat
Tel: +229 95 93 77 00/ +229 97 89 54 15
Email: limeloge@gmail.com

BURKINA FASO

Unité – Progrès - Justice

Ministère de l'Economie, des Finances et du Développement

Direction Générale de la Coopération

ADAPTATION FUND

Letter of Endorsement by Government

Ouagadougou, 25 JUIL 2018

To : The Adaptation Fund Board
C/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: *Endorsement for Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin Programme*

In my capacity as designated authority for the Adaptation Fund in Burkina Faso, I confirm that the above regional programme proposal is in accordance with the government's regional priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Burkina Faso

Accordingly, I am pleased to endorse the above programme proposal with support from the Adaptation Fund. If approved, the programme will be implemented by World Meteorological Organization (WMO) and executed by World Meteorological Organization (WMO), Volta Basin Authority (VBA) and Global Water Partnership (GWP) West Africa.

Sincerely,

Ambroise KAFANDO
Adaptation Fund National Designated Authority
03 BP 7067 Ouagadougou 03
Tel: +226 25 31 25 50/+226 70 41 98 41
Email: ambkafando@gmail.com

MINISTRY OF ENVIRONMENT AND SUBSTAINAIBLE DEVELOPMENT

NATIONAL CLIMATE CHANGE PROGRAMME

REPUBLIQUE DE COTE D'IVOIRE

Union – Discipline – Travail

N° 00068 /MINEDD/CAB1 /PNCC/jda

Abidjan, le 01 AOUT 2018

Letter of Endorsement by Government of Côte d'Ivoire

To: **The Adaptation Fund Board**
c/o Adaptation Fund Board Secretariat
Email : Secretariat@Adaptation-Fund.org
Fax : 202 522 3240/5

Subject: Endorsement for Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin Programme

In my capacity as designated authority for the Adaptation Fund in Côte d'Ivoire, I confirm that the above regional programme proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Côte d'Ivoire.

Accordingly, I am pleased to endorse the above programme proposal with support from the Adaptation Fund. If approved, the programme will be implemented by World Meteorological Organization (WMO) and executed by World Meteorological Organization (WMO), Volta Basin Authority (VBA) and Global Water Partnership (GWP) West Africa.

Sincerely,

Jean Douglas ANAMAN
Head of Adaptation Unit at
National Climate Change Programme

MINEDD – Tel.: 22 44 10 84 – Fax.: 20 21 08 76 Cocody Riviera, Bonoumin

MINISTRY OF ENVIRONMENT, SCIENCE, TECHNOLOGY & INNOVATION

Our Ref: MESTI/IA/006/02

Tel: 0302 - 666 049
Fax: 0302 – 688 913/ 688 663
E-mail: info@mesti.gov.gh
Website: www.mesti.gov.gh

Republic of Ghana

Post Office Box M232
Ministries, Accra
Ghana

August 6, 2018

The Adaptation Fund Board
C/O Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.Org
Fax: 2025223240/5

ENDORSEMENT FOR THE INTEGRATING FLOOD AND DROUGHT MANAGEMENT AND EARLY WARNING FOR CLIMATE CHANGE ADAPTATION IN THE VOLTA BASIN

In my capacity as the designated authority for the Adaptation Fund in Ghana, I confirm that the, above regional programme proposal is in accordance with the government of Ghana's national priorities in implementing adaptation activities to reduce adverse impacts of , and risks, posed by climate change in Ghana

Accordingly, I am pleased to endorse the above project proposal with support from the Adaptation Fund. If approved, the programme will be implemented by World Meteorological Organization (WMO) and executed by World Meteorological Organization (WMO), Volta Basin Authority and Global Water Partnership (GWP) West Africa

Accept our assurance of the highest esteem

Thank you

MINISTRY OF ENVIRONMENT, SCIENCE TECHNOLOGY & INNOVATION ACCRA

FREDUA AGYEMAN
DIRECTOR (ENVIRONMENT)
FOCAL POINT FOR ADAPTATION FUND

MINISTERE DE L'ENVIRONNEMEN

DE L'ASSAINISSEMENT ET DU DEVELOPPEMENT DURABLE *-*-*-*-*-*-*-*-*-*-*-*-*-*-*-

SECRETARIAT GENERAL

REPUBLIQUE DU MALI

Un Peuple – Un But – Une Foi

ADAPTATION FUND

Letter of Endorsement by Government

To: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org Fax: 202 522 3240/5

Subject: Endorsement for Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin Programme

In my capacity as designated authority for the Adaptation Fund in Mali, I confirm that the above regional programme proposal is in accordance with the government's regional priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate change in Mali.

Accordingly, I am pleased to endorse the above programme proposal with support from the Adaptation Fund. If approved, the programme will be implemented by World Meteorological Organization (WMO) and executed by World Meteorological Organization (WMO), Volta Basin Authority (VBA) and Global Water Partnership (GWP) West Africa.

Sincerely

Bamako, 25 July 2018

Dr SEYDOU KEITA, Designated Authority

Technical Advisor

Ministry Of Sanitation, Environment And Suistainable Development
Dr Seydou KEITA Technical Advisor
Designated Authority For Adaptation Fund in Mali. Bamako / Mali

MINISTRY OF ENVIRONMENT AND FOREST RESSOURCES

DIRECTORATE OF ENVIRONMENT

REPUBLIQUE TOGOLAISE
Travail-Liberté-Patrie

N° 0485 /DE

Lomé, le 03 AOUT 2018

Telephone : (228) 22 21 33 21
Fax: (228) 22 21 03 33
Email: denv .togo@yahoo.fr
essobiyou@hotmail.com

Letter of Endorsement by Government of Togo

To : the adaptation Fund Board
C/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Subject: *Endorsement for integrating Flood and Drought Management and Early Warning for climate Change Adaptation in the Volta Basin programme*

In my capacity as designated authority for the adaptation Fund in Togo, I confirm that the above regional programme proposal is in accordance with the government's national priorities in implementing adaptation activities to reduce adverse impacts of, and risks, posed by climate in the region.

Accordingly, I am pleased to endorse the above programme proposal with support from the Adaptation Fund. If approuved, the programme will be implemented by World Meteorological Organization(WMO) and executed by World Meteorological Organization (WMO), Volta Basin Authority (VBA) and Global Wather Partnership (GWP) West Africa.

Sincerely,

Direction de l'Environnement Le Directeur

Mr. Essobiyou Thiyu Kohoga
Director of Environment

Version 2: September 03, 2018

B. Implementing Entity certification

Provide the name and signature of the Implementing Entity Coordinator and the date of signature. Provide also the project 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, commit to implementing the project in compliance with the Environmental and Social Policy of the Adaptation Fund and on the understanding that the Implementing Entity will be fully (legally and financially) responsible for the implementation of this project.
Jean-Paul Gaudechoux, Senior Programme Manager, Office of Development Partnerships, World Meteorological Organization Implementing Entity Coordinator

Date: 3/9/18	Tel. and email: +41 79 514 4261 jpgaudechoux@wmo.int
Project Contact Person: Giacomo Teruggi	
Tel. And Email: gteruggi@wmo.int +41 22 730 8354	

Annex

Annex 1: List of participants who attended the consultation workshop in Ouagadougou, Burkina Faso during 21-25th November 2017

Global Water Partnership West Africa

ATELIER REGIONAL DE FORMATION SUR LA GESTION INTEGREE DES INONDATIONS (GIC), SUR LA PREPARATION ET LE FINANCEMENT DES PROJETS SUR LA GIC DANS LE BASSIN DE LA VOLTA

Lieu : Salle de réunion de l'ABV

N°	Noms / Surname	Prénoms / Name	Emails / Téléphone / Phone	Fonction / Function	Structure	Signature 22/11/2017	Signature 23/11/2017	Signature 24/11/2017
1	WABI	Moudjahid A	+229 61001564 wmoudjahid@yahoo.fr	PFS-CCNUCC	DGEC / MCVDD			
✓ 2	NDJE L.	Balissibadi	+228 91127201 balissendjen@yahoo.com	Charge d'études	Direction des Ressources en Eau			
✓ 3	MEBA	T. Pagnibam	+228 90 16 33 91 joafjedno@gmail.com	Chef Division	Direction de l'Environnement/Togo			
✓ 4	ETSE	Komla E.	(+228) 90 15 29 99 getse_2000@yahoo.fr	Chef division	MERF			
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✓ 6	SABÉ	Fatoumata	+223 76219942 fatousabe@yahoo.fr	Chef DSGRE par intérim	MEE/DNH			
✓ 7	PLEAH	Sina Aly Badara	+22366782945	membre comité scientifique et Technique PNE	PNE-Mali			
✓ 8	KONE	Issa Fahiri	+223-66712210 issafahiri@yahoo.fr	GEF-OFP	MEADD - AEDD			

N°	Noms / Surname	Prénoms / Name	Emails / Téléphone / Phone	Fonction / Function	Structure	Signature 22/11/2017	Signature 23/11/2017	Signature 24/11/2017
9	TRAORE	Gaoussou	touramakaan@yahoo.fr	Chef Bureau	Mali-Météo	[signature]	[signature]	[signature]
10	BOATENG-GYIMAH	Maxwell	boatgyimax2@gmail.com	Exe. Secretary	CWP-Ghana	[signature]	[signature]	[signature]
11	KUSI-MANKAH	Ernest	eminkah@hotmail.com	Deputy Director	Hydrological Services Dept.	[signature]	[signature]	[signature]
12	BALDE	Alpha Oumar	balde782001@yahoo.fr	Chef de Division P.P. DB/OMVS	OMVS	[signature]	[signature]	[signature]
13	AMPOMAH	Benjamin	bjampomah@yahoo.com	Exec. Sec.	WRC, Ghana	[signature]	[signature]	[signature]
14	KOUADIO	Konan François	habiet777@yahoo.fr	Secrétaire Exécutif	PNECI	[signature]	[signature]	[signature]
15	GOMEZ	Bernard	bgomez@wmo.int +234-708 35 98874	OMM/WMO Representative for North Central & West Af.	WMO	[signature]	[signature]	
16	TERUGGI	GIACOMO	GTERUGGI@WMO.INT	SCIENTIFIC OFFICER WMO	WMO	[signature]	[signature]	[signature]
17	ZOKO	BAOUA SIMEON	zokobaoua@gmail.com	Chef SICO, Point focal ABV	DGPRE/MINEF	[signature]	[signature]	[signature]
18	OUEDRAOGO	Mahamadou	ouederc67@yahoo.fr	Chef service Réseau météo	ANAM-Météo BF.	[signature]	[signature]	[signature]

N°	Noms / Surname	Prénoms / Name	Emails / Téléphone / Phone	Fonction / Function	Structure	Signature		
						22/11/2017	23/11/2017	24/11/2017
19	BANDE EP TONDE	Adama F. S. Audrey	[illegible]audreytonde@gmail.com	Assistante juridique DP/GIRE	ABV	[signature]	[signature]	[signature]
20	ASSAO Abdoulkarim	Abdoulkarim	aassao@uemoa.int	Chargé des Ressources en Eau	Commission de l'UEMOA	[signature]	[signature]	[signature]
21	SALOU SOUMANA	Abdourahmane	+226 72 93 45 08 [illegible]	Chef de service Infrastructures et Communications	ALG	[signature]		
22	ETOH	Kudzo Séna Salomon	+228 90 24 87 25 etoh2001@yahoo.fr	Hydrologue/ Bassin OTI/Togo	MAEH/Togo	[signature]	[signature]	[signature]
23	ZAKPA	Galé, Frédéric	zakpafrede [illegible]	Sous-Directeur	MINEDD/ DLCC	[signature]	[signature]	[signature]
24	KONE	Diakaria	konediak@live.fr	Consultant Hydrologie OMM/AMN	MIE/ONEP	[signature]	[signature]	[signature]
25	SROHOROU	Bernard	srohorou@yahoo.fr	Chef Départ. [illegible] Environnement	SODEXAM DMN	[signature]	[signature]	[signature]
26	Ndiaye	Déthié S.	dethiesoumare@gmail.com	Consultant		[signature]	[signature]	
27	HOUANYE	K. ARMAND	a.hounanye@cgiar.org	Secrétaire Exécutif	GWP-AO	[signature]	[signature]	[signature]
28	SANOUSSI	Razaki	sanoussi.raz@gmail.com	DP-GIRE	ABV	[signature]	[signature]	[signature]

N°	Noms / Surname	Prénoms / Name	Emails / Téléphone / Phone	Fonction / Function	Structure	Signature		
						22/11/2017	23/11/2017	24/11/2017
29	BAZIE	Josiane	bamo.josiane@yahoo.fr	Assistante en Finances et Administration	GWP			
30	Nacoulma	Julien		Chauffeur	GWP-HC			
31	Nacoulma	Julien		Chauffeur	GWP-AD			
32	TAMAKLOE	Gloria	sahnokpokpo@gmail.com	hôtesse				
33	HIE	Batchéné	hiebatchene@gmail.com	Chargé de Programme	PNIE-BF			
34	GASCON	Tania	tgascon@wmo.int	project officer	WMO			
35	Wittwer	Caroline	cwittwer@wmo.int	joint project officer	WMO-CLW			
36	FOFANA	Rafaatou	fofraf2008@gmail.com	Hydrologue	ABV			
37	Daoumba	Frédéric A	frederic.daoumba@iucn.org	Chargé du programme en Suivi-Eval	IUCN-PACO			
38	JIOFACK FEUZE	Rollis Ernest	rollisjiofack@yahoo.fr	Etudiant Master Stagiaire	OMM			

N°	Noms / Surname	Prénoms / Name	Emails / Téléphone / Phone	Fonction / Function	Structure	22/11/2017	23/11/2017	24/11/2017
39	MILLOGO	Dibi	fredomill@yahoo.fr 00226 78349155	DEA	ABV			
40	Suleiman	Nura	nura@pegasys.co.za	Consultant	Pegasys			
41	Kane	Michael	michaelk@pegasys.co.za	Consultant	Pegasys			
42	TUMBULTO	Jacob	jwtumbulto@gmail.com	D/Observatoire	ABV			
43	CHABI-GONNI GP. VODOUNHESSI	B. G. Felicité	felicite.vodounhessi@gwp.org	chargée de Projet	GWP/HO			
44	BIDIMBOU	Sadjinamaou	agitine04@gmail.com	Chargée du Protocole et des Relations Publiques	ABV			
45	Diboni	Y. Faiti	dyblotia@outlook.fr	Hotesse	—			
46	DESSOUASSI	Y. Robert		Secrétaire Exécutif	ABV			
47	DAN	Mogbante			GWPAO			
48	HOUANYE	Armand		SE				

N°	Noms / Surname	Prénoms / Name	Emails / Téléphone / Phone	Fonction / Function	Structure	Signature		
						22/11/2017	23/11/2017	24/11/2017
49	YARO	Aguiratou	aguiratou.yaro@gwpao.org	RAF	GWP/AO			
50	OUEDRAOGO SOME	K.N. Reine Esther	gwp.westafrica@gwpao.org	AA	GWP/AO			
51	COULIBALY	Sidi	sidi.coulibaly@gwp.org	RCGC	GWP/AO			
52	BAZIE	Josiane	Dome.josiane@yahoo.fr	AFA	GWP/AO			
53								
54								
55								
56								
57								
58								

Annex 2: High level prototype screen-prints of the envisaged interface 'VoltAlarm' (Flood and Drought Informations with EWS)

Hydro-meteo VOLTALARM

alerting Volta Basin for extreme events

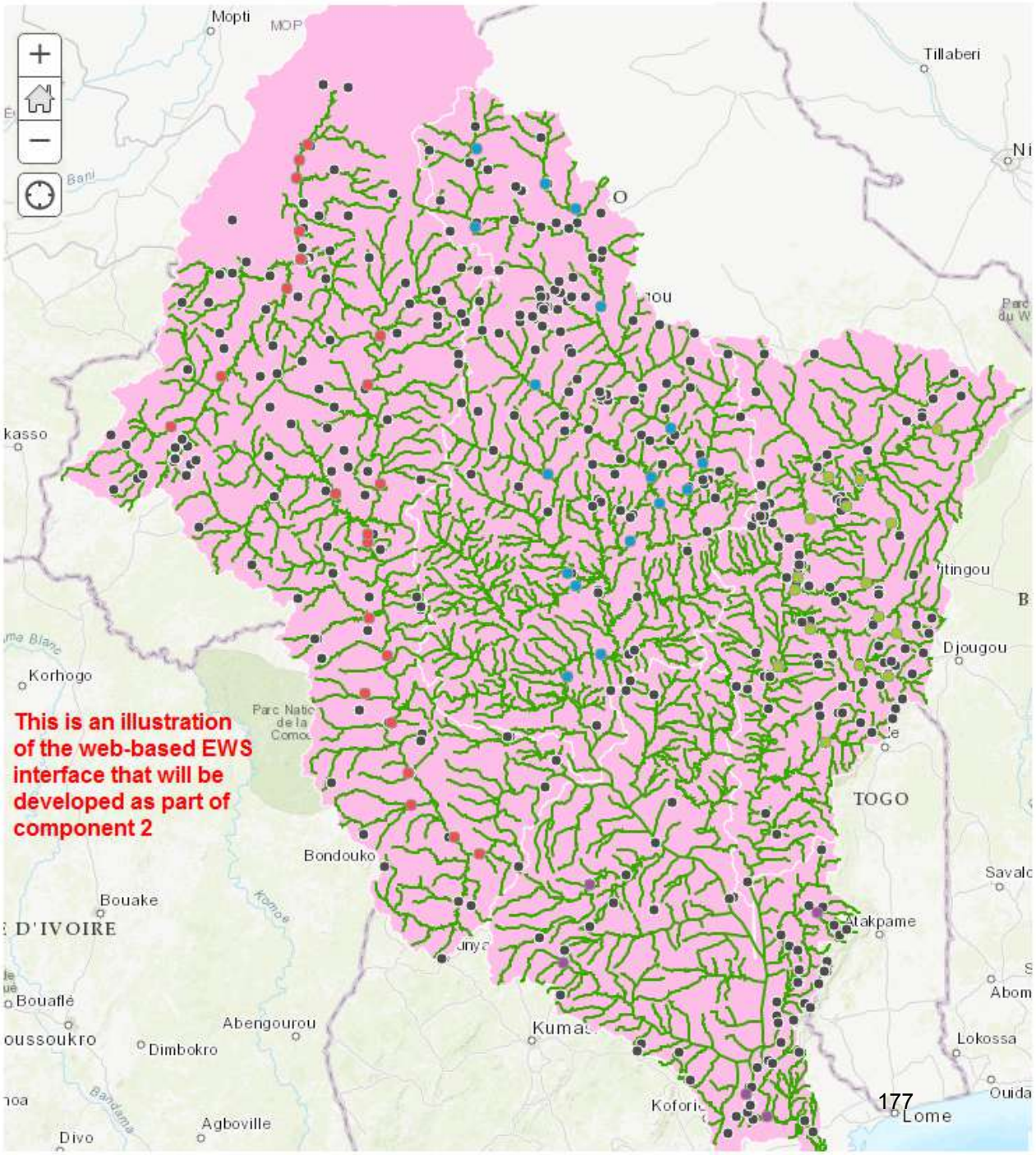
Carte des risques d'inondation ↓

Carte des risques de sécheresse ↓

BULLETIN
Cet après midi :
Très nuageux avec quelques averses à l'est.
Lire la suite

Version 2: September 03, 2018

Inscrivez-vous pour recevoir des alertes



Légende

Rouge :
Risque de crue majeure
Tout lire

Orange :
Risque de crue génératrice de débordements importants
Tout lire

Jaune :
Risque de crue génératrice de débordements Tout lire

Vert :
Pas de vigilance particulière requise.

stations_hydrometriques_volta_hycos

- Volta Noire
- Volta Blanc
- Oti
- Lower Volta
- River Stream

- **Rain**
- **Flood**
- **Rain-Flood**
- **Thunderstorms**
- **Extreme high temperature**
- **Extreme low temperature**
- **Coastal Event**
- **awareness typ not available**

If the icon on country level has a dark background: The country doesn't issue warnings for this awarness-level!

awareness types: all awareness types ▾ **Awareness Level »**

Contact | Mentions légales | Répertoire des informations publiques

Hydro-meteo VOLTALARM

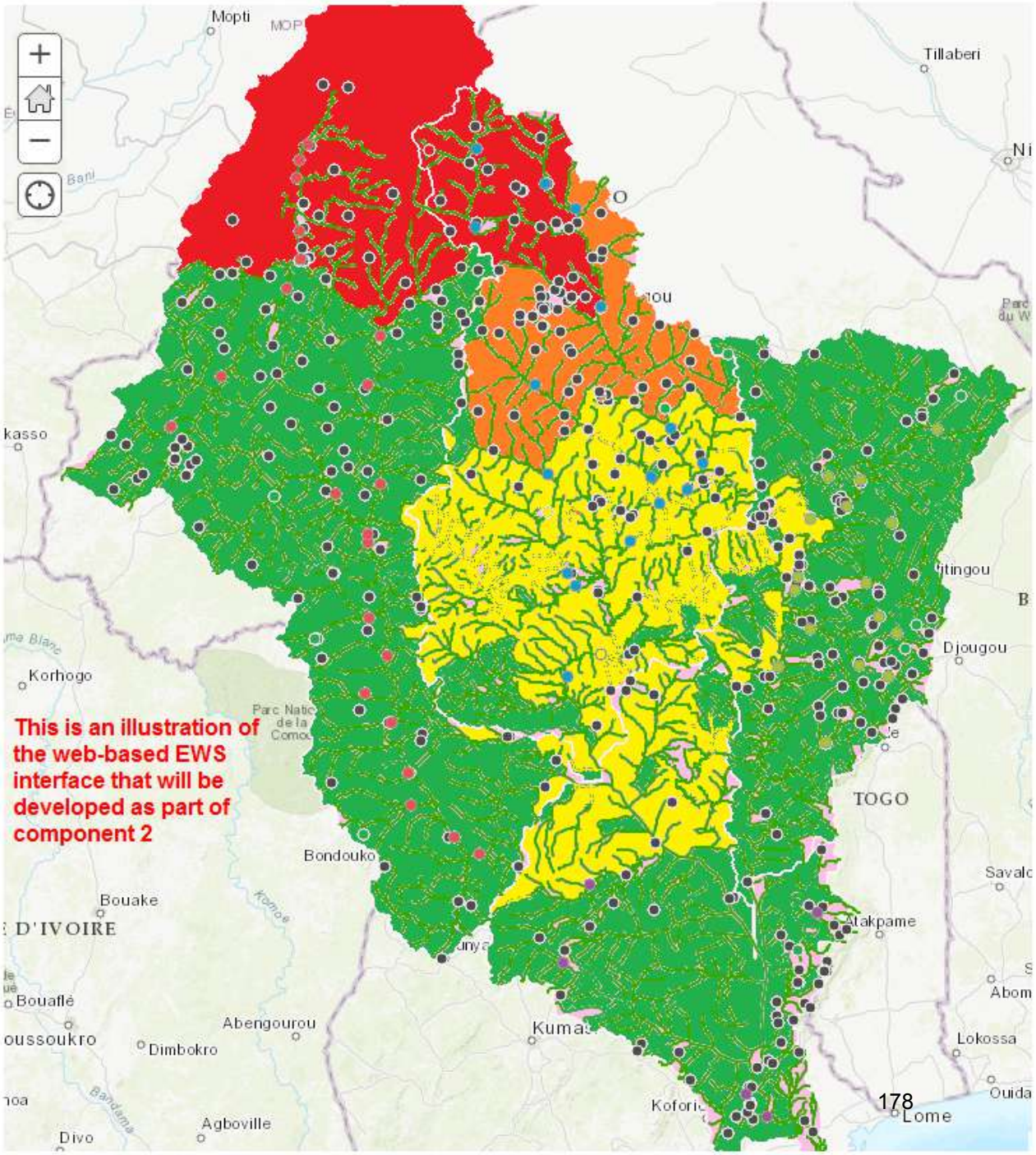
alerting Volta Basin for extreme events

Carte des risques d'inondation ↓

Carte des risques de sécheresse ↓

BULLETIN
Cet après midi :
Très nuageux avec quelques averses à l'est.
Lire la suite

Version 2: September 03, 2018



Inscrivez-vous pour recevoir des alertes

Légende

Rouge :
Risque de crue majeure
Tout lire

Orange :
Risque de crue génératrice de débordements importants
Tout lire

Jaune :
Risque de crue génératrice de débordements Tout lire

Vert :
Pas de vigilance particulière requise.

stations_hydrometriques_volta_hycos

- Volta Noire
- Volta Blanc
- Oti
- Lower Volta

River Stream

- **Rain**
- **Flood**
- **Rain-Flood**
- **Thunderstorms**
- **Extreme high temperature**
- **Extreme low temperature**
- **Coastal Event**
- **awareness typ not available**

If the icon on country level has a dark background: The country doesn't issue warnings for this awarness-level!

awareness types: all awareness types ▾ **Awareness Level »**

Contact | Mentions légales | Répertoire des informations publiques

Hydro-meteo **VOLTALARM**

alerting Volta Basin for extreme events

Carte des risques d'inondation ↓ | Carte des risques de sécheresse ↓

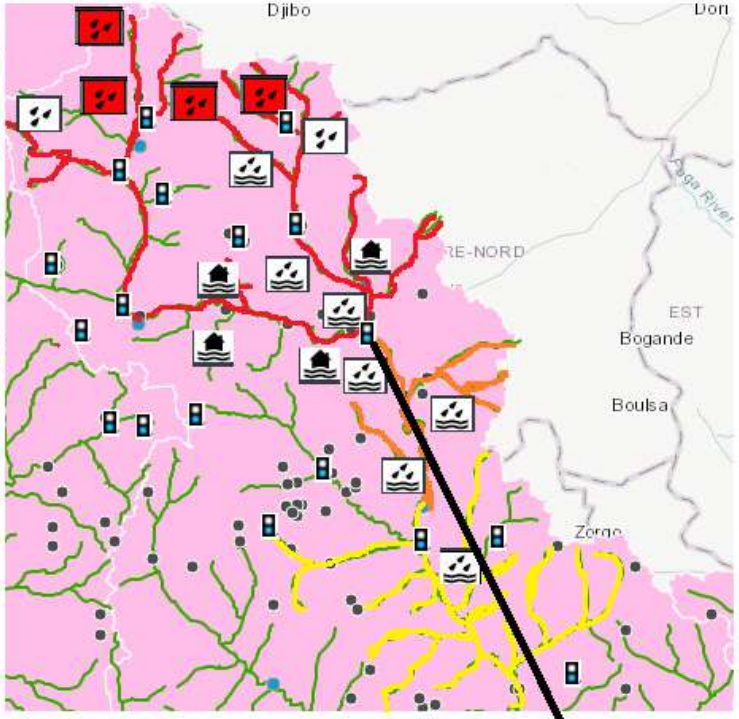
BULLETIN
Cet après midi :
Lire la suite

Version 2 - September 03, 2018

Inscrivez-vous pour recevoir des alertes

Flood Warning system for White Volta-Upper

Cliquez sur une zone grisée de la carte pour changer de page d'information. Cliquez sur un site de la carte pour afficher les niveaux des cours d'eau (symbole).



awareness types: all awareness types

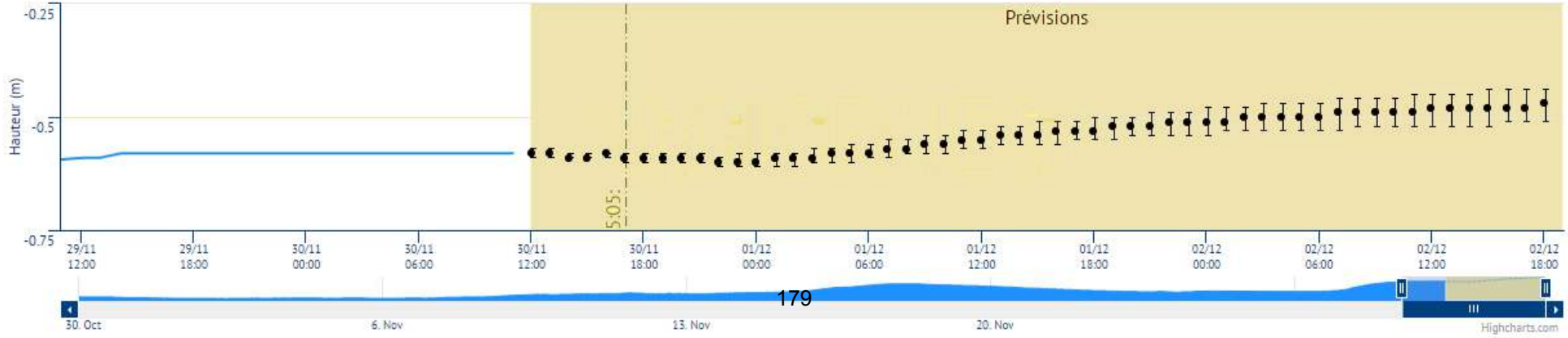
Display: today | tomorrow

This is an illustration of the web-based EWS interface that will be developed as part of component 2

Graphique | Observation | Prévision | Info station

Rechercher une station :

Afficher les données sur : 1 jour | 3 jours | 7 jours | 14 jours | 30 jours | Zoom initial



Hydro-meteo VOLTALARM

alerting Volta Basin for extreme events

Carte des risques d'inondation

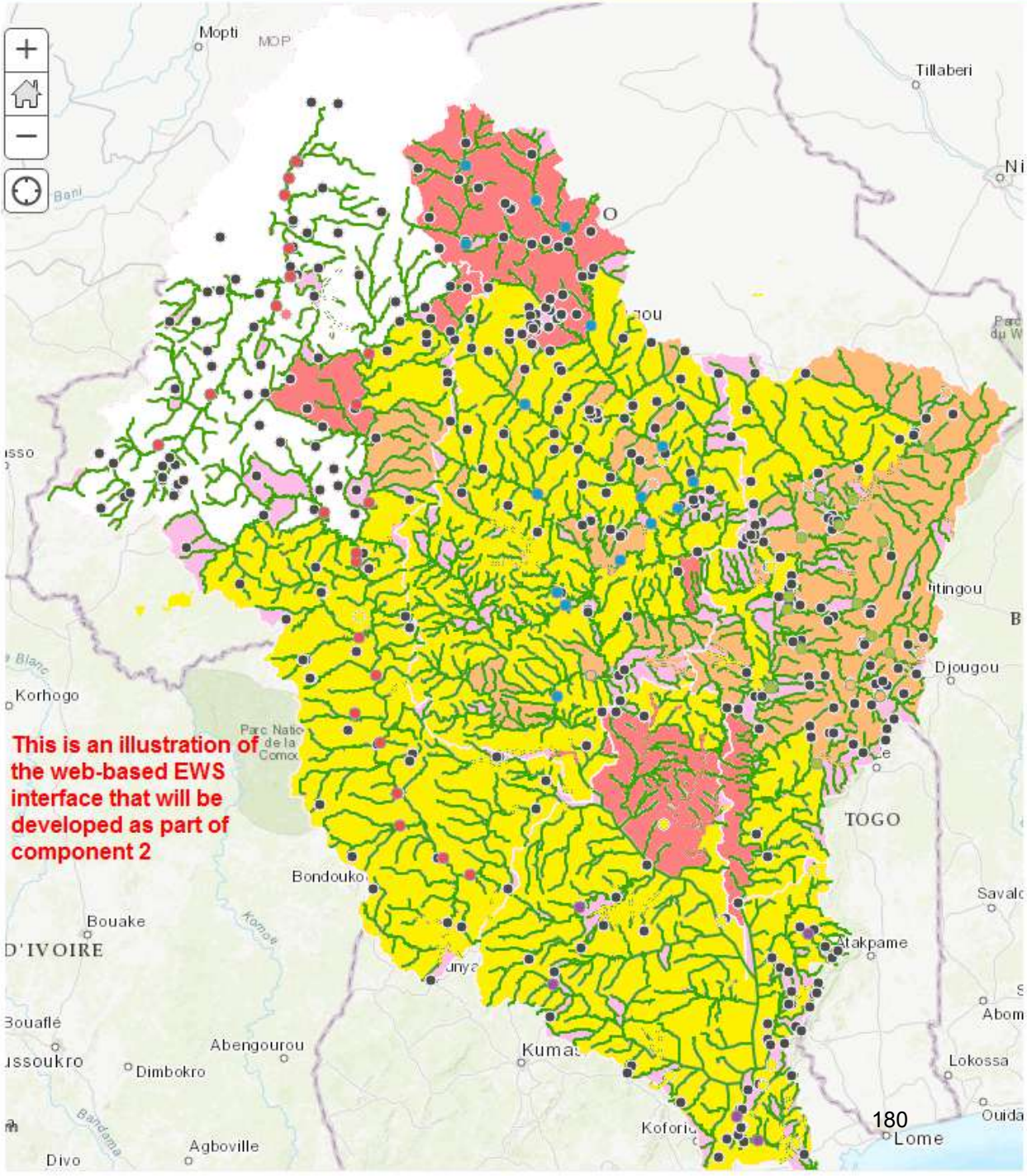
Carte des risques de sécheresse

BULLETIN
Cet après midi :
Très nuageux avec quelques averses à l'est
Lire la suite

Version 2: September 03, 2018

Inscrivez-vous pour recevoir des alertes

Carte des risques de sécheresse dans le bassin de la Volta



Légende

- Border
- No
- Low
- Medium
- High

stations_hydrometriques_volta_hycos

- Volta Noire
- Volta Blanc
- Oti
- Lower Volta

River Stream

Hydro-meteo VOLTALARM

alerting Volta Basin for extreme events

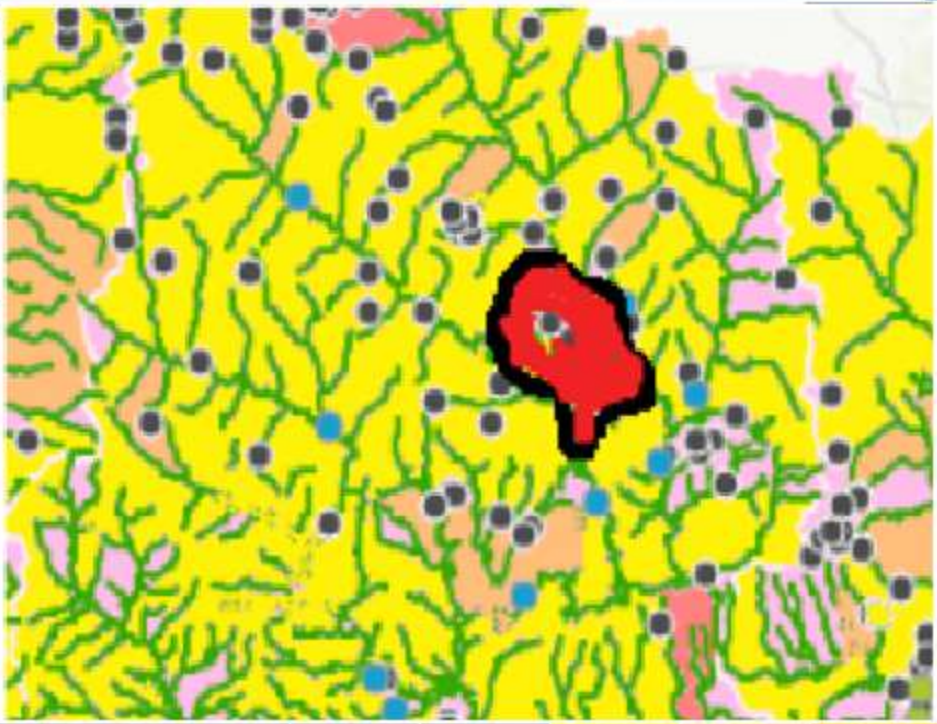
Carte des risques d'inondation

Carte des risques de sécheresse

BULLETIN
Cet après midi :
Lire la suite

Version 2: September 03, 2018

Inscrivez-vous pour recevoir des alertes



Intensity:

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

This is an illustration of the web-based EWS interface that will be developed as part of component 2

Warning

< 10

> 10

Week	Date	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
Current	2017-12-19	19.39	80.61	25.96	3.74	0.90	0.00	111
Last Week	2017-12-12	23.45	76.55	23.70	3.74	0.90	0.00	105
3 Months Ago	2017-09-19	43.98	56.02	28.58	10.93	1.33	0.06	97
Start of Calendar Year	2016-12-27	50.65	49.35	21.54	4.05	0.00	0.00	75
Start of Water Year	2017-09-26	56.15	43.85	21.11	8.37	1.32	0.06	75
One Year Ago	2016-12-20	44.85	55.15	22.68	4.68	0.00	0.00	83

Annex 3: Consultation meeting of the Executing Partners of the Volta Project

Minutes of the Meeting

The consultation meeting was organized between the World Meteorological Organization (WMO), Global Water Partnerships-West Africa (GWP-WAF) and the Volta Basin Authority (VBA) to review and discuss the draft budget plan prepared by WMO. There was a discussion on other activities needed for preparing the final project proposal which will be submitted to the Adaptation Fund for funding.

Day & Date: 21st June 2018
Start Time: 9:30 am Ouagadougou time
Meeting location: Volta Basin Authority Workshop Hall, Ouagadougou

List of participants attending the Consultation meeting:
Please check the attendance list at the end of the document

1. OPENING INTRODUCTION
Everyone introduced themselves to get familiarize with each other work responsibilities.

2. AGENDA TO BE DISCUSSED
- Presentation of the Volta objectives and work programme
- Discussion on the Ecosystem aspect of the project
- Long-term sustainability of the project
- WMO Meteorological, climatological and Hydrological (MCH) database
- Presentation by WMO of the tentative budget plan and timeline for achieving the milestones
- Discussion on the list of partners who will be implementing a part of the activities
- Monitoring and Evaluation
- Staffing/Resources
- Discussion on the work of the Consultant in charge of Environment and Social Impact Assessment study
- Any Other Business (AOB)

Points discussed during the consultation meeting

- Presentation of the Volta objectives and work programme
  WMO presented the list of deliverables and the number of activities that will be necessary to reach the goal of the project. This helped them to better understand the challenges that could be raised during the implementation and the role of the partnership.
- Discussion on the Ecosystem aspect of the project
  WMO briefed the partners about the ecosystem related activities which was proposed by Adaptation Fund especially concerning the flood-pulsed concept and the way bio-diversity in the basin could be preserved assessing the Hydrological requirements and how awareness could be raised through the project activities.
- Long-term sustainability of the project
  Long-term sustainability of the project activities were discussed with the executing partners especially the cost for maintenance and operation of VoltAlarm Early Warning System. VBA proposed to take care of the operation of VoltAlarm and incorporate it in the day-to-day activities of Volta Basin Observatory. VBA proposed National Meteorological and Hydrological Services (NMHSs) of the six countries to provide commitment of delivering Hydrological, Meteorological and Climatological data. The commitment letter for VBA and NMHS will be prepared and shared with VBA and NMHS of six countries. It is anticipated that VBA will also propose to include operational and maintenance costs in other future projects that will be linked to the early warning system developed under the Volta project.
- WMO Meteorological, climatological and Hydrological (MCH) database
  WMO presented the MCH database and its usefulness for the Volta project in developing floods and drought risk maps and Volta EWS. The executing agencies provided their feedback on the requirements of MCH installation and data from observing station and networks. WMO proposed to install MCH database in the six countries and one at a regional level for collection of Meteorological, Climatological and Hydrological data along with social and structural information as it will compatible and easily accessible. The executing partners will propose the MCH database to the National partners during the inception meeting of the project.
- WMO will present the tentative budget plan and timeline for achieving the milestones
  WMO presented the tentative budget plan and timeline for the project activities. The VBA and GWP-WAF asked for additional time in order to review and finalize the costs for the staff and resources. WMO will follow-up with VBA and GWP-WAF around 10th July.
- Discussion on the list of partners who will be implementing a part of the activities
  List of partners in each countries were finalized and the plan for consultation was proposed by VBA and GWP-WAF. The consultation with national partners was planned on 25th, 26th and 27th June 2018.
- Monitoring and Evaluation
  The need for regular monitoring and evaluation of the project activities and the roles and responsibilities of the executing partners and national stakeholders were discussed.
- Staffing/Resources

WMO, VBA and GWP-WAF discussed about the participation of the resources from the national partners (staff members of various departments such as NMHS, Environment, Civil protection etc.) who will attend the trainings and complete the activities during the implementation period.

- Discussion on the work of the Consultant in charge of Environment and Social Impact Assessment study
  The work progress of the consultation was discussed and also the next step to support his work and reporting. The consultant was asked for his availability for a face-to-face meeting on 22nd June 2018.
- Any Other Business

The WMO team asked about the arrangements of the field visits planned for the next days and prepared a methodology for discussing with the respondents (vulnerable, marginalized and minority citizens).

5. ADJOURNMENT The meeting was adjourned at 6:00 pm

Location: VBA office, Ouagadougou, Burkina Faso | Date: 21/06/2018

EXECUTING AGENCIES CONSULTATION MEETING – VBA/GWP/WMO

FIRST NAME	FAMILY NAME	ORGANIZATION	DESIGNATION	EMAIL	SIGNATURE
RAMESH	TRIPATHI	WMO	Associate Project officer	rtripathi@wmo.int	[signature]
Ayayi AJAVON	AJAVON	VBA	Traducteur	lanbiscut@yahoo.co.uk	[signature]
KONE M.H. Farida	KONE	VBA	Hydrologist	faridakone@gmail.com	[signature]
BELEMBOBGO Marc		ABV	Chargé de Communication	belemmarcel@yahoo.fr	[signature]
K Armand	HOUANYE	GWP-AO	Secrétaire Exécutif	armand.houanye@gwpao.org	[signature]
DESSOUASSI	Robert	DE/ABV	DE	dessouassi2003@yahoo.fr robertdessouassi@gmail.com	[signature]
FOFANA	Rafatou	ABV	Hydrologue	rafatoufofana.abv@gmail.com	[signature]
IOGO	VALENTIN	VBA	Specialiste IT & SIG, Admin Système	iogo.abv@gmail.com	[signature]
Bidimbeu	Sodjinamawu	ABV	Chargée du Protocole et des Relations Publiques	agtitine.ok@gmail.com	[signature]
Witthuer	Caroline	consultant (~~invited WMO expert~~)	invited expert	cwitthuer@wmo.int	[signature]

Annex 4- Consultation with the communities of the Volta Basin countries (Vulnerable, Marginalized, and Minority including women groups)

..

Minutes of the Meeting

A series of the consultation meeting with the communities and association/groups was organized by the Global Water Partnerships-West Africa (GWP-WAF), Volta Basin Authority (VBA) and World Meteorological Organization (WMO), to identify and collect information on their experience of existing early warning systems for Floods and Drought. Under the Volta project, the project is proposing to develop a system/tool to warn the citizens about the flood and drought events and the community individual suggestions on the proposed features will be useful during the design and development of EWS. The citizens will also have the opportunity to provide additional recommendations for the VoltAlarm system or in other areas which will improve their preparedness for floods and drought events (check below for the sample filled questionnaire).

First Consultation meeting: Mandouri, Togo

Day & Date: 23rd June 2018
Start Time: 9:00 am Togo time
Meeting location: Mandouri district, Togo

List of participants attending the Consultation meeting:
Please check the attendance sheet at the end of the document

Type of Consultation: Focus group discussion

1. OPENING INTRODUCTION

The meeting was opened by the prefect who also announced that the radio will be installed in a near future in the village. GWP-WAF, VBA and WMO staff introduced themselves with their work responsibilities to the participants. The Mayor of the Mandouri gave a brief introduction on the project and also the purpose of the meeting.

2. AGENDA TO BE DISCUSSED

- Presentation of the questionnaire on the existing EWS and proposed VoltAlarm system.
- Other issues concerning the management of floods and drought events
- Past and on-going projects in the region focussing on floods, drought and ecosystem
- Gender sensitive participation
- Any other Business

Points discussed during the consultation meeting

- Presentation of the questionnaire on the existing EWS and proposed VoltAlarm system.

The questionnaire developed (check below for unfilled sheet) before the meeting was presented to the group of participants. The participants provided their joint-response (check below sheet of the response) to each of the questions along with additional information which will be beneficial in the implementation.

After the presentation of the objectives, partnership, services involved in the future implementation of the Volta project, pilot sites (the downstream area of the Kompienga dam, with the area of Mandouri being part of them), the main activities (flood and drought risk maps, consultations at local level, development of warning system, capacity building), the audience provided comment on the current situation and expressed their needs and issues:

- The first flood occurred in 1984, in the past the frequence was every 7 years but since a while they are more frequent even though the fields outside of the fluvial zone stay dry. The role of the water release from the Kompienga dam needs to be understood as it is creating tensions
- Floods are only generating negative impacts, how is it feasible to manage the agricultural production in the lower areas in between the floods in order to provide food and revenue for the population?

• Agricultural production has changed since the floods, the former production made of ignam and sorgho was linked to little expenses and no fertilizers, now the production is made of corn associated to fertilizers and the need of rain before the flood
• The village is located in a risk area suffering a number of floods and a tool to warn the population is missing
• Flood events are occurring faster than before and the ancient way to deal with the events is not appropriate anymore and also more dangerous. Previous information about a flood event would help to be prepared and to act, for example collect even if the products are not fully ready
• Consultation have been conducted by the coordinator of natural hazard in Lomé, in order to convey information to women on the way to grow crops in the lower areas
• The population would like to understand why floods and drought are occurring together
• Shortage of water is now noticed since the month of January, this also creates health issues as the river water, which is the only available water resource during drought is not clean
• Due to flood, side effects are also impacting the daily life as the roads to the health centre are inundated.

- Other issues concerning the management of floods and drought events

People raised issues concerning the management of flood water as there is no proper channel pathway for the flowing water. The village gets inundated and its takes long time to recover back to pre-existing state. Also, people requested to provide support for developing economy such as Honey-comb conservation training as this was could preserve the Honey for long time and generate income for the people.

- Past and on-going projects in the region focussing on floods, drought and ecosystem
  The participants informed about the other disaster risk reduction projects in the region especially the recently completed project of Togo Red-cross.
- Discussion on the gender participation
  The participant provided information how gender sensitive approach will be beneficial to the women associations

3. ADJOURNMENT The meeting was adjourned at 11:00 am

Second Consultation meeting: Ramitenga village, Loumbila, Burkina Faso

Day & Date: 27th June 2018
Start Time: 10:00 am Burkina Faso time
Meeting location: Ramitenga village, Lombuila,

Visit to the townhall of Loumbila to meet General Secretary of the Mayors
The delegation met the General Secretary of the Mayors and the focal point for water and sewage system to exchange about the needs of the town related to flood and drought hazards and risks and on the Volta project objectives.

The commune has 31 villages and a population of about 35000 inhabitants out of 25% of them are suffering from floods. The lower areas close to the dam are inundated and this occurs more often than in the past, due to climate change. The villages are located close to the water and encounter problems on the roads during high precipitations. The access to Ouagadougou becomes difficult and this is problematic as the area is providing agricultural products for the markets of Ouagadougou. A lower productivity of the soils has also been noted. The community development plan is new and includes all relevant information about the issues to be solved for the community.
The city council will be supporting the Volta project as it is important to be able to educate the population, to inform on how to behave during extreme situations and to help in the development efforts.
The delegation explained that the visit will include consultations of the Matenga and Tabtenga villages to collect their views on flood and drought events and to discuss with them a short questionnaire related to the future implementation of the Volta project and especially its early warning system.
After the consultations visits at Ramitenga and Tabtenga, the delegation returned to the city hall and could meet the mayor who also expressed her support to the Volta project.

List of participants attending the Consultation meeting:
Please check the attendance sheet at the end of the document

Type of Consultation: Focus group discussion

1. OPENING INTRODUCTION
GWP-WAF, VBA and WMO staff introduced themselves with their work responsibilities to the participants. The Mayor of the Mandouri gave a brief introduction on the project and also the purpose of the meeting.

2. AGENDA TO BE DISCUSSED

- Presentation of the questionnaire on the existing EWS and proposed VoltAlarm system.
- Other issues concerning the management of floods and drought events
- Past and on-going projects in the region focussing on floods, drought and ecosystem
- Gender sensitive participation
- Any other Business

Consultation with the farmer organisation of Ramitenga village

This farmer organisation, made of 17 representatives, 9 women and 8 men, is recognised by agreement signed by the authorities. The farmers have already been involved into a drip to drip irrigation project with solar panels under the WACDEP project and implemented by the Water National Partnership of Burkina Faso. This project has been very fruitful, as the work load and the cost of the motor pumps have decreased, the exploitation has been extended thanks to the solar energy and the production has increased.

The farmers were formerly installed close to the dam but regulations have been enforced and they have been moved to the current area. The farmers note a decrease in agricultural production as the water is not sufficient during the dry season. In 2009, the levee almost broke during the flood and houses collapsed. In 2016-2017, they suffered the first drought without any production, hunger, loss of animals and mango trees. The dam was dry and the groundwater had lowered, they had to face even drinking water shortage and diseases appeared.

Additional information was gathered during the discussion about the flood and drought questionnaire:

- Global and national information can lead to false alarms; therefore the information must be tailored by local zones
- Meteorological information would be useful, such as early warning through local radio but it would not be sufficient as the transmission is made only at certain time and the warning can be received too late
- SMS warnings in local language could be received by 2 -3 persons (owning phones) who would disseminate the message in the village, with the help of a megaphone if available
- Automatic meteorological stations are installed in the communities and transfer data to ANAM but in their case the only station of Kilougou can be used and this is not very accurate
- The farmer organisation would like to reinforce their capacities to better anticipate and adapt
- Any activity related to water and soil conservation is welcome, for example small dams to retain runoff water

Third Consultation meeting: Tabtenga village of Burkina Faso

Day & Date: 27th June 2018
Start Time: 12:00 pm Togo time
Meeting location: Ramitenga village, Lombuila,

List of participants attending the Consultation meeting:
Please check the attendance sheet at the end of the document

Type of Consultation: Focus group discussion (see below one of the example of filled questionnaire)

1. OPENING INTRODUCTION
GWP-WAF, VBA and WMO staff introduced themselves with their work responsibilities to the participants. The Mayor of the Mandouri gave a brief introduction on the project and also the purpose of the meeting.

2. AGENDA TO BE DISCUSSED
- Presentation of the questionnaire on the existing EWS and proposed VoltAlarm system.
- Other issues concerning the management of floods and drought events
- Past and on-going projects in the region focussing on floods, drought and ecosystem
- Gender sensitive participation
- Any other Business

The community, made of 100 persons, is living on the side of a stream, each year floods cause damages. In 2016, the agricultural production (cereals, vegetables) has been harmed, animals too, some houses collapsed. In the area, the production takes place all year, except where the overflow occurs. Some floods also occur on the other side of the train tracks. Former floods occurred in 1982, with more important and major damages, then in 1990 when water stagnated during more than one week in the fields. On the other side, drought also occurred in 2003 and 2004, two years without any agricultural production after the rain season, the village suffered hunger. Trees are still affected by the drought of 2016, furthermore 2017 has also been a bad year. As for 2018, it will be a middle year because the growth is belated for this time of the year.
Concerning the transfer of information provided by the Ministry of Agriculture, a mechanism is in place through one person owning a mobile.
Additional information was gathered during the discussion about the flood and drought questionnaire:

- The village receives the meteorological information from a farmer rain gauge installed to manage the use of fertilizers
- Warning can be received through the local radio Savane FM in local language
- The person in charge of transmitting the meteorological information would like to use a megaphone to warn the entire village
- A system like VoltAlarm could be used by the community as the village owns now an internet connection
- The village is interested into adapting and using new information to improve its production

• The Main Man explains that it is important to go through testing studies before implementing any new activity and that it is too early to assess the future warning system but that the village is ready for new information
• A major worry is expressed about the future drainage system of the new airport to be built in the neighbourhood, as rainwater and sewage water should be drained towards the dam

Other Consultation meeting in Mali, Togo, Burkina Faso, Ghana, Benin, Cote d'Ivoire

Day & Date: 12th June-05th July 2018
Start Time: 12:00 pm Togo time
Meeting location:

List of participants attending the Consultation meeting:
Please check the attendance sheet at the end of the document

Type of Consultation: Focus group discussion or semi structure interviews (see below one of the example of filled questionnaire)

Similar Consultation with communities (vulnerable, marginalized, minority including women groups) was carried out in different regions of the six Volta Basin countries. The opinions of the respondents will be included in the final design and development of VoltAlarm and it will be established during the pilot testing at 10 locations of the Volta Basin region (under component 2.2).

1

User Survey Questionnaire for the Volta Basin project

Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin

The questions below are designed to collect information on your experience and recommendations on Floods and Drought. Under the project, the project partners are planning to develop an information tool, called VoltAlarm Early Warning System, to warn the citizens about the flood and drought events.

Location: BOLGA / GHANA

Please click here to indicate that you agree to allow the use of your information for a regional assessment: ☑

Questions:

1. Have you experienced flood and drought situations in the past?

Yes ☑ No ☐

If Yes, did you face negative consequences and lose properties or goods?

YES - loss of lives, crops and property.

2. Did you receive any warning about the flood or drought event?

Yes ☑ No ☐

If Yes,

By whom:

Village/Community Representative☐ Municipality☐ Disaster Management☐

others ☐ Meteorological Dept.

How?? :

Word of mouth ☐ Loudspeaker ☐ SMS/Phone call ☐ Television/Radio☑

others ☐ _____

When before the event ? :

0-2 Hours ☐ 2-12 Hours ☐ 12-24 Hours ☐ other duration: On set of the rainy season in May 2007

3. Would you like to receive direct, quick and reliable warning information?

Yes ☑ No ☐

If Yes,

How would you like to receive this information?

using the mass media as well as phone SMS.

2/

4. Do you have access to smart phone and internet?

Yes ☑ No ☐

If Yes then proceed to question 5 and 6.

5. If Volta Basin Authority and the national agencies would provide an interface/website such as VoltAlarm (see the attached screenshot), would this solve your problem?

Yes ☐ No ☐

If Yes,

Can you recognize the features available in the VoltAlarm tool?

1._____
2._____
3._____
4._____
5._____

If No: what would be useful to you?

6. Would you agree to receive training for the use of VoltAlarm tool?

Yes ☑ No ☐

Do you have additional comments and recommendations?

- There should be training for key stakeholders on the VoltAlarm system.
- Effective and efficient education on early warning signs prior to the rainy seasons.

Thank you for filling out the form.

notables, éleveurs, vice président CVD, producteurs, conseil de village

Térélation du phénomène et traduction par ... de la radio disponible pour l'administration

Questionnaire d'enquête auprès des utilisateurs du futur projet sur le bassin de la Volta

Intégration de la gestion des inondations, de la sécheresse et de l'alerte précoce pour l'adaptation aux changements climatiques dans le bassin de la Volta

Les questions ci-dessous ont pour objectif de recueillir des informations sur votre expérience et vos suggestions concernant les périodes d'inondations et de sécheresse. Dans le cadre du projet, les partenaires du projet prévoient de développer un outil, nommé le système d'alerte précoce VoltAlarm, pour avertir les citoyens des situations d'inondations et de sécheresse.

Lieu : Tabtenga

Veuillez cliquer ici pour indiquer que vous acceptez que vos informations soient utilisées pour une évaluation régionale: ☐

Questions:

1. Avez-vous déjà connu des situations d'inondation et de sécheresse?

Oui ☒ Non ☐

Si oui, avez-vous encouru des conséquences négatives, des pertes de biens?

1992, 1990, 2016 : inondations (moins nets)
2003-2004, 2017 : sécheresse

2. Avez-vous reçu un avertissement concernant le danger d'inondations ou de sécheresse?

Le village reçoit des informations météo.

Oui ☒ Non ☐

Si oui,

Un pluviomètre paysan a été installé

Par qui :

Représentant du village / de la communauté ☐ Municipalité ☐ Gestion des catastrophes ☐ autres ☐

pour fixer l'orientation d'engrais. Hier 8 mm, Samedi 60 mm ~~avec~~ un relevé journalier

Comment?? :

Bouche à oreille ☐ Haut-parleur ☐ SMS / appel téléphonique ☐ Télévision / Radio ☒ autres ☒ internet, téléphone

Quand avant l'événement ?:

0-2 heures ☐ 2-12 heures ☐ 12-24 heures ☐ autre durée : ____________

3. Souhaitez-vous recevoir des informations d'avertissement directes, rapides et fiables?

Oui ☒ Non ☐

Si oui, Comment souhaitez-vous recevoir cette information?

par la radio mais en langue locale
L'agent météo souhaiterait un mégaphone pour alerter tout le village.

Un panneau d'affichage serait aussi utile, sur lequel on pourrait afficher des vignettes, couleurs

4. Avez-vous accès au téléphone et à Internet? locale, Savane FM. la radio est un canal

Oui ☒ Non ☐

Si oui, répondez aux questions 5 et 6.

5. Si l'Autorité du bassin de la Volta et les services nationaux fournissent une interface / un site Web tel que VoltAlarm (voir les exemples ci-joints). Cela résoudrait-il votre problème?

Oui ☐ Non ☐

système VoltAlarm pourrait à terme être utile puisque le village a accès à internet. le village est prêt à s'adapter et utiliser de nouvelles approches pour améliorer leur production.

Si oui,

Pouvez-vous reconnaître les fonctionnalités disponibles dans l'outil VoltAlarm?

1.____________________

2 .____________________

3 .____________________

4 .____________________

5 .____________________

Si non, quelle aide vous serait utile ?

6. Seriez-vous d'accord de recevoir une formation sur l'utilisation de l'outil VoltAlarm?

Oui ☐ Non ☐

Avez-vous d'autres recommandations et commentaires

Impressions du [illegible]: il faut des études préalables avant toute achat. ils sont prêts à utiliser de nouvelles approches; mais c'est trop tôt pour se prononcer. Autre préoccupation: Un bassin: un site d'accueil a été aménagé pour les déplacés de l'aéroport / de l'aéroport. le système d'assainissement [illegible] complète [illegible] vers la Terre [illegible] il y avait un danger [illegible] au point de connexion. Une reprise du plan de gestion est peut être nécessaire, eaux de pluie + eaux usées va être dirigée vers le barrage (!!!)

Merci d'avoir rempli notre formulaire!

BENIN/1

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation / Occupation principale	Tick if marginalized, vulnerable or minority / Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact / Information de contact	Signature
LAISSI Gariou	Maison SITOU à Tanguiéta / quartier Djindjiré - Béri.	Stagiaire au CPS Tanguiéta	X	96-77-15-19 65-90-06-29	
BODJRENOU Gildas	Godjé.	Collaborateur CPS Tgta		64-75-8565	
GNONLE POUNTE Fabrice Yempabou	BUPDOS-ONG Antenne de Tanguiéta Chef d'antenne	Chargé de Programme Chef d'antenne ATACORA-BONGA	Travaille avec les femmes et personnes vulnérable de l'ATACORA BONGA	97321587/95679473 fabrice.gnonle-pounte@bupdosong.org	
N'TCHA K. M'borinati	Jura-Afrique Bénin ONG	Directeur Exécutif	Travaillant avec des groupements de femmes	96327972 mborinati@yahoo.fr	
WOMBO Mitelba	CA Tanongou Mairie Tanguéta	CA Tgou		97393716 96679847	
SAHOU N. Paul	Tanguiéta (residence de la mairie	Maire Tanguiéta		97240402 94607211	

OTTO S. Michel	Mairie de Tanguiéta BP 26	SG Mairie	-	97112686	
NDAH Konagni Bertin	Jura-Afrique Bénin	RSE	-	96939857 ndahkonagni@gmail.com	
YARGO Francine	Présidente de l'Union des Association et Réseaux des Groupements de femmes		+	97242093 64105383	

BENIN/2

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation / Occupation principale	Tick if marginalized, vulnerable or minority / Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact / Information de contact	Signature
SAAGUI B-Jafaga Gilbert	Producteur Résident à Gouandé	Membre de la coopérative de producteur du riz de Koufor	X	97358071 63656669	
KIATTI Benoît	Point focal Protection civile de la mairie	C/SAG Mairie		97352198 kiattiben76@gmail.com	
KIATTI Dalvine	-cultivateur conseiller	Producteur Tantéga	X	64570993	
GNAMMI M Antoinette	CICPS chef centre de Promotion	Matéri		96525133 64567859	
SAMBIENI Soukoua	Maire	Matéri	97242266	97242266	
KIANSI T-Mathias	SG Mairie Matéri	Matéri		97352242	

KOUGNATI Justin	CA/Gouandé	Autorité locale		97251151 94575775	

BF_Tenkodogo-Garango

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation Occupation principale	Tick if marginalized, vulnerable or minority Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact Information de contact	Signature
Bambara JOHNNY Alain	71-01-78-44 76-68-12-65	Agent voyer		Mairie	[signature]
Djiguemdé Bertrand	Radio Municipale de Garango	Chargé de Communication		70-51-13-33 bertrand.djiguemde@gmail.com	[signature]
SAWADOGO Abdoulkarim	Association DAKUPA	Animateur	X	70 29 21 39	[signature]
Kaboré Ferdinand	"	Responsable projet		ferdikabore@yahoo.fr 70289701	[signature]
Ouedraogo Edmond	Mairie Tenkodogo	Chef de service eau, hygiène et Assainissement		lamoussa.ouedraogo@yahoo.fr	[signature]

BF - Tenkodogo

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation Occupation principale	Tick if marginalized, vulnerable or minority Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact Information de contact	Signature
KOANA Fidèle	Direction Régionale de l'Eau et Assainissement BP 123 Tenkodogo	DR Eau Assainissement Centre-Est		71 29 35 60 koamasson81@yahoo.fr	
PARÉ Raymond	Mairie Tenkodogo	chef de service		70875789	

Kaya
BF_~~Gaoua_Arc~~

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation Occupation principale	Tick if marginalized, vulnerable or minority Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact Information de contact	Signature
BAKOUAN B. Lacina	DREA-CN Kaya	Sociologue		70271010 lacinabakouan@gmail.com	
SAWADOGO Arzouma	DREA/CN Kaya	Ingénieur du Génie Rural		70793493 arzouma_sla@yahoo.fr	
KONDITAMDE P. Yolande	DREA/CNR Kaya	Ingénieur du Génie Rural		71337160 kyolandeo1@yahoo.fr	

BF_ Ouaga. Arr. 4

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation / Occupation principale	Tick if marginalized, vulnerable or minority / Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact / Information de contact	Signature
KOUDOUGOU Jacob	Mairie Arrdt 4 70-07-78-52	Secrétaire général			
Doumbia/D. Sandra	Arrdt 4 70-05-58-64 doumbia_dds@yahoo.com	chef de SC SASES		70.05-58.64	
NIKIEMA Boukaré	78267702 boukarenitch81@yahoo.fr	Section: Action Sanitaire et Assainissement			
BAMOGO Adama	Mairie Arrdt 4 60.27.32.22	Commission Environnement	X		
Yameogo Marc	Mairi Arrdt 09 Ouaga	Educateur social		70280571	
NIKIEMA Moumouni	"	Président de jeune	X	78774881 71358912	

BF_Ouaga.Ar.3

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation / Occupation principale	Tick if marginalized, vulnerable or minority / Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact / Information de contact	Signature
YAMEOGO Ida Jéréba			X	70.25.74.85 76.84.74.28 idablass@yahoo.fr	
Barry Nadine C. Ho Madina	Mairie de l'Arrondissement N°3	Travailleur social		70-30-13-98 78-82-41-64	
Quedraogo Elise	Mairie	Conseiller municipal		70 10 60 28	

Côte-d'Ivoire

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation Occupation principale	Tick if marginalized, vulnerable or minority Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact Information de contact	Signature
KAMENA Kré Etienne	05 36 99 28	SG préfecture Bondoukou			
Mme OUATTARA née KOUA Ebi A. A	08755774 APPIMANDOUM	SIP Appimandoum			[signature]
Abou Ouattara	4745-32-28 06 63 47-87	Représentant député			[signature]
Kouassi Kra Vincent	06161077 07 57 38 70	Conseiller Régional			[signature]
ATSIN Florian E.	45765897	Administrateur civil		atsieneve@yahoo.fr	[signature]
BLAI Koffi Guy Florent	08932924	Chargé d'études Conseil R.		binoguyflorent@gmail.com	[signature]

Kouamé Abenan	03-51-65-56	superviseur A la CIBES		onglacibes@yahoo.fr	
AKUE ALBERT	09659064	chef de service Energie de la Direction MPEDER		ledpues@gmail.com	
DEMBELE IBRAHIMA	58055931	Représentant Eaux et Forêts BKou		dembele5805@yahoo.fr	
GUEYE ANGE	07-45-64-36	Chef de sce industrie à la DA -IDI		angegueye@hot.com	
KAMAGATE EL-HADJI DIEDIA ALI	08227327 05724969	Directeur Radio Zanzan		radiozanzan03@yahoo.fr	
YEO KAHATIE	05881619	MINSEDD Gontougo		kahatiey1@gmail.com	
Guemelin yao	09262627	Conseil Régional		guemelin63@gmail.com	
Kouassi Ama Sewa Jacqueline	09646683 03461859	FAGEFEG	11	jacquelinemay15@gmail.com	
Bouah yaoua marcelline	57222436	ONG le Bonheur	11	marcellmobouah@gmail.com	

Ouattara Drissa	49190568	Jeunesse Communale	c/	Ouattaradrissa654@gmail.com	
PODA JONAS	06724561	Representant DR/MINADER Chef Service Foncier		podasarnyr@gmail.com	

Côte d'Ivoire

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation / Occupation principale	Tick if marginalized, vulnerable or minority / Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact / Information de contact	Signature
Kambou Lonkpiété Michel	Porte-Parole chef de Pouan	agent secondaire d'état civil		06 92 42 12 / 49 99 94 50	[signature]
Coulibaly Seydou	Mairie de Bouna	S. G		05.90.88-48 / cseydou[illegible]@gmail.com	[signature]
KOFFI YAO JULIEN	PREFECTURE DE BOUNA	SECRETAIRE GENERAL 2		07-53-72-99	[signature]
Guei Sylvain	CHEF DE CABINET PREFET			08 76 00 21	[signature]
ZEKRE Sylvestre	Chef Office Ivoirien des parcs et reserves	Chef cellule Mesures Humaines		+225 09 47 46 32 / zekresylvestre@gmail.com	[signature]
Koumbiro Sionta	SINIENEKHA	présidente	X	06 07 24 34 / 47 48 83 55	[signature]

Hien-HERI Florence	SINIGNINKHA	Trésorière	X	47-35 47 75 06-23-62-99	
Kambou Koko Brigitte	SINIGNINKHA	Membre	X	45 65 61 71 48 09 48 10	
Kambiré Fatouma	SINIENINKHA	secrétaire	X	06.07.24 34 48 34-10-94	

GHANA

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation Occupation principale	Tick if marginalized, vulnerable or minority Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact Information de contact	Signature
Andrew Asaviansa	Box 489 Bolgatanga	Water Resource Manager		0244507141	
Aaron Bundi Aduna	WRCO Box 489 Bolga	Hydrologist		0242074137 0208234442	
Gbolata Ezekiel Seun	WRC, Box 489, Bolgatanga.	Student / Intern		~~05~~ 0501594261	
Asamani Jerry	Reg Nadmo Bolgatanga. UER	Nadmo Disasters		0241424910 0206352645	
Alhaji Ibrahim Habiba	RCC, Bolga	Civil servant		0243306404	
Emmanuel Yeboah	EPA, Bolga	Public Servant		0246223775	

Mali - Bankass

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation / Occupation principale	Tick if marginalized, vulnerable or minority / Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact / Information de contact	Signature
Boubacar Diaré	Cercle de Bankass	Préfet		75113817 cerclebankass@gmail.com	
Sombora Antoine	Conseiller Cercle Bankass	Sgal		65720250	
Dembaran Guindo	Régisseur Conseil Cercle Bankass	Régisseur		66014825	
Hamadoun HAMASSA	Chef Secteur Agriculture	Responsable Agriculture.		76-318881	
Maliki BOCOUM	Agt Service d'assainissement / Bankass	R. SACPN		77487355	
Bafalé Diarra	Chef Service Hydraulique Bankass	Chef de Service		76143696 bafalemaiga14	

TOGO11

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation / Occupation principale	Tick if marginalized, vulnerable or minority / Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact / Information de contact	Signature
YOUA YACOUBOU	PREFECTURE de KPENDJAL (TOGO)	PREFET		90 055206	
LEGUIBELI Nadéfio	commissariat de Police Mandouri	chargé		90 181296	
NADJAGOU Kanpiéni Lalle	Directeur Préfectorale de l'Agriculture	DP		90 200945	
DJAKPERE Tignoati	Canton de Mandouri	Chef de Canton		90332436	
DAGOU Kansounti	Comité Cantonal de developpement	President		92997169	
ALEYITO Egbozimia	CB Mandouri Gendarmerie Nationale	CB		90 01 9831 99056071	

NABEDE Essowè	D.P Action Sociale Kpendjal	DP		90834548 93548447	
GBENIN Benjamin	MERF	DPERF de Kpendjal		90244412 99015064	
ANDOUE Bakpinti	MBBAJEJ/ANADEB	PF		91980831 98890798	
AKPO A. Soulé	chef d'Agence ICAT	chef d'Agence		90339575 98460590	
DJESSIBO Alédjo	chef Météo	Météo		90-89-10-97	

TOGO/2

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation Occupation principale	Tick if marginalized, vulnerable or minority Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact Information de contact	Signature
Nabagou Souni	Mandouri	Présidente de la fédération des unions des gds Féminin	X	90-36-71-88 97-65-79-11	
Kombaté Awa	Mandouri	Présidente des unions cantonales	X	91-98-93-87	
KOMBATE BADI	Mandouri	Agriculteur		90 00 14 04 99 00 39 08	
Abdoulaye Dramane	Mandouri	Imame		90 34 69 78	
Aladji Songui Seydou	Mandouri	Ajoin Imame		90 27 04 88	
Soulemane Amidou	Mandouri	cultivateur		91 94 24 71 98 10 12 19	

NANDA Akoth	Mandouri	Agean à la Météo		92 62 37 92 99 93 86 93	
DAGOU Konsounti	Mandouri	CCD	Président	92 99 71 69 99 75 51 41	

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation Occupation principale	Tick if marginalized, vulnerable or minority Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact Information de contact	Signature
KOMBATE AWA	Mandouri	Ménagère	Femme	91989387	[signature]
MAMADOU Awa	Mandouri	Ménagère	Femme	—	[signature]
Nabagou Sounï	Mandouri	Présidente de la Fédération du développement à la Base	Femme	90 36 71 98	[signature]
BOUKARI Mikaïle	Mandouri	Ménagère	Femme	93 [illegible] 30 45	[signature]
SAMBIANI Pouguimba	Mandouri	Ménagère	Femme	—	[signature]
KOUMONGA Damoaba	Mandouri	Ménagère	Femme	—	[signature]

ALASSANI Amidou	Mandouri	Tailleur	Homme	99 50 ~~87~~ 58	
KOMBATE Monanbo	Mandouri	Kourché	Homme	96 18 43 33	
MAMA Abdoufatao	Mandouri	Producteur	Homme	90355020	
SANWOGOU Nambassoundi	Mandouri	cultivateur	Homme	92 68 16 09	
AMADOU Rabi	Mandouri	Ménagère	Femme	—	
SADOU Zénabou	Mandouri	Ménagère	Femme	—	
SEIBOU Roukéya	Mandouri	Commerçante	Femme	—	
AMANI Ménouna	Mandouri	Commerçante	Femme	—	
LAMBONI Sahnamou	Mandouri	coiffeuse	Femme	99 21 89 28	

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation Occupation principale	Tick if marginalized, vulnerable or minority Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact Information de contact	Signature
SAMBIANI Bifaye	Mandouri	Secrétaire	Femme	90576027	
GAGA adissa	Mandouri	Commerçante	Femme	—	
SAKIO CZOU Mamata	Mandouri	Commerçante	Femme	—	
Monique KANTATI	Mandouri	Commerçante	Femme	91126026	
NADJATE Mouyouque	Mandouri	Commerçante	Femme		
SAMBIANI yomébinga	Mandouri	chauffeur	homme	92 89 75 99	

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation / Occupation principale	Tick if marginalized, vulnerable or minority / Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact / Information de contact	Signature
Djakpeznoïti	Mandouri	Chef canton	A	90312036	[signature]
ABDOULAY Dramane	Mandouri	IMAM Mandouri	Homme	90346978	[signature]
BOUKARI Zakari	Mandouri	Chef quartier Zongo	Homme	–	[signature]
LAMBONI Kolambiga	Mandouri	Chef quartier Tolongou II	Homme	–	[signature]
Natchiembaté Bardama	Mandouri	Sous-Chef centre Mand	Homme	–	[signature]
MAMA Azara	Mandouri	Ménagère	Femme	–	[signature]

AHADOU Adissa	Mandaré	Commerçante	Femme	—	
DOUTI Bichname	Mandaré	cultivateur	Homme	—	
Apentidja	Mandaré	cultivateur	Homme	—	
KOBONA Méli	Mandaré	Ménagère	Femme	—	
MAMODOU Loukmane	Mandaré	Commerçant	Homme	99 75 53 08	
BOMBOMA Songuimpale	Mandaré	cultivateur	Homme	—	
KOLAWI Natendja	Mandaré	cultivateur	Homme	—	
KOMBATE Bada	Mandaré	Ménuisier	Homme	90 00 14 04	
BOUKARI Abdou	Mandaré	Mécanicien	Homme	—	

TIKIAGA Yombo	Mandouri	Plombier Ferrailleur	Homme	92690200	
TATROU Tassala	Mandouri	Commerçante	Femme	—	
Lamboni Baboani	Mandouri	Secrétaire	Homme	—	
SEYDOU Moussa	Mandouri	Cultivateur	Homme	—	
SAMBIAN Lamboni	Mandouri	Chef quartier Kpandimagou	Homme	99 00 39 93	
NATCHENDJABO Gountante	Mandouri	Notable	Homme	97931585	
ALEYAO Essozimna	Mandouri	CB Gendarmerie	Homme	90 01 98 31	
LEGEMBELI Nadedjo	Mandouri	Police	Homme	90 18 12 96	
NABEDE Essowé	Mandouri	DP Action Sociale	Homme	90 83 45 48	

SAHPANA Patidoume	Mandouri	CDQ	Homme	96056404	
SANKLOGOU Moaoli	Mandouri	Secretaire	Homme	99810203	
YEMBLIMA Ayouba	Mandouri	Cultivateur	Homme	98203153	
DJAKPERE Pompame	Mandouri	Ménagère	Femme	—	
DJAKPERE Migelba	Mandouri	coiffeuse	Femme	91232051	
KOMBATE Minamba	Mandouri	Commerçante	Femme	98640389	
KOUMONGA Migèba	Mandouri	Ménagère	Femme	—	
KOMBATE Kounougnini	Mandouri	Secretaire	Femme	98283 82	
155A Tapoa	Mandouri	Ménagère	Femme	—	

BOMBOMA Kanfitiné	Mandouri	cultivateur	homme	98-01-92-21	
NATCHEND Nakoma	Mandouri	LABORANTIN	Homme	9013-83-89	-
ALADJI Amidou	Mandouri	cultivateur	Homme	-	
KOMBATE Nanda	Mandouri	cultivateur	Homme	98 03 57 68	
KOLANI Ségni	Mandouri	cultivateur	Homme	-	
TAIROU Alima	Mandouri	Ménagère	Femme	-	
ISSA Fati	Mandouri	Ménagère	Femme	-	
ADAMOU Alia	Mandouri	Ménagère	Femme	-	
SEYDOU Sekoule	Mandouri	Couturière	Femme	91 77 37 15	

Name	Region/ Village Name	Occupation	Check if Marginalized Vulnerable minority	Information Contact	Signature.
YAMBA SALAMATA	MANDOURI	Agriculture	X	92372530	
RAMATOU ~~MO~~ OUMAROU	MANDOURI	Agriculture	X	—	
YEKUERE POULINGA	MANDOURI	Agriculture	X	—	
MOROU FATI	MANDOURI	Agriculture	X	—	
FATI AMADOU	MANDOURI	Agriculture	X	—	
ISAME MOUNA	MANDOURI	Agriculture	X	—	
AMINA ANZA	MANDOURI	Agriculture	X	97173610	
ALASANI ABIBA	MANDOURI	Agriculture	X	—	
COMBATE MBENJA	MANDOURI	Agriculture	X	—	

Name	Region/ Village Name	Occupation	Check if marginalized. Vulnerable/minority	Information Contact	Signature.
SAMO NALANJA	MANDOURI	Agriculture	x	—	
BOURAIMA Safiánou	MANDOURI	Agriculteur	x	92997177 99007277	
SAMBIANI yadjatu	MANDOURI	Agriculteur	x	90316748 99507727	
ISSA RAOUf	MANDOURI	Couture	x	98760242 93531260	
LIYARBA DJATOITE	MANDOURI	Elève	x	97762644	
BAKISOU ISSA	MANDOURI	Agriculture	x	99372893	
COMBATE FATOU	MANDOURI	Agriculture	x	92221207	
NIAOU MEBOUA	MANDOURI	Pêche	x	—	
DOUTI Pascaline	MANDOURI	Agriculture	x	—	

Name	Region/ Village Address	occupation	check if Marginalized Vulnerable Minority	Contact Information	signature
AMSATOU ISSA	MANDOURI	Agriculture	x	—	
SAMBIANI ~~KARGA~~ KAGA	MANDOURI	couture	x	99693556	
SAMO ABIBA	MANDOURI	Couture	x	—	
AMANDOU BIBATA	MANDOURI	Agriculture	x	93805963	
KAKRA TIWAGA	MANDOURI	Agriculture	x	—	
ZAKARI FOSSELA	MANDOURI	Agriculture	x	—	
SAROU ~~ZENAB~~ ZENABOU	MANDOURI	Agriculture/ Comerçante	x	—	
MOUKILA AFIROUWA	MANDOURI	Comerçante/ Agriculture	x	97440525	
COMBATE KOUTENYALE	MANDOURI	Agriculture	x	—	

BOUKARI Aïchétou	Mandouri	Ménagère	Femme	—	
SOULE Aïchétou	Mandouri	Ménagère	Femme	—	
Adjossou GBOAYEdo	Mandouri	Mécanicien	Homme	92 57 44 55	
SALIFOU Ibrahim	Mandouri	Commerçant	Homme	98 18 38 37	

NAME	REGION/ VILLAGE	OCCUPATION	check if Marginalized vulnerable minority	Information Contact	signature
~~SOUSSEL~~ SOULE FOUSSENA	MANDOURI	Agriculture	x	/	
BAWA ADISSE	MANDOURI	Agriculture	x	-	
DAGOU Kansounti	Mandouri	comptable matière	x	92 99 71 69 99 75 51 41	
KOLANI yempabe	Mandouri	Secretaire Général Pref		90011797	
YOUA YACOUBOU	Mandouri	Préfet		90055206	

List of Participants Consulted (Liste des participants consultés)

Full Name (Nom complet)	Address (Adresse)	Main occupation Occupation principale	Tick if marginalized, vulnerable or minority Cochez si marginalisé, vulnérable ou minoritaire	Informations about the contact Information de contact	Signature
TARAM Germain	SONABEL Kompienga	chef de Maintenance		+226 70751347	
SO Adama	SONABEL Kompienga	chef de Service		+226 71248004	
KIEMTORE Amado	Loumbila (Ramitenga)	Secretaire du groupement	Vulnerable	+22675305594	
Tiemtore Nady	Loumbila (Ramitenga)	Conseiller	Vulnerable	+22676039330	
Tiemtore Rasmané	Loumbila (Ramitenga)	Vice président du groupement	Vulnerable	+226 64073402	

Kaboré Habibou ~~Ouédraogo Agnonata N°2~~	Loumbila Ramitenga	Membre du groupement	Vulnerable		
Ouédraogo Rasmata	Loumbila Ramitenga	Membre du groupement	Vulnerable		
Kiendor Alimata	Loumbila Ramitenga	Membre du groupemat	Vulnerable		
Illboudo Assèta	Loumbila Ramitenga	Membre du groupement	Vulnerable		
HIE Batchéné	PNE-BF	Chargé de Programme		+22670592432	
Compaoré Nathalie	Tablenga	Commerçante	Vulnerable	+22665697268	

Tablenga

Nom Complet	Adresse	occupation fonction	Cocher si: - vulnérable - minoritaire - marginalisé	Contact	Signature
Kinda Tinnoaga leopard	66-27-61-05 TAB TENGA	Habitant		cultivateur Eleveur	
Binba Poly-carbe	64-24-67-35 TAB TENGA	Habitant		cultivateur Eleveur	
Birba Pascal	65-98-62-18 TAB TENGA	Habitant		Cultiveur Eleveur	
Kinda Issouf	74-63-20-81 TABTENGA	Habitant		cultivateur Eleveur	
Kinda Samuel	75-49-73-47 TAB TENGA	Habitant		cultivateur	
Ouédraogo Elie	57-85-82-08 TABTENGA	Habitant		Cultivateur	
Kinda Rassmané	74-02-10-57 TABTENGA	Habitant		Cultivateur	
Birba Ferdinand	79-31-79-18 TAB TENGA	Habitant		cultivateur Eleveur	
Comporé Simon	76-34-28-23 TABTENGA	Habitant		cultivateur Eleveur	
Birba Emile	75-67-80-14 TABTENGA	Habitant		Cultivateur Eleveur	
Kinda Jean-Pierre	TAB TENGA	Habitant		cultivateur Eleveur	

Tabtenga

Nom & Complet	Adresse/lieu	occupation	Cocher si: personne: - vulnérable - mineure - marginalisée	moyen de contact	signature
Ouédraogo Adama	78-36-54-84 TABTENGA	Président	CVD	cultivateur	
Yaméogo Nongma	74-09-61-55 TABTENGA	Représentant du chef		cultivateur	
Zoungrana salif	75-72-73-35 TABTENGA	Conseiller	municipal	cultivateur	
Ouédraogo Rasmané	76-73-18-48 TABTENGA	Vice-Président CVD		cultivateur	
Ilboudo Sadia	75-53-47-50 TABTENGA	secrétaire CVD		cultivateur	
Ilboudo soulaymane	76-07-25-83 TABTENGA	Personne Ressource		cultivateur	
Birba Joseph	TABTENGA	Vieux	Vulnérable	cultivateur	
Kinda Noaga Augustin	TABTENGA	Vieux	Vulnérable	Cultivateur	
Zangré Salif	TABTENGA	Vieux	Vulnérable	cultivateur	
compaoré jean-marie	TABTENGA	Vieux	Vulnérable	cultivateur	
Birba André	74-74-82-52 TABTENGA	Habitant	Vulnérable	cultivateur	

H	Tiémtoré Roumouni	Loumbila/Zamitenga	Président du groupement	Vulnerable	+226 76-80 33 02	
H	Tiémtoré Oumarou	Loumbila/Ramitenga	Membre du groupement	Vulnerable		
H	Nikiéma Soumaïla	Loumbila/Ramitenga	Membre du groupement	Vulnerable	+226 66 87 18 90	
H	Tiémtoré Saïdou	Loumbila/Ramitenga	Informateur du groupement	Vulnerable	+226 75 76 14 03	
F	Comparoré Salamata	Loumbila/Ramitenga	Secrétaire Adjointe du groupement	Vulnerable		
F	Sodré Minata	Loumbila/ Ramitenga	Trésorière du groupement	Vulnerable	+226 66 87 12 90	
F	Sinaré Alimata	Loumbila Ramitenga	Membre du groupement	Vulnerable		
F	Soré Alimata	Loumbila Ramitenga	Membre du groupement	Vulnerable		
F	Ouédraogo Aguenata	Loumbila Ramitenga	Membre du groupement	Vulnerable		

	Nom Complet	Addresse	Occupation	Cocher if -Vulnerable -Minority -Marginalized	Numero Telephone	Signature
F	Kinda (Mlle) Victorine	Tablenga	menagère agricultrice	X	+226 67271216	
F	Ilboudo (Mme) Agathe	"	menagère agricultrice	X		
F	Kindo Sonia	"	menagère agricultrice	X	+226 55576416	
F	Kindo Edwidge	"	Commerçante	X	+226 35264090	
F	Toodwandé Rasmata	"	Commerçante	X	+226 67172071	
F	Sawadogo Sanada	"	Commerçante	X	+226 74087541	
F	Bamogo Nadeleine	"	Agricultrice	X	—	
F	Ouedraogo Thérèse	"	Commerçante	X	—	
F	Dipama Ami	"	menagère Commerçante	X		
F	Soré Alimata	"	Commerçante	X	+226 77893224	

Nom Complet	Addresse	Occupation	Cocher if -Marginalized -Vulnerable -Minority	Numero Telephone	Signature
Comparoé Ernest	55-57-48-64 TABTENGA	Habitant	cultivateur		
comparoé Valentin	76-19-47-55 TABTENGA	Habitant	cultivateur		
Kinda Aly Mathieu	TABTENGA	Habitant	cultivateur		
Kinda Moussa	TABTENGA	Habitant	cultivateur	75-75-16-30	
Kinda Sayouba	TABTENGA	Habitant	cultivateur	56-34-64-75	
Kinda Louis	TABTENGA	Habitant	cultivateur	76-37-6193	
Kinda Idissa	TABTENGA	Habitant	cultivateur	67-24-02-58	
Kinda Adama	TABTENGA	Habitant	Cultivateur Eleveur	75-02-72-43	
Kinda Ipolythe	TABTENGA	Habitant	cultivateur	69-10 82-15	

Kinda Maxim	TABTENGA	cultivateur	67-66-62-42	
Kinda Joseph	TABTENGA	cultivateur	66-04-28-83	
Kinda Hamidou	TABTENGA	Elève cultivateur	—	
Compaoré Sita	TABTENGA	cultivateur	77-15-21-51	
Kinda Raphaël	TABTENGA	Cultivateur	76-05-06-95	
Kinda Bonifac	TABTENGA	cultivateur Eleveur	76-50-17-68	
Kinda Karim	TABTENGA	cultivateur	67-41-60-60	
Compaoré Rasmané	TABTENGA	cultivateur	76-17-39-47	
Dipama Sylvin	TABTENGA	Cultivateur	65-23-78-53	

H/F	Nom Complet	Addresse	Occupatione	Cocher if -Marginalized -Vulnerable -minority	Nomero Telephone	Signature
F	Kagando Josiane	Tablonga	Commerçante jardinage	X	—	
F	Kindamanata	Tablonga	commerçante jardinage	X	+22667437616	X
F	Ouedraogo Fatimata	11	Commerçante jardinage	X	+22665713339	
F	Zizinga Kafi	11	Agriculture	X	+22666372185	
F	Sawadogo Abibata	11	Commerçante jardinage	X	+22664647974	
F	Ouedraogo Awa	11	Commerçante jardinage	X	+22655068335	
F	Sawadogo Zanala	11	Commerçante jardinage	X	+22657165085	
F	Ouedraogo Rasseta	11	Commerçante jardinage	X	+22655161845	
F	Sawadogo Sanata	11	Commerçante jardinage	X	+22666669-8821	
F	Zidzida Rasmata	11	commerçande jardinage	X	+226 69 76 46 08	
F	Sanrooga Bernaise	11	Commerçante	X	+226 56434684	
F	Bantogo Julienne	11	~~Agriculture~~	X	+22657709012	

Nom	Adresse	Occupation	Vulnérable	N° de Téléphone	Signature
Ouedraogo Tidita	Tabtenga	Agriculteur	X	+	—

Annex 5: Consultation with the national partners of the six countries of the Volta Basin

Minutes of the Meeting

The consultation meeting with the national partners of the six countries was organized by the World Meteorological Organization (WMO), Global Water Partnerships-West Africa (GWP-WAF) and the Volta Basin Authority (VBA) to discuss the main national contributors/supporters and their roles and responsibilities during the implementation of the Volta project activities.

Day & Date: 25th and 26th June 2018
Start Time: 9:30 am-5 pm Ouagadougou time
Skype Call location: Global Water partnerships Office, Ouagadougou

List of participants attending the Consultation meeting:
1) Ms. Caroline Wittwer (Invited Expert –WMO)
2) Mr. Ramesh Tripathi (Associate Project officer-WMO)
3) Ms. Rafatou Fofana (Volta Basin Authority)
4) Ms. Felicite Vodounhessi (Programme Officer-GWP-WAF)
5) Please find below the list of national partners consulted

1. OPENING
The preparation for the telephone call was carried out within the executing partners.

2. AGENDA TO BE DISCUSSED
- Presentation of the objectives and work programme of the Volta project and the explanation on the task table related to the involvement of the national services into the future project activities
- Presentation of the work of the Consultant in charge of Environment and Social Impact Assessment study and the support required from the partners in meeting the stakeholders.
- Long-term sustainability of the project
- Any Other Business (AOB)

Points discussed during the consultation meeting : The executing partners contacted the national partners (already shortlisted from NMHSs and prior appointments were taken for the consultation meeting- check the attachment) and briefed them about the purpose of the call. The contacting team initially provided information on the current status of the project. Later, the consultation team requested the countries to send them the names of the national partners/contributors who would fulfill the important tasks of the activities proposed in the project. The sheet with the activities (French version of the sheet to all the countries except English to Ghana) was sent later to the partners and deadline of one week was agreed. The team also requested the national partners to provide support in the field visits of the Consultant who is responsible for the environmental and social impact assessment.

ACTION: The consulted national partners (Permanent Representative (PR) and Hydrological Advisors (HA) to World Meteorological Organization) of the six countries will add the main contributors and supporting partner's names in the sheet (check at the end of the document) who will contribute in accomplishing the activities under each output. The updated sheet is expected to reach the executing partners by 06 July 2018.

- Any Other Business

The staff of Executing agencies visited IUCN office (Date: 26th June 2018, Time: 3 pm-4 pm) based in Ouagadougou to exchange information on both the AF-Volta project and the REWARD project in the Volta Basin countries proposed by UNEP-IUCN submitted to Global Environment Facility (GEF) for funding. The meeting was focused on identifying synergies in the two projects activities mainly on the involvement of VBA observatory in the building and maintenance of the hydrological database for the Basin, the development of the Early Warning System and consideration of Ecosystem services in the Volta Basin region and how both the project could support the activities of each other.

ACTION: WMO will send the approved concept note of the Volta project to the incharge of UNEP-IUCN project so that they get more insight of the work proposed under the project.

5. ADJOURNMENT The meeting was adjourned on both days at 6:00 pm

Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin
Bénin, Burkina Faso, Côte d'Ivoire, Ghana, Mali and Togo

List of Potential National Partners (from the Six countries) for the consultation Meeting

Green color- The first priority for the consultation in each of the six countries
Blue color- The second priority for the consultation

Sr No	Countries	National Meteorological and Hydrological Services (NMHS)	Agency in charge of climate cha	Agency in charge of ecosystem (Agriculture, Environment, Hydraulic and Forests)	Disaster Management/Civil Protection	Remarks/Comments	FOR ABV	FOR CWP
1	**Benin**	**Direction Générale de l'Eau (DGEAU)/Ministère des Mines, de l'Energie et de l'Eau** **M. ADJOMAYI Philippe Armand** **'Directeur Général de l'Eau** **'01 BP 385 Cotonou** **Tél : +229 21 31 32 98 / 34 87 / 31 77 93** **Tél.: 00 229 97 10 12 87** **Email : adjomayip@yahoo.fr** **Permanent Representative to WMO** **Mr Marcellin Kokou NAKPON** **Agence Nationale de la Météorologie (METEO BENIN)** **Directeur** **Phone Number: + 229 95 96 99 85 - + 229 94 17 41 51** **- + 229 94 17 41 57** **Fax Number:** **Email: marcellin.nakpon@gmail.com** **Hydrological Adviser to WMO** Mr Aurélien TOSSA Agence Nationale de la Météorologie (METEO BENIN) Phone Number: + 229 959 699 85 Fax Number: + 229 941 741 51 Email: aureltoss@gmail.com	MINISTERE DU CADRE DE VIE ET DU DEVELOPPEMENT DURABLE DIRECTION GENERALE DES CHANGEMENTS CLIMATIQUES	**A) Agence Béninoise pour l'environnement** **B) Ministère de l'Agriculture de l'Elevage et de la Pêche** **C) Ministère de l'Environnement et de la protection de la Nature** **D) MERPMEDER Ministère de l'énergie, des Recherches**	**Ministère de l'Intérieur, de la Sécurité Publique** Agence Nationale de la Protection Civile			Arnauld Adjagodo - aarnauld@yahoo.fr -Tel +229 21 31 10 93
2	**Burkina Faso**	**Direction Générale des Ressources en Eau/Ministère de l'Eau et de l'Assainissement** M. Serge TRAORE Directeur Général des Ressources en Eau 03 B.P 70 25 Ouaga 03 Tél: +226 25.37 48 72 / 74 Port: +226 70 23 95 74 Smdtra1980@gmail.com; dgre.dg@gmail.com **Permanent Representative to WMO** Mr Kouka Ernest OUEDRAOGO Direction de la météorologie Directeur Général Ouagadougou 01 Phone Number: + 226 75 40 00 11 - + 226 25 35 60 32 - + 226 784 532 13 Fax Number: + 226 25 35 60 39 Email: ernest_ok@yahoo.com - - **Hydrological Adviser to WMO** Mr Lokou Pascal NAKOHOUN Direction de l'Inventaire des Ressources hydrauliques 03 BP 7025 Ouagadougou 03 Phone Number: + 226 75536976 + 226 25 30 88 78 - + 226 70 29 57 92 Fax Number: + 226 50 37 48 65 Email: locoupascal@yahoo.fr	**Ministère de l'Environnement de l'économe verte et du changement climatique** http://www.environnement.gov.bf/index.php?option=com_content&view=article&id=260:la-direction-generale-de-l-econome-verte-et-du-changement-climatique&catid=174&Itemid=1083	**A) Ministry of Agriculture of Hydraulics and Fish Resources** **B) Ministry of Facilities, Hydraulic Resources, Agriculture and food safety**	**Conseil National de Secours d'Urgence et de Réhabilitation, Ministère de l'Action Sociale et de la Solidarité National (CONASUR)** Email: secours@conasur.bf Phone Number: +226 347003 +226 345251			HIE Batchéné - hiebatchene@gmail.com - tel +226 70 59 24 32
3	**Côte d'Ivoire**	**DGPRE - Direction de la Gestion et de la Protection des Ressources en Eau/MINEF Ministère des Eaux et Forêts** Prof. KOUAME Koffi Fernand Directeur de la Gestion et de la Protection des Ressources en Eau Bur : +225 20 21 94 06 +225 03 03 99 81 Mob: 00225 48 65 59 78/ 0022544881073 dgpre.minef@gmail.com. kouamef@yahoo.fr **Permanent Representative to WMO** Mr Daouda KONATE Direction de la Météorologie Nationale Directeur Phone Number: + 225 48896996 -+ 225 21 27 7163 Fax Number: + 225 21 27 7344 Email: directeur.dmn@sodexam.ci - konatedaouda71@gmail.com **Hydrological Adviser to WMO** Mrs Saramatou KONE BAHIRE Direction de la Météorologie Nationale Directrice des Ressource en Eau à l'Office National de l'Eau potable (ONEP) Phone Number: + 225 22 51 43 00 - +225 21 58 20 01 Fax Number: +225 21 41 26 28 Email: sbahire@hotmail.com Adjossan Adjossan Direction Général des Infrastructures Economiques / Direction de l'Hydrologie, de la Normalisation, de la Réglementation et de la qualité : 20 22 77 19, 09 213 232	**A) Ministère de la Salubrité, de l'Environnement et du Développement Durable (MINSEDD)** **Programme National de lutte contre le Changement Climatique (PNCC)** **B) Ministère en charge de transport** Société d'Exploitation et de Développement Aéroportuaire, Aéronautique et Météorologique (SODEXAM)	**A) Ministère de l'Environnement et du Développement Durable** http://www.environnement.gouv.ci/fichier/1432667898organigraminesudd.pdf GERE M. Gisela Doua 07 80 98 93 doua_gisele@yahoo.fr Dr Koffi Claude François Direction de l'environnement, de l'Hygiène et de la Santé 77 43 27 05	**MINISTERE D'ETAT, MINISTERE DE L'INTERIEUR ET DE LA SECURITE** **ONPC - Office National de la Protection Civile** Abidjan Cocody, Riviera Golf 4, Lot 98 Ilot 06 - 04 BP 2813 Abidjan 04	Remmplace pour prof KOUAME ET KONATE PAR Prof. GOULA Bi Tié Albert - Directeur de la Protection et de l'Aménagement des Ressources en Eau (DPARE) - Point Focal National - 20 BP 650 Abidjan 20 -Bur : +225 22 43 50 05 -Mob: 00225 07 52 61 63 ET M. ZOKO BAOUA Siméon - Chef de service à la Direction des Ressources en Eau - Assistant au Point Focal National - zokobaoua@gmail.com - 00225 08 70 04 93 - 00225 01 68 63 83 dpare.minef@gmail.com kbjero@yahoo.fr	**Prof. GOULA Bi Tié Albert - Directeur de la Protection et de l'Aménagement des Ressources en Eau (DPARE) - Point Focal National - Directeur de la Protection et de l'Aménagement des Ressources en Eau (DPARE) - Point Focal National - 20 BP 650 Abidjan 20 - Bur : +225 22 43 50 05 -Mob: 00225 07 52 61 63 -dpare.minef@gmail.com - kbjero@yahoo.fr** **-AND** **M. ZOKO BAOUA Siméon - Chef de service à la Direction des Ressources en Eau - Assistant au Point Focal National - zokobaoua@gmail.com - 00225 08 70 04 93 - 00225 01 68 63 83**	KOUADIO François - habiet777@yahoo.fr - Tel '+225 09 21 36 34

4	**Ghana**	**Commission des Ressources en Eau WATER RESOURCES COMMISSION / (Ministry of Sanitation and Water Resources)** Dr AMPOMAH Benjamin Yaw Secrétaire Exécutif /Commission Ressources en Eau Tél : +233 302 763 651 / 765 860 Mob: +233 244 874 138 byampomah@yahoo.com **Permanent Representative to WMO** Dr Michael MAWUTOR TANU Ghana Meteorological Agency Director-General Phone Number: + 233 21 511 980 - Fax Number: + 233 21 511 981 Email: tanumichael@gmail.com **Hydrological Adviser to WMO** Mr Hubert OSEI-WUSUANSA Ghana Meteorological Agency Department: Hydrological Services Phone Number: +233 277 754 047 Email: howmaria@yahoo.com **HYDROLOGICAL SERVICES DEPARTMENT (HSD)** **P O Box MB 501** **Tel: 0302 662989/666694/5** **Email: hsd@ghana.com** **Location: Regional Education Service Office**	**Ministry of Finance** https://www.mofep.gov.gh/ +233 302-747-197 info@mofep.gov.gh https://www.mofep.gov.gh/divisions/rsd/climate-change	**Ministry of Environment, Science, Technology & Innovation** 0302 – 666 049 0302 – 688 913/ 688 663 contact@mesti.gov.gh www.mesti.gov.gh	**National Disaster Management Organisation (NADMO)** 0302 772 926 0302 780 541 0289 554 061 http://www.nadmo.gov.gh		OK for AMPOMAH but please add Miss Esi Esuon BINEY - Aquatic Ecologist - Water Resources Commission - Focal Point Assistant - (+233) 302763651 / 302765860 / 302780232 - +233 244 22 44 60 - zbiney@yahoo.com	BOATENG-GYIMAH Maxwell - boatgyimax2@gmail.com -Tel : +233 26 67 30 876 Executive of Country Water Partnership
5	**Mali**	**Permanent Representative to WMO** Mr Djibrilla Ariaboncana MAIGA Direction nationale de la météorologie Directeur Général Representing Member: Mali Phone Number: + 223 29 21 01 - + 223 20 20 6204 Fax Number: + 223 29 21 01 Email: dnm@malinet.ml - dnm@afribonemali.net Ministère de l'Énergie et de l'Eau **Hydrological Adviser to WMO** Mr Mama YENA Direction nationale de l'Hydraulique et de l'Energie B.P. 66, Square Patrice Lumumba Phone Number: + 223 66 79 69 96 - + 223 78 63 31 42 Fax Number: + 223 20 21 86 35 Email: mamayena@yahoo.fr - -		**Ministère de l'Environnement de l'assainissement et du Developpement Durable** **L'Agence de l'Environnement et du Développement Durable AEDD** **Direction Nationale des Eaux et Forêts (DNEF)** **Directeur National de l'Hydraulique** **M. YAYA Boubacar** **BP 1909 Bamako - Mali**	**Ministère de la Sécurité et de la Protection Civile** **Hamdallaye ACI 2 000** **BP E4771 Bamako - Mali** **Tél. (+223) 20 22 84 47**		**M. YAYA Boubacar - Directeur National de l'Hydraulique, Point Focal National - BP 1909 Bamako – Mali Tél. : +223 20 22 41 84 00 223 76 05 13 51/20 21 63 78 - cdidnh@yahoo.fr yaya.boubacar@yahoo.fr - Djoouro Bocoum : bdjoouro@yahoo.fr (Directeur Adjoint) and Fatou SABE - fatousabe@yahoo.fr**	PLEAH Sine Aly Badara - abpleah@gmail.com -Tel : +223 66 78 29 45
6	**Togo**	**Permanent Representative to WMO** Mr Latifou ISSAOU Direction générale de la météorologie nationale Directeur général Phone Number: + 228 22 61 27 60 - + 228 22 19 80 22 - + 228 90 26 86 28 Fax Number: + 228 261 5752 Email: isslat@yahoo.fr - meteo_togo@yahoo.fr **Hydrological Adviser to WMO** Mr Kossi HODIN Direction du Génie rural Chef de la Division de l'Hydrologie Boîte postale 1463 Lome Togo **'Direction des Ressources en Eau** **(+228) 22 34 48 67** **(+228) 22 20 58 00**		**Ministère de l'Agriculture, de l'Elevage et de l'Hydraulique** 'M. AKAKPO Wohou '01 BP 119 Lomé Togo Tél. : +228 22 20 99 11/22 21 04 82 Cel. : + 228 90 01 69 73 akakpo_raouf@yahoo.fr **Ministère de l'Environnement et des Ressources Forestières** **DIRECTION DE L'AGRICULTURE)**			**M. AKAKPO Wohou - Directeur des Ressources en Eau - Point Focal National - 01 BP 119 Lomé Togo - Tél. : +228 22 20 99 11/22 21 04 82 - Cel. : + 228 22222466 - akakpo_raouf@yahoo.fr - secretariat.ministre@eau.gouv.tg - secretariat.ministre@economie.gouv.tg (Ministère des finances Togo)** **AND** **M. AGOUDA Kpadja - Géologue à la Direction des Ressources en Eau - Assistant au Point Focal National - k.agouda@gmail.com - Tel: + 228 220 90 48** **Mob : +228 90 26 62 84**	ETSE Komla Enyonam - getse_2000@yahoo.fr - '+228 90 15 29 99

Consultation avec les partenaires pour réaliser les tâches du projet Volta (gestion des inondations et des sécheresses et développement d'un système d'alerte précoce hydrométéorologique sur le bassin de la Volta)

Projet en phase de préparation par OMM, GWP AO et VBA à soumettre au Fond d'Adaptation le 6 août 2018

Rédacteur : *NAKPON Marcellin DG Météo- Bénin*

Résultats attendus	Activités prévues	Pays Concerné Bénin		Remarques
Pour plus de détails voir pages 33 à 44 dans la partie conceptuelle Volta		Principaux Services contributeurs	Besoins de supports	
1.1 Des cartes des risques d'inondations et de sécheresse sont réalisées	• Inventaire des Vulnérabilité, capacité, exposition, risques (VCER) • Base de données • Renforcement des capacités • Outils de communication	- Météo Bénin et le Service de l'Information de la DGEau - ANPC - Collectivités territoriales	• Mettre à contribution les points focaux de l'ANPC • Elaboration des TDRs • Moyen roulant, logistique • Outils ODK pour la collecte	Pour plus d'efficacité, il faut recruter un cabinet pour faire le recensement sur le bassin.
1.2 Les scénarios	• Inventaire des scénarios climatiques	Météo Bénin et le Service	Séries de données	

climatiques	• Consultation pour définir l'impact du climat sur les cartes de risques	de l'Information de la DGEau	hydroclimatiques	
1.3 Des stratégies de gestion des risques sont élaborées	• Document d'orientation • Renforcement de capacité	Météo Bénin et le Service de l'Information de la DGEau, ANPC	Elaborer un document de stratégie sur la gestion des risques	
2.1 Des prévisions hydrométéorologiques pour les inondations et la sécheresse et création du système d'alerte précoce sont développées (VoltAlarm)	• Inventaire des données Hydro-météo • Création d'un centre opérationnel connecté aux services nationaux • Définition des seuils d'alerte • Procédures pour fournir des prévisions sur les impacts • Conception et développement du système d'alerte précoce VoltAlarm	Météo Bénin et le Service de l'Information de la DGEau	• Renforcer la Cellule interinstitutionnelle • réaliser les études pour la définition des seuils d'alerte • validation de l'étude	
2.2 Simulation sur les sites pilotes de VoltAlarm	•Réunion de sensibilisation •Effectuer des tests pendant la mousson et la saison sèche dans 10 sites pilotes (voir carte page 23, 24 et 25)	Météo Bénin, le Service de l'Information de la DGEau et Agence Nationale de la Protection civile (ANPC)	- Missions de terrain - véhicule pour les déplacements - logistique (véhicule, carburant, perdiem)	METEO BENIN ne dispose pas de véhicule pour les missions
2.3 Sensibilisation des communautés aux	•présentation et test de la méthodologie du guide vert d'inondation (WWF)	Météo Bénin, le Service de l'Information de la DGEau et Agence Nationale de la	Atelier d'internalisation des documents	

environs du Bassin par des programmes d'éducation sont sensibilisés.	• Atelier sur l'intégration du genre dans les systèmes d'alerte et la gestion intégrée des inondations et sécheresses	Protection civile (ANPC)	Mission de sensibilisation	
3.1 Les politiques et des institutions sont renforcés	•Examen des politiques et des plans au regard des nouveaux outils du projet •Sensibilisation au niveau national et local	Météo Bénin, le Service de l'Information de la DGEau et Agence Nationale de la Protection civile (ANPC)	- vulgarisation du document sur la politique nationale de gestion intégré des catastrophes en direction des collectivités locales - vulgarisation du Mode Opératoire Normalisé (MON)	
3.2 Les impacts sont perceptibles à long terme au niveau national et régional	•Liens avec les plans d'adaptation au changement climatique (PANA, NDC, NAP) et le plan d'action transfrontalier, PAS-PNA.	Météo Bénin, DGEau, Cadre de vie et Agence Nationale de la Protection civile (ANPC)	Consultation et Atelier de validation	
3.3 La sensibilisation est effectuée au niveau local	•Organiser la consultation de la société civile •Développer un cadre d'action	Météo Bénin, le Service de l'Information de la DGEau et Agence Nationale de la Protection civile (ANPC)	Action de sensibilisation Mission de terrain de supervision Atelier de validation des résultats	

Consultation avec les partenaires pour réaliser les tâches du projet Volta (gestion des inondations et des sécheresses et développement d'un système d'alerte précoce hydrométéorologique sur le bassin de la Volta)

Projet en phase de préparation par OMM, GWP AO et VBA à soumettre au Fond d'Adaptation le 6 août 2018

Rédacteur : BURKINA FASO

Résultats attendus	Activités prévues	Pays concerné: BURKINA FASO		Remarque
		Principaux services contributeurs	Besoins de support	
1.1 Produire des cartes des risques d'inondations et de sécheresse et des zones inondables • Prévision météorologique à moyen terme et en temps réel	• Inventaire des vulnérabilité, capacité, exposition, risques (VCER) • Base de données • Développement des capacités • Outils de communication • Scénarios de crues intégrant les côtes d'alertes des cours d'eau • Installation de capteurs automatiques (pluviomètres et humidité du sol) sur les principaux affluents des cours	Agence Nationale de la Météorologie du Burkina Faso (ANAM), **DEIE** (Direction des Etudes et de l'Information sur l'Eau). Partenariat National de l'Eau du Burkina Faso (PNE), Autorité du Bassin de la Volta (ABV), Institut Géographique du Burkina (IGB), Collectivités territoriales.	Installation de capteurs automatiques (pluviomètres et humidité du sol) sur les principaux affluents des cours d'eau. Données hydrologiques et météorologiques en temps réel. Etude des côtes d'alertes des différents bassins versants. Elaboration des TDRs 02 véhicules (4x4) pour la maintenance préventive et curative des stations automatiques et aussi des missions d'inspection et de formation des communautés. Sites internet dédiés aux différentes alertes qui seront produites. Renforcement des débits internet de l'ANAM et de la **DEIE** pour la collecte en temps réel des données	Mettre à contribution tous points focaux, Recrutement de cabinets pour des études des côtes d'alerte des différents bassins versants du pays.

	d'eau			
1.2 Les scénarios climatiques	• Inventaire des scénarios climatiques • Consultation pour définir l'impact du climat sur les cartes de risques	ANAM, DEIE, PNE, ABV.	Équipements en ordinateurs calculateurs, renforcement des capacités en gestion des bases de données, Logiciels SIG, Ordinateurs équipés de logiciels appropriés pour les modélisations hydrologiques	Développer des politiques de gestion proactives de la sécheresse et des inondations fondées sur la détection des risques
1.3 Stratégies de gestion des risques	• Document d'orientation • Développement de capacité • Renforcer l'encrage institutionnel	ANAM, ABV, PNE et la DEIE (DGRE)	Elaborer un document de stratégie sur la gestion des risques	Politique nationale de gestion des risques. Mise en place d'une structure de coordination au sein de l'administration et entre les structures de mise en œuvre.
2.1 Développer des prévisions hydrométéorologiques sur les inondations et la sécheresse et rendre opérationnel un système d'alerte précoce (VoltAlarm)	• Inventaire des données Hydro-météo • Création du centre opérationnel et mise en place d'une politique de gestion des catastrophes • Définition des seuils d'alerte • Procédures pour fournir des prévisions basées sur les impacts • Conception et développement du système d'alerte précoce VoltAlarm	ANAM, DEIE, ABV, PNE	Faire des inventaires des stations de mesure hydrologique; mettre en place une plate-forme de collecte de données hydrométéorologiques avec un mécanisme de transfert de données en temps réel. Renforcer la Cellule interinstitutionnelle, réaliser les études pour la définition des seuils d'alerte validation de l'étude, renforcer les capacités des ressources humaines de l'ANAM et de la DGRE (Formations diplômantes et continues et Renforcer le réseau météorologique et hydrologique en stations automatiques.	Accompagner les Services Météorologiques et hydrologiques nationaux en ressources financières pour les suivis et maintenances des stations météorologiques et hydrométriques existantes le renforcement des capacités opérationnelles des Services Météorologiques et Hydrologiques Nationaux (équipements informatiques, moyens modernes de communication et

				d'information, outils de travail) ;
2.2 Démonstration sur les sites pilotes de VoltAlarm	• Réunions de sensibilisation • Effectuer des tests pendant la saison des pluies et la saison sèche dans 10 sites pilotes (voir carte page 23, 24 et 25)	ANAM, DGRE, ABV, PNE	Missions de terrain Allouer un budget de fonctionnement: (véhicules pour les déplacements, élaboration des formations, organisation des ateliers forum)	Budget pour l'organisation des séminaires itinérants
2.3 Sensibilisation par des programmes d'éducation	• présentation et test de la méthodologie du guide vert d'inondation (WWF) • Atelier sur l'intégration du genre dans les systèmes d'alerte et la gestion intégrée des inondations et sécheresses	ANAM, DEIE, DGPC	Atelier et d'internalisation des documents Mission de sensibilisation Tenue des réunions périodiques	
3.1 Les politiques et des institutions sont renforcés	•Examen des politiques et des plans au regard des nouveaux outils du projet • Sensibilisation au niveau national et local	ANAM, DEIE, Direction Générale de la Protection Civile (DGPC), CONASUR, COLLECTIVITES COMMUNALES,	Toutes structures de l'état. Une coordination au plus haut niveau de l'état.	dysfonctionnement dans la coordination des actions ; ancrage institutionnel mal défini ; manque de ressources matérielles, financières, logistiques, humaines
3.2 Les impacts sont perceptibles à long terme au niveau national et régional	• Liens avec les plans d'adaptation au changement climatique (PANA, PNA) et le plan d'action transfrontalier	ANAM, DGPC, CONASUR, COLLECTIVITES COMMUNALES, SP/CNDD	Consultation et Atelier de validation, rapports PANA, PNA, enquêtes terrains	Mettre à contribution tous acteurs qui ont agi dans le cadre du PANA et PNA. Mener des enquêtes sur des villages ou villes choisis comme

				mise en place d'une politique nationale de gestion des catastrophes assortie d'une stratégie et d'un plan d'action
3.3 la sensibilisation au niveau local est effective	• Organiser la consultation de la société civile •Développer un cadre d'actions Tous les secteurs d'activités	ANAM, DEIE, DGPC, CONASUR, Collectivités Municipales, medias locaux	Action de sensibilisation, Mission de terrain de supervision, Atelier de validation des résultats. Budget alloué à la production des affiches, à la diffusion et à la vulgarisation des informations	Expliquer et faire connaître la politique nationale de gestion des catastrophes (inondations et sécheresses) et les plans de préparation, aux populations et avoir leur adhésion

Consultation avec les partenaires pour réaliser les tâches du projet Volta (gestion des inondations et des sécheresses et développement d'un système d'alerte précoce hydrométéorologique sur le bassin de la Volta)

Projet en phase de préparation par OMM, GWP AO et VBA à soumettre au Fond d'Adaptation le 6 août 2018

Rédacteur : DEIE/DGRE

Resultats attendus	Activités prévues	Pays concerné: *BURKINA FASO*……		Remarques
Pour plus de détails voir pages 33 à 44 de la page conceptuelle Volta		Service contributeur principal	Besoins de support	
1.1 Développement des cartes des risques d'inondations et de sécheresse	• Inventaire des Vulnérabilités, capacité, exposition, risques (VCER) • Base de données • Développement des capacités • Outils de communication	- DGRE (Direction Générale des des Ressources en Eau). - Agence Nationale de la Météorologie du Burkina Faso (ANAM), - - Institut Géographique du Burkina (IGB), - Autorité du Bassin de la Volta (ABV) -Bureau d'Etudes - Collectivités territoriales -CONASUR - Direction Générale de	I-nstallation de capteurs automatiques à télétransmission (Limnigraphes numériques et battéries d'éhelles limnimétriques des stations du réseau du Système d'Alerte Précoce) Pour la collecte de données hydrométriques en temps réel. - Etude de la définition des côtes d'alertes sur le bassin de la Volta. - Mettre à la disposition, de	Pour les équipements, il est souhaitable que les pays fassent eux même le choix de leurs équipements afin d'harmoniser avec les installations déjà existantes.

		la Protection Civile (DGPC)	la DEIE trois (0 3) véhicules (4x4) pour la maintenance et l'inspection périodique des stations automatiques du réseau SAP. - Renforcer le débit internet de la DEIE pour la collecte de données hydrométriques en temps réel..	
1.2 Les scenarios climatiques	•Inventaire des scénarios climatiques •Consultation pour définir l'impact du climat sur les cartes de risques	-Bureau d'études -Mairies -IGB -SP/CNDD -UICN -MEEVCC Ministère	-Équiper en ordinateurs professionnels (10) la DEIE pour la collecte des données sur terrain, le traitement et la gestion des données du SAP. - Renforcer les capacités des agents de la DEIE en gestion des bases de données, Logiciels de prévision hydrologiques, SIG etc.… - -Doter en ordinateurs équipés de logiciels appropriés la DEI pour les modélisations hydrologiques	
1.3 Stratégies de gestion des risques	• Document d'orientation • Développement de capacité	-Bureau d'études pour conception -Service SIEPRE -Mairies -DRE Directions	-Elaboration d'un document de stratégie sur la prévention et la gestion des risques d'inondation et de sécheresse dans le bassin	

		Régionales de l'Enseignement	de la Volta.	
2.1 Développement des prévisions hydrométéorologiques pour les inondations et la sécheresse et création du système d'alerte précoce(VoltAlarm)	• Inventaire des données Hydro-meteo • Création du centre opérationnel et de ses connexions avec les services nationaux • Définition des seuils d'alerte • Procédures pour fournir des prévisions basées sur les impacts • Conception et développement du système d'alerte précoce VoltAlarm	-DGRE -ANAM -Bureau d'études Informatique CONASUR CNDD Programme SAAGA MAAH Agriculture Aménagement Hydraulique MEEVCC Fournisseur ou prestataire pour les équipements et l'installation	- Faire l'état des lieux des réseaux hydrométéorologiques du bassin de la Volta - mettre en place une plate-forme de collecte de données hydrométéorologiques avec un mécanisme de transfert de données en temps réel. - Réaliser les études pour la définition des seuils hydrométriques d'alerte et pour la conception et le développement d'un Système d'Alerte Précoce des inondations. - Renforcer les capacités des	- Renforcer les capacités opérationnelles des Services Hydrométéorologiques Nationaux (équipements informatiques, moyens modernes de communication et d'information, etc. -Doter les Services Hydrométéorologiques Nationaux en ressources financières pour les suivis d'entretien et de maintenance des stations de leurs réseaux.

			ressources humaines de l'ANAM et de la DGRE (Formations diplômantes	
2.2 Démonstration sur les sites pilotes de VoltAlarm	•Réunion de sensibilisation •Effectuer des tests pendant la mousson et la saison sèche dans 10 sitespilotes (voir carte page 23, 24 et 25)	Unité de Gestion du projet Mairies Directions régionales du développement rural (Eau Agriculture Elevage Environnement) Partenaires formés Agents des SHMN Services SAP DEIE(SIEPRE) : communication télé radio téléphonie mobile	-Allocation d'un budget conséquent pour les missions terrain et les ateliers. - Doter les structures dans les pays membres de l'ABV de véhicules 4X4 pour les missions de terrain.	
2.3	•présentation	-Unité de gestion	Organiser des missions de	

Sensibilisation par des programmes d'éducation	et test de la méthodologie du guide vert d'inondation (WWF) •Atelier sur l'intégration du genre dans les systèmes d'alerte et la gestion intégrée des inondations et sécheresses	du projet -Bureau d'études ou ONG spécialisés, -Ministère de la femme - Mairies - OSC et Associations -Directions régionales de développement rural	sensibilisation auprès des populations cibles.	
3.1 Renforcement des politiques et des institutions	•Examen des politiques et des plans au regard des nouveaux outils du projet •Sensibilisation au niveau national et local	-Bureau d'études ou Agences de Communication pour étude documentaire -Agents des services SAP	Impliquer les structures de l'Etat agissant dans la gestion de catastrophes naturelles pour une meilleure coordination .	
3.2 Impact à long terme au niveau	•Liens avec les plans	-Services SAP	Besoins de capitalisation de toutes les initiatives	Faire un état des lieux des études existantes dans le domaine de l'alerte

national et régional	d'adaptation au changement climatique (PANA, NDC, NAP) et le plan d'action transfrontalier	-SP/CNDD -2iE	existantes dans le domaine de l'alerte précoce dans les pays membre de l'ABV (rapports PANA, PNA, Burkina HYDROMET, 2iE, SAP /IC etc..)	précoce et les capitaliser pour éviter la redondance des études de ce genre de projets.
3.3 Sensibilisation au niveau local	•Organiser la consultation de la société civile •Développer un cadre d'actions	-Bureau d'études ou Agence de communication pour étude documentaire -OSC du secteur de l'eau et de la gestion de catastrophes naturelles . -Collectivités locales -Associations agriculture élevage pêche..	-Mission de terrain pour la sensibilisation des populations. de supervision, - Missions de supervision des ateliers de sensibilisation. -Allocation de Budget pour la production des affiches, la diffusion et à la vulgarisation des informations - Atelier de validation des résultats des ateliers de sensibilisation. -	

Consultation avec les partenaires pour réaliser les tâches du projet Volta (gestion des inondations et des sécheresses et développement d'un système d'alerte précoce hydrométéorologique sur le bassin de la Volta)

Projet en phase de préparation par OMM, GWP AO et VBA à soumettre au Fond d'Adaptation le 6 août 2018

Rédacteur : SOUMAHORO AHMED LAMINE Direction de la Météorologie Nation de Côte d'ivoire

Résultats attendus	**Activités prévues**	**Pays concerné: CÔTE D'IVOIRE**		**Remarques**
Pour plus de detail voir pages 33 à 44 de la page conceptuelle Volta		Service contributeur principal	Besoin de support	
1.1 Développement des cartes des risques d'inondations et de sécheresse	• Inventaire des vulnérabilité, capacité, exposition, risques (VCER) • Base de données • Développement des capacités • Outils de communication	SODEXAM	• Elaboration et actualisation du document de mémoire des catastrophes d'origine hydrométéorologique ; • Cartographie des zones à risque de catastrophes hydrométéorologiques (inondations, orages, feux de brousse, glissement de terrain, érosion côtière, sécheresse) ; • Numérisation de toutes les données climatiques et hydrologiques historiques existantes ; • Sauvegarde des archives des documents de relevées de données climatiques et hydrologiques historiques ; • Etudes pour la définition des seuils de	Le service Météorologique (SODEXAM) et le Service Hydrologique (DGIHH) pourront collaborer dans le cadre de la mise en œuvre de certaines activités.

			déclenchement de risque de feux de brousse et de seuil de déclenchement de la sécheresse, etc. ; • Conception, production et diffusion de bulletin veille environnementale ; • Production et diffusion de bulletin risque d'inondation ; • Production et diffusion de bulletin risque feux de brousse ; • Acquisition de licences pour exploitation et traitement (SIG et Télédétection, Statistique, analyse de données etc.) ; • Acquisition de systèmes informatiques ; • Densification et modernisation du réseau d'observations hydrométéorologiques ; • Renforcement des capacités techniques et humaines des services nationaux de météorologie et d'hydrologie (SNHM) et des partenaires sectoriels ; • Organisation d'ateliers et de réunion.	
1.2 Les scénarios climatiques	• Inventaire des scénarios climatiques • Consultation pour définir l'impact du climat sur les cartes de risques	SODEXAM	• Renforcement des capacités matérielles et humaines à l'exploitation des modèles numériques du climat par l'utilisation des scenarios de changement pour conduire des études d'impacts futurs dans divers secteurs (agriculture, eau, ressources naturelles, etc.) ; • Outils d'études d'impacts des scénarios futurs ; • Définition des indicateurs.	
1.3 Stratégies de gestion des risques	• Document d'orientation	SODEXAM	• Mémoire des catastrophes climatiques ; • Renforcement des capacités matérielles et	SODEXAM pourra

	• Développement de capacité		humaines ; • Elaboration de stratégie de communication en faisant un mapping de tous les utilisateurs et producteurs d'information ; • Mise en place de réseau de communicateurs et de journalistes qui couvre toute l'étendue des zones à risques (mettre l'accent sur les médias locaux en langues nationales) ; • Mise en place de mécanisme de feedback dans la stratégie de communication ; • Développement des moyens de communications ; • Organisation d'ateliers et de réunion.	collaborer avec ses partenaires dans le cadre de la mise en œuvre de certaines activités.
2.1 Développement des prévisions hydrométéorologiques pour les inondations et la sécheresse et création du système d'alerte précoce (VoltAlarm)	• Inventaire des données Hydro-meteo • Création du centre opérationnel et de ses connexions avec les services nationaux • Définition des seuils d'alerte • Procédures pour fournir des prévisions basées sur les impacts • Conception et développement du système d'alerte précoce VoltAlarm	SODEXAM et DGIHH	• Saisie des données climatiques et hydrologiques non saisies (manquantes) dans la base de données ; • Mise à jour des systèmes de gestion de base de données climatiques et hydrologiques ; • Renforcement et modernisation du système de prévision météorologique et d'alerte précoce. • Acquisition de système de prévision hydrométéorologique pour les zones à risque et les bassins versants des grands barrages (barrages hydroélectriques, etc.); • Mise en place d'un système d'acquisition et de transmission automatique des données hydrométéorologiques des sites d'observations à la base de données centrales ; • Etudes pour la définition des seuils de	Le service Météorologique (SODEXAM), le Service Hydrologique (DGIHH) et les partenaires pourront collaborer dans le cadre de la mise en œuvre de certaines activités.

			déclenchement des alertes de risque d'inondation ; • Suivi des zones à risque de catastrophes hydrométéorologiques (inondation, orages, feux de brousse, glissement de terrain, érosion côtière, sécheresse, vent violent, pluviométrie cumulée, indice de confort) ; • Mise en place d'un système d'alerte précoce-action rapide national multirisques pour les aléas climatiques majeurs identifiés ; • Renforcement des capacités techniques et humaines des services nationaux de météorologie et d'hydrologie (SNHM) ; • Organisation d'ateliers et de réunion.	
2.2 Démonstration sur les sites pilotes de VoltAlarm	• Réunion de sensibilisation • Effectuer des tests pendant la mousson et la saison sèche dans 10 sites pilotes (voir carte page 23, 24 et 25)	SODEXAM	• Organisation de réunion et atelier de sensibilisation ; • Elaboration des matériels de communication ; • Diffusion des informations.	SODEXAM, DGIHH et les partenaires (ONEP, ABN, MINEF, PNA, PNCC, etc.)
2.3 Sensibilisation par des programmes d'éducation	• présentation et test de la méthodologie du guide vert d'inondation (WWF) • Atelier sur l'intégration du genre dans les systèmes d'alerte et la gestion intégrée des	SODEXAM	• Organisation de réunion et atelier de sensibilisation ; • Renforcement de capacités.	SODEXAM, DGIHH et les partenaires (ONEP, ABN, MINEF, PNA, PNCC, etc.)

	inondations et sécheresses			
3.1 Renforcement des politiques et des institutions	• Examen des politiques et des plans au regard des nouveaux outils du projet • Sensibilisation au niveau national et local	PNCC	• Organisation de réunion et atelier; • Etude documentaire et rédaction de rapport ; • Installation des Comités Locaux de Développement Durable de la zone de bassin transfrontalier de la volta couvrant la Côte d'Ivoire ; • Etude de vulnérabilité des ressources en eau face aux changements climatiques dans la zone de bassin transfrontalier de la volta couvrant la Côte d'Ivoire.	MINEF, MINSEDD, SODEXAM
3.2 Impact à long terme au niveau national et régional	• Liens avec les plans d'adaptation au changement climatique (PANA, NDC, NAP) et le plan d'action transfrontalier	PNA	• Organisation de réunion et atelier ; • Etude et rédaction de rapport.	PNCC, PNA ; SODEXAM
3.3 Sensibilisation au niveau local	• Organiser la consultation de la société civile • Développer un cadre d'actions.	MINISTERE DE LA SALUBRITE DE L'ENVIRONEMENT ET DU DEVELOPPEMENT DURABLE à travers la plateforme RRC.	• Organisation de réunion et atelier; • Etude documentaire et rédaction de rapport.	La plateforme RRC pourra collaborer avec la SODEXAM et le MINISTERE D'ETAT, MINISTERE DE L'INTERIEUR ET DE LA SECURITE

Consultation avec les partenaires pour réaliser les tâches du projet Volta (gestion des inondations et des sécheresses et développement d'un système d'alerte précoce hydrométéorologique sur le bassin de la Volta)

Projet en phase de préparation par OMM, GWP AO et VBA à soumettre au Fond d'Adaptation le 6 août 2018

Rédacteur : KOUADIO François, Secrétaire Exécutif du Partenariat National de l'Eau de Côte d'Ivoire (PNECI)

Résultats attendus	Activités prévues	Pays concerné: Côte d'Ivoire		Remarques
Pour plus de détails voir pages 33 à 44 de la page conceptuelle Volta		Service contributeur principal	Besoin de support	
1.1 Développement des cartes des risques d'inondations et de sécheresse	• Inventaire des vulnérabilité, capacité, exposition, risques (VCER) • Base de données • Développement des capacités • Outils de communication	Météorologie nationale ONEP		Le Partenariat National de l'Eau de Côte d'Ivoire sera le relais du Service Météorologique National à travers la sensibilisation des bénéficiaires directs sur les cartes des risques d'inondation et de sécheresse. Former et sensibiliser : - Les Autorités des départements concernés ; - Les institutions sociales ; - Les ONG ; - Les organisations communautaires….

1.2 Les scénarios climatiques	• Inventaire des scénarios climatiques • Consultation pour définir l'impact du climat sur les cartes de risques	SODEXAM Ministère de l'Environnement et du Développement Durable		Le comité scientifique et technique du partenariat national de l'eau de Côte d'ivoire peut contribuer à l'inventaire des scénarios climatiques et à la définition de l'impact du climat sur les cartes de risques
1.3 Stratégies de gestion des risques	• Document d'orientation • Développement de capacité	Ministère de l'Environnement et du Développement Durable ONPC		
2.1 Développement des prévisions hydrométéorologiques pour les inondations et la sécheresse et création du système d'alerte précoce (VoltAlarm)	• Inventaire des données Hydro-meteo • Création du centre opérationnel et de ses connexions avec les services nationaux • Définition des seuils d'alerte • Procédures pour fournir des prévisions basées sur les impacts • Conception et développement du système d'alerte précoce VoltAlarm	SODEXAM ONEP PNECI		Le PNECI peut installer des partenariats locaux dans chaque région pour faciliter le relais des informations concernant données produites
2.2 Démonstration sur les sites pilotes de VoltAlarm	• Réunion de sensibilisation • Effectuer des tests pendant la mousson et la saison sèche dans 10 sites pilotes (voir carte page 23, 24 et 25)	PNECI SODEXAM ONEP		La mission de formation et de sensibilisation des populations qui revient au PNECI le place comme un acteur important pendant cette phase démonstration sur les sites pilotes (environ 150 jeunes bénévoles sont disponibles)

2.3 Sensibilisation par des programmes d'éducation	• présentation et test de la méthodologie du guide vert d'inondation (WWF) • Atelier sur l'intégration du genre dans les systèmes d'alerte et la gestion intégrée des inondations et sécheresses	Le partenariat national de l'eau de côte d'ivoire		La mission de formation et de sensibilisation des populations qui revient au PNECI le place comme un acteur important pendant cette phase démonstration sur les sites pilotes (environ 150 jeunes bénévoles sont disponibles)
3.1 Renforcement des politiques et des institutions	• Examen des politiques et des plans au regard des nouveaux outils du projet • Sensibilisation au niveau national et local	Le partenariat national de l'eau de Côte d'ivoire		La mission de formation et de sensibilisation des populations qui revient au PNECI le place comme un acteur important pendant cette phase démonstration sur les sites pilotes (environ 150 jeunes bénévoles sont disponibles)
3.2 Impact à long terme au niveau national et régional	• Liens avec les plans d'adaptation au changement climatique (PANA, NDC, NAP) et le plan d'action transfrontalier			
3.3 Sensibilisation au niveau local	• Organiser la consultation de la société civile • Développer un cadre d'actions	De par sa composition, le partenariat national de l'eau offre un cadre idéal pour mobiliser la société civile et développer des actions citoyennes		La mission de formation et de sensibilisation des populations qui revient au PNECI le place comme un acteur important pendant cette phase démonstration sur les sites pilotes (environ 150 jeunes bénévoles sont disponibles)

Consultation with the National Partners to fulfill the tasks of the Volta Project (Integrating Flood and Drought Management and early Warning for Climate Change Adaptation in the Volta Basin)

Project in the preparation phase by WMO, GWP WA and VBA to be submitted to the Adaptation Fund on August 6, 2018

Written by:……Water Resources Commission (WRC)- VBA Focal Institution

Expected outcomes	**Planned activities**	**GHANA** **Concerned country: ……**		**Remarks**
For more details see pages 33 to 44 of the concept note Volta		Main Contributing Service	Need of Support	
1.1 Development of Floods and Drought risk maps	• Inventory of Vulnerability, capacity, exposure and risk (VCER) for flood and drought hazard • Database • Capacity development • Communication tools	Water Resources Commission (WRC) National Disaster Management Organisation (NADMO)	Funding/logistics- IT equipment, etc.	Technical capacity available. To be coordinated by WRC
1.2 Climate scenarios	• Inventory of climate information and scenarios • Consultation to define the impacts of climate variability on the risk	Environmental Protection Agency (EPA)	Funding/logistics- IT equipment, etc.	Technical capacity available. To be coordinated by WRC

	maps			
1.3 Risk management strategies	• Guidance document • Capacity development	National Disaster Management Organisation (NADMO)	Funding/logistics Technical Capacity Building	To be coordinated by WRC
2.1 Flood and Drought forecasting and Early warning systems (VoltAlarm)	• Inventory of Hydro-meteo data • Creation of the operational centre and connections to the national services • Development of warning Thresholds • Procedure for defining impact-based forecasts • Design and development of web-based VoltAlarm platform	• Ghana Meteorological Agency (GMet) and Hydrological Services Dept. (HSD) • NADMO • WRC • GMET and HSD • WRC	Funding/logistics-IT equipment, etc.	Technical capacity available in all cases. To be coordinated by WRC
2.2 Demonstration of VoltAlarm on the pilot sites	• Awareness meeting • Perform testing during monsoon and dry season in 10 sites (see map and site details on the page 23,24 and 25 of the concept note)	NADMO	Funding	Technical capacity available. To be coordinated by WRC
2.3 Awareness through education programs	• Presentation and test of the methodology Flood Green Guide • Workshop on mainstreaming	NADMO	Funding	Technical Capacity Available. To be coordinated by WRC

	Gender in E2E-EWS-FF and IFM			
3.1 Policy and Institutional strengthening	• Review of policies and plans • Awareness at national and local level	WRC	Funding	Technical Capacity Available. To be coordinated by WRC
3.2 Long term impact at national and regional level	• Linkage with national climate adaptation plans (NAPA, NDC, NAP) and transboundary action plan	EPA	Funding	Technical capacity available. To be coordinated by WRC
3.3 Awareness at local level	• Organize community consultation with the civil society • Develop a framework of actions	NADMO	Funding	Technical capacity available. To be coordinated by WRC

Consultation avec les partenaires pour réaliser les tâches du projet Volta (gestion des inondations et des sécheresses et développement d'un système d'alerte précoce hydrométéorologique sur le bassin de la Volta)

Projet en phase de préparation par OMM, GWP AO et VBA à soumettre au Fond d'Adaptation le 6 août 2018

Rédacteur : *SIDIBE Ibrahima DSGRE/DNH- Mali*

Résultats attendus	Activités prévues	Pays Concerné Bénin		Remarques
Pour plus de détails voir pages 33 à 44 dans la partie conceptuelle Volta		Principaux Services contributeurs	Besoins de supports	
1.1 Des cartes des risques d'inondations et de sécheresse sont réalisées	• Inventaire des Vulnérabilité, capacité, exposition, risques (VCER) • Base de données • Renforcement des capacités • Outils de communication	- DNH[1] - DGPC[2] - MALI METEO - DNACPN[3] - SAP[4] - Croix Rouge Mali	• Mettre à contribution les points les comités locaux de l'eau • Elaboration des TDRs • Moyen roulant, logistique	Recruter un Consultant en collaboration avec les structures concernées

[1] Direction Nationale de l'Hydraulique

[2] Direction Générale de la Protection Civile

[3] Direction National de l'Assainissement, Contrôle Pollution et des Nuisances

[4] Système d'Alerte Précoce

		- Collectivités territoriales, - Société civile - Chefs des villages		pour l'inventaire des sous bassins.
1.2 Les scénarios climatiques	• Inventaire des scénarios climatiques • Consultation pour définir l'impact du climat sur les cartes de risques	DNH, MALI METEO, SAP, AEDD et DNACPN.	Séries de données hydrologiques	Vérification de l'étalonnage des stations de référence
1.3 Des stratégies de gestion des risques sont élaborées	• Document d'orientation • Renforcement de capacité	DNH, MALI METEO, DNACPN, SAP et DGPC.	Elaborer un document de stratégie sur la gestion des risques	
2.1 Des prévisions hydrométéorologiques pour les inondations et la sécheresse et création du système d'alerte précoce sont développées (VoltAlarm)	• Inventaire des données Hydro-météo • Création d'un centre opérationnel connecté aux services nationaux • Définition des seuils d'alerte • Procédures pour fournir des prévisions sur les impacts • Conception et développement du système d'alerte précoce VoltAlarm	DNH, MALI METEO, DNACPN, le SAP et DGPC.	• Renforcer le Service National d'hydrologie du Mali, • Délimiter les sous bassins à risque d'inondation • Mettre en place un réseau optimum et définir les cotes d'alerte d'inondation • Installer des stations automatiques de capteurs sonores et d'avertisseur de d'inondation • Valider les études	Mettre à la disposition de la DNH des équipements hydrologiques (embarcation en aluminium et son chariot, moteur hors-bord, moulinet, micro moulinet) et petits matériels (bottes, camping…..)
2.2 Simulation sur les sites pilotes de VoltAlarm	•Réunion de sensibilisation •Effectuer des tests pendant la mousson et la saison sèche dans 10 sites pilotes (voir carte page 23, 24 et	DNH, MALI METEO, DNACPN, SAP et DGPC.	- Missions de terrain - véhicule pour les déplacements - logistique (véhicule,	

	25)		carburant, perdiem)	
2.3 Sensibilisation des communautés aux environs du Bassin par des programmes d'éducation sont sensibilisés.	•présentation et test de la méthodologie du guide vert d'inondation (WWF) • Atelier sur l'intégration du genre dans les systèmes d'alerte et la gestion intégrée des inondations et sécheresses	DNH, MALI METEO, DNACPN, SAP et DGPC.	Atelier d'internalisation des documents Mission de sensibilisation	
3.1 Les politiques et des institutions sont renforcés	•Examen des politiques et des plans au regard des nouveaux outils du projet •Sensibilisation au niveau national et local	DNH, MALI METEO, DNACPN, SAP et DGPC.	- Atelier National d'information et de sensibilisation sur le code de l'eau (collectivités, chefs de villages, quartiers…) - vulgarisation du document sur la politique nationale de gestion intégré des catastrophes en direction des collectivités locales	
3.2 Les impacts sont perceptibles à long terme au niveau national et régional	•Liens avec les plans d'adaptation au changement climatique (PANA, NDC, NAP) et le plan d'action transfrontalier, PAS-PNA.	DNH, MALI METEO, DNACPN, SAP et DGPC.	Consultation et Atelier de validation	
3.3 La sensibilisation est effectuée au niveau local	•Organiser la consultation de la société civile •Développer un cadre d'action	DNH, MALI METEO, DNACPN, SAP et DGPC.	Action de sensibilisation Mission de terrain de supervision Atelier de validation des résultats	

Consultation avec les partenaires pour réaliser les tâches du projet Volta (gestion des inondations et des sécheresses et développement d'un système d'alerte précoce hydrométéorologique sur le bassin de la Volta)

Projet en phase de préparation par OMM, GWP AO et VBA à soumettre au Fond d'Adaptation le 6 août 2018

Rédacteur : DIRECTION DES RESSOURCES EN EAU……

Résultats attendus	**Activités prévues**	**Pays concerné : TOGO……**		**Remarques**
Pour plus de détail voir pages 33 à 44 de la page conceptuelle Volta		Service contributeur principal	Besoin de support	
1.1 Développement des cartes des risques d'inondations et de sécheresse	• Inventaire des vulnérabilité, capacité, exposition, risques (VCER) • Base de données • Développement des capacités • Outils de communication	• Agence Nationale de protection Civile • Direction Ressources en Eau • Direction Générale de la Météorologie Nationale • Direction l'environnement • URBANISME • Université	• Moyens financiers pour la réalisation des activités • Consultant pour le renforcement des capacités et l'appui à l'élaboration des outils de communication	Des cartes de risques d'inondations existent et auront besoin d'être actualisées par le projet
1.2 Les scénarios climatiques	• Inventaire des scénarios climatiques • Consultation pour définir l'impact du climat sur les cartes de risques	• Direction Ressources en Eau • Direction Générale de la Météorologie Nationale	• Moyens financiers et consultant pour la mise en œuvre de des activités	Des cartes de risques d'inondations existent et auront besoin d'être actualisées par le projet

1.3 Stratégies de gestion des risques	• Document d'orientation • Développement de capacité	• Agence Nationale de Protection Civile • Direction de l'environnement • Direction Ressources en Eau • Direction Générale de la Météorologie Nationale	• Moyens financiers et consultant pour l'élaboration du document et le renforcement des capacités	
2.1 Développement des prévisions hydrométéorologiques pour les inondations et la sécheresse et création du système d'alerte précoce (VoltAlarm)	• Inventaire des données Hydro-météo • Création du centre opérationnel et de ses connexions avec les services nationaux • Définition des seuils d'alerte • Procédures pour fournir des prévisions basées sur les impacts • Conception et développement du système d'alerte précoce VoltAlarm	• Direction Ressources en Eau (DRE) • Direction Générale de la Météorologie Nationale • Agence Nationale de Protection Civile • UNIVERSITE • Autorité du bassin de la Volta	• Moyens financiers pour la mise en œuvre des activités • Consultant	
2.2 Démonstration sur les sites pilotes de VoltAlarm	• Réunion de sensibilisation • Effectuer des tests pendant la mousson et la saison sèche dans 10 sites pilotes (voir carte page 23, 24 et 25)	• Direction Ressources en Eau • Direction Générale de la Météorologie Nationale • Agence Nationale de protection Civile • UNIVERSITE • Autorité du bassin de la Volta	• Moyens financiers pour la mise en œuvre de des activités • Appui d'un consultant pour la réalisation des tests	
2.3 Sensibilisation par des programmes d'éducation	• présentation et test de la méthodologie du guide vert d'inondation (WWF) • Atelier sur l'intégration du genre dans les systèmes d'alerte et la gestion intégrée des inondations et sécheresses	• Direction Ressources en Eau • Direction Générale de la Météorologie Nationale • ABV	• Moyens financiers pour la mise en œuvre de des activités	

3.1 Renforcement des politiques et des institutions	• Examen des politiques et des plans au regard des nouveaux outils du projet • Sensibilisation au niveau national et local	• Direction Ressources en Eau • Direction Générale de la Météorologie Nationale • Agence Nationale de Protection Civile • UNIVERSITE	• Consultant pour l'examen des politiques et des plans au regard des nouveaux outils du projet • Moyens financiers pour la réalisation des activités de sensibilisation	
3.2 Impact à long terme au niveau national et régional	• Liens avec les plans d'adaptation au changement climatique (PANA, NDC, NAP) et le plan d'action transfrontalier	• Direction de l'environnement • Direction Ressources en Eau • Direction Générale de la Météorologie Nationale	• Moyens financiers pour la mise en œuvre de des activités	
3.3 Sensibilisation au niveau local	• Organiser la consultation de la société civile • Developper un cadre d'actions	• Direction Ressources en Eau • Direction Générale de la Météorologie Nationale • Agence Nationale de Protection Civile • Direction de l'environnement	• Moyens financiers pour la mise en œuvre de des activités • Appui d'un consultant	

Consultation avec les partenaires pour réaliser les tâches du projet Volta (gestion des inondations et des sécheresses et développement d'un système d'alerte précoce hydrométéorologique sur le bassin de la Volta)

Projet en phase de préparation par OMM, GWP AO et VBA à soumettre au Fond d'Adaptation le 6 août 2018

Rédacteur : AFFO-DOGO Abalo Directeur météo synoptique

Résultats attendus	Activités prévues	Pays concerné: TOGO		Remarques
Pour plus de detail voir pages 33 à 44 de la page conceptuelle Volta		Service contributeur principal	Besoin de support	
1.1 Développement des cartes des risques d'inondations et de sécheresse	• Inventaire des vulnérabilité, capacité, exposition, risques (VCER) • Base de données • Développement des capacités • Outils de communication	- Météo-Togo (DGMN) - ANPC - INSEED - DRE	- Moyens financiers - Moyens logistiques et roulants	
1.2 Les scénarios climatiques	• Inventaire des scénarios climatiques • Consultation pour définir l'impact du climat	- DGMN - MERF (ANGE) - CRT - DRE	- Moyens financiers - Moyens logistiques	

	sur les cartes de risques	- ANPC - CARTOGRAPHIE		
1.3 Stratégies de gestion des risques	• Document d'orientation • Développement de capacité	- ANPC (Plateforme RRC)	- Moyens financiers - Moyens logistiques et roulants	
2.1 Développement des prévisions hydrométéorologiques pour les inondations et la sécheresse et création du système d'alerte précoce (VoltAlarm)	• Inventaire des données Hydro-meteo • Création du centre opérationnel et de ses connexions avec les services nationaux • Définition des seuils d'alerte • Procédures pour fournir des prévisions basées sur les impacts • Conception et développement du système d'alerte précoce VoltAlarm	- DGMN - DRE - ANPC - ABV - DRE	- Moyens financiers - Moyens logistiques et roulants	
2.2 Démonstration sur les sites pilotes de VoltAlarm	• Réunion de sensibilisation • Effectuer des tests pendant la mousson et la saison sèche dans 10 sites pilotes (voir carte page 23, 24 et 25)	- DGMN - DRE - ANPC - CRT	- Moyens financiers - Moyens logistiques et roulants	
2.3	• présentation et test de	- DGMN	- Moyens	

Sensibilisation par des programmes d'éducation	la méthodologie du guide vert d'inondation (WWF) • Atelier sur l'intégration du genre dans les systèmes d'alerte et la gestion intégrée des inondations et sécheresses	- ANPC - DRE - CRT - Ministère agriculture - Ministère de l'éducation	financiers - Moyens logistiques et roulants	
3.1 Renforcement des politiques et des institutions	• Examen des politiques et des plans au regard des nouveaux outils du projet • Sensibilisation au niveau national et local	- ANPC - DGMN - DRE - CRT	- Moyens financiers Moyens logistiques et roulants	
3.2 Impact à long terme au niveau national et régional	• Liens avec les plans d'adaptation au changement climatique (PANA, NDC, NAP) et le plan d'action transfrontalier	- DGMN - ABV - ANPC - DRE - MERF	- Moyens financiers - Moyens logistiques et roulants	
3.3 Sensibilisation au niveau local	• Organiser la consultation de la société civile • Développer un cadre d'actions	- ANPC - DGMN - DRE - CRT	- Moyens financiers - Moyens logistiques et roulants	

Annex 6 Environmental and Social Impact Assessment (ESIA) Report and Environmental and Social Risk Management Plan (ESRMP)

Environmental and Social Impact Assessment (ESIA) with the development of Environmental and Social Risk Management Plan (ESRMP) in the framework of drafting a project proposal to be submitted for funding to Adaptation Fund (AF)

Final ESIA REPORT

Version 02 ***August 2018***

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INTRODUCTION

Extreme events such as floods and drought in the Sahel countries contribute to vulnerable populations with catastrophic consequences. In the countries of the Volta basin (Burkina Faso, Mali, Togo, Benin, Ghana and Ivory Coast), populations are also facing these climatic phenomena expressed in every season. For this purpose, it becomes imperative to reduce the vulnerability of the population of the basin through integrated management of floods and droughts. Need assessment studies have been conducted in each country of the Volta Basin region. The national assessment have resulted in an expression of the needs of capacity-building for adaptation of populations to adapt to the adverse effects of floods and other extreme events related to climate change. These needs assessments of capacity-building at the level of each of the 6 countries have been validated by the national authorities.

In the light of the needs expressed by each country, it became imperative to proceed to the drafting of a project proposal to be submitted for funding to the Adaptation Fund (AF). The overall objective of the project of the Volta "integrate flood and drought management and early warning for Adaptation to climate change in the Volta Basin" is to strengthen the capacity of adaptation and resilience of communities and agencies target the impact of events of climate change with an integrated flood and drought management. The development of this project requires an assessment of the actions planned, as well as a management plan for environmental and social risks which will endorse environmental and social aspects.

The main objective of the project is to manage floods and drought in the Volta region and to assist the six countries in **the implementation of joint and coordinated measures to improve** their existing management plans at the regional, national and local and to build on the lessons learned of past and current projects related to **disaster risk reduction and climate adaptation**. The six riparian countries will therefore benefit **not only a framework for cross-border management of the entire basin to ensure the economic and environmental development in the long term, but also practical solutions** to mitigate a possible increase in vulnerability and build an effective network of actors. As droughts and floods are a common feature in the Volta basin region, the integrated management of water resources and the development of early warning systems should be implemented to increase community resilience to the floods and droughts events and ensure sustainable socio-economic development. It will find solutions for balanced management of water resources in order to make better use of excess water during floods and keeping it in preparation for the case of drought. In addition, at the local level, agricultural production will be adapted to these challenges with transfer of knowledge and early warnings which allow farmers to adapt their production methods. To meet the needs expressed in 2016 by a large number of stakeholders, the program will **include the selection and implementation of integrated early warning systems appropriate against floods and drought, which will allow integrating in the short term and provide seasonal indicators as part of long-term management.** The system will integrate the two risks that will be provided according to different methods (indicators that use different criteria to assess risk; models hydrologic and hydraulic informing on

threshold level; maps indicating the levels of risk through color coding). Based on the dissemination of alerts, existing systems (for example on the basin of the White Volta and the Oti River) will be implemented within a common platform. The system will be based on the open source code and free technologies, a future integration of modules covering natural and health risks additional will be planned to allow for its upgrade to a Multi Risk Early Warning System.

The program of the Volta aims to provide first cross-border large-scale integrated management strategies of floods and droughts by empowering the national meteorological and hydrological services (NMHS) and other competent authorities of the six riparian countries with robust and innovative solutions for disaster risk reduction and climate adaptation, including green solutions and participatory approaches that take into account the kind. System will use existing national hydrological models, aid to the decision-making process and a platform for early warning will be included in the cross-border early warning system.

The program will tackle climate adaptation issues to ensure cross-cutting solutions through governance, technology and the decision-making process. It will develop the underlying capacity of the national and regional institutions to maintain the long-term sustainability and to intensify the results. This will help the stakeholders at all levels by providing **guidance on the management and policy and by sharing scientific information, knowledge and best practices for integrated of the Climate Adaptation and disaster risk Reduction**. One of the main objectives will be to support the implementation of the memorandum of understanding between the Volta Basin Authority (VBA) and the six bordering countries in order to promote the sharing of data, which is currently not enough structured but required at both national and transboundary level.

The components of the project target 3 thematic areas identified by partner countries in their recent needs assessment:

1. informed decision-making by the local level at the regional level risk,
2. development of integrated measures of reduction of risks and adaptation, capacity building at cross-border level,
3. coordination of policies and the strengthening of community capacity at cross-border level.

The project activities are developed around the components as below:

- **Component 1**: Develop capabilities and frameworks established at local, national and regional levels to ensure a risk-informed decision making
- **Component 2**: Develop actions to adapt concrete and respectful of the environment with an integrated approach
- **Component 3**: Political and institutional capacity for integrated local, national and cross-border levels of flood and drought management

The project leaders which are the WMO, the VBA and the GWP-WAF is a consortium of institutions that have roles to provide any assistance and documentation available for the mission of environmental and social assessment of the project. As for the consultant, it is responsible for implementing the mission and provide expected results in accordance with the ToR of the study.

1. SCREENING OF THE ADAPTATION FUND'S 15 PRINCIPLES AGAINST THE PROJECT ACTIVTIES IN ENVIRONMENTAL, SOCIAL AND GENDER TERMS

The mission of environmental and social assessment for the Volta basin project has done an assessment based on the AF principles to be applied for the components and activities of the project. As a reminder, the 15 principles of the Adaptation Fund are the following:

- **Principle 1: Compliance with the law**. Projects/programs funded by the Adaptation Fund must be in compliance with all national and international rights applicable.
  The Implementation Entity will ensure that the project will be in accordance the national and international law applicable.
- **Principle 2: Access and equity**: Projects/programs funded by the Fund must provide fair and equitable access to the benefits of inclusive way and must not hinder the access to safe drinking water, basic health services and sanitation, energy, education, housing safe and decent working conditions and land rights. Projects/programs should not exacerbate existing inequalities, especially with respect to marginalized or vulnerable groups.
- **Principle 3: Marginalized and vulnerable groups:** Projects/programs funded by the funds must not impose any negative impact on marginalized and vulnerable groups, including children, women and girls, the elderly, indigenous peoples, the tribal groups, displaced persons, refugees, persons living with disabilities and people living with HIV/AIDS. In the proposed project/program review, enforcement entities must assess and consider the specific impacts on marginalized and vulnerable groups.
- **Principle 4: Human Rights :** Projects/programs funded by the Fund must satisfy and if necessary promote human rights as defined at international level
- **Principle 5: Gender equality and women empowerment:** Projects/programs funded by the Fund must be designed and implemented so that women and men 1) have equal opportunities to participate in accordance with the UNFPA gender equality policy; (2) receive social benefits and comparable economic; and (3) do not suffer from negative effects disproportionate during the development process.
- **Principle 6: Core labour rights:** Projects/programs funded by the Fund must satisfy such core labour standards as defined by the International Labor Organization.

- **Principle 7: Indigenous peoples**. The Fund does not fund projects/programs that are incompatible with the rights and obligations set out in the Declaration of the United Nations on the rights of indigenous peoples and other international instruments relating to the indigenous people
- **Principle 8: Involuntary resettlement**. Projects/programs funded by the Fund must be designed and implemented so as to avoid or reduce to a minimum the need for involuntary resettlement. When limited involuntary resettlement is unavoidable, due process must be respected so that displaced persons are informed of their rights, found on their options and that they be offered technical, Economic and social alternatives for possible resettlement or a fair and appropriate compensation.
- **Principle 9: Protection of the Natural Habitats**. The Fund does not fund projects/programs that would include a wrongful transformation or a reduction of critical natural habitats, including those who are (a) legally protected; (b) which are the subject of an official of protection proposal; (c) recognized by sources for their high ecological value, including as critical habitat; or (d) recognized as protected by the local indigenous or traditional communities.
- **Principle 10: Conservation and biodiversity**. Projects/programs funded by the Fund must be designed and implemented so as to avoid any reduction or significant or unjustified biodiversity loss or the introduction of invasive species.
- **Principle 11: Climate change**. Projects/programs funded by the Fund should not lead to a significant or unjustified gas emissions to greenhouse or other factors of climate change.
- **Principle 12: Pollution Prevention and efficient use of resources**. Projects/programs funded by the Fund must be designed and implemented to meet international standards to maximize efficiency and minimize the use of material resources, production of waste and pollutants
- **Principle 13: Public health**. Projects/programs funded by the Fund must be designed and implemented so as to avoid potentially negative impacts on public health.
- **Principle 14: Cultural and physical heritage**. Projects/programs funded by the Fund must be designed and implemented so as to avoid the alteration, deterioration, or removal of any physical cultural resources, cultural sites and sites with natural values unique recognized as such at the community, national or international level. Projects/programmes should also not interfere with existing access and usage of these physical and cultural resources.
- **Principle 15: Land and soil Conservation**. Projects/programs funded by the Fund must be designed and implemented so as to promote the conservation of soils and avoid the degradation or conversion of productive land, or land that make valuable services to the ecosystem.

During the entire EIA and SIA, The entire project activities were screened for any environmental and social risks according to the above 15 principles outlined in the AF's Environmental and Social Policy. As noted in the following table, all principles are applicable

in the countries and for all sites of the Volta Basin region. Specific principles were analyzed on a case-by-case basis during the field visits and in view of the exposure to one or both floods and drought hazards. It is also noted that when a specific risks is applicable and triggered, this could lead to other risks as well. The EIA and SIA identified other dependent risks and a combined mitigation measures will be developed for such risks and its negative impacts, before the project inception and during the course of project activities.

Table1 : Principles assessed on investigation sites

Sr No	ESP PRINCIPLES	BURKINA FASO	COTE-D'IVOIRE	GHANA	BENIN	TOGO	MALI
1	Compliance with law	x	x	x	x	x	x
2	Access and Equity	x	x	x	x	x	x
3	Marginalized and vulnerable Groups	x	x	x	x	x	x
4	Human Rights	x	x	x	x	x	x
5	Gender Equity and Women Empowerment	x	x	x	x	x	x
6	Core Labour Rights	x	x	x	x	x	x
7	Indigenous peoples	x	x	x	x	x	x
8	Involuntary Resettlement	x	x	x	x	x	x
9	Protection of the Natural Habitats	x	x	x	x	x	x
10	Conservation and Biodiversity	x	x	x	x	x	x
11	Climate Change	x	x	x	x	x	x
12	Pollution Prevention and efficient use of resources	x	x	x	x	x	x
13	Public Health	x	x	x	x	x	x
14	Physical and Cultural Heritage	x	x	x	x	x	x
15	Land and Soil Conservation	x	x	x	x	x	x

2. ENVIRONMENTAL AND SOCIAL REGULATION OF THE VBA COUNTRIES

Principle 1 *of the ESP of the AF (Compliance with the law)* stipulates that projects/programs funded by the Fund must be in compliance with all national and international rights applicable. Accordingly, environmental and social of the 6 countries of the basin of the Volta regulations will be applied as the legal basis of the Volta basin project environmental assessment. Different regulations in terms of the environment and that are applicable in this project are the following:

Benin

- Loi n ° 98-030 du 12 février 1999: Loi-cadre sur l'environnement au Bénin;
- Loi n ° 2010-44 du 21 octobre 2010: gestion de l'eau en République du Bénin;
- Loi n ° 87-016 du 21 septembre 1987: Législation de l'eau au Bénin;
- Décret n ° 2001-190 du 19 juin 2001: organisation de la procédure d'audition publique au Bénin;

Burkina Faso

- La loi n°006-2013/ AN du 2 Avril 2013 portant Code de l'Environnement au Burkina Faso ;
- La loi n°003-2011/ AN du 5 Avril 2011 portant code forestier au Burkina Faso
- Le Décret d'application n°2015-1187/PRES TRANS/PM/MERH/MATD/MME/MS/MARHASA/MRA/MICA/MHU/MIDT/MCT portant conditions et procédures de réalisation et de validation de l'évaluation environnementale stratégique, de l'étude et de la notice d'impact environnemental et social
- La loi n°034-2012/AN du 02 juillet 2012 portant réorganisation agraire et foncière ;
- Loi n ° 008-2014 / AN: Orientation sur le développement durable au Burkina Faso;
- Loi n ° 002-2001 / AN du 8 février 2001: Loi d'orientation sur la gestion de l'eau;
- Loi n ° 012-2014 / 2014: Orientation pour la prévention et la gestion des risques, des crises, de l'humanitaire et des catastrophes fournissant la composition de la plateforme au niveau national avec des rôles définis.

Côte d'Ivoire

- Loi n ° 96-766 du 3 octobre 1996: Législation environnementale (pour mettre en place les règles et procédures concernant l'impact des activités de développement sur l'environnement) de la Côte d'Ivoire
- Loi n ° 98-755 du 12 décembre 1998: Législation de l'eau

Ghana:

- The Environmental Assessment Regulations 1999, L.I. 1652 and its Amendment Regulations, 2002;
- The Water Resources Commission Act 1996, Act 522;
- The Local Government Act 1993, Act 462;
- The Lands Commission (LC) was established by Article 258 of the 1992 Constitution and the Lands Commission Act, 2008 (Act 767)
- Town and Country Planning Ordinance (Cap. 84) No. 13 of 1945;
- The New Labour Act 2003, Act 651;
- The State Lands Act 1962, Act 125;
- The Lands (Statutory Wayleaves) Act, 1963;
- The Rivers Act, 1903.

Mali

- La loi n ° 02-006 / AN-RM du 31/01/2006 relative à la législation sur l'eau. La législation sur l'eau stipule dans son article 2 les règles d'utilisation, de conservation, de protection et de gestion des ressources en eau.
- La loi N ° 08-033 / AN-RM du 11 août 2008: Installations classées pour la protection de l'environnement;
- Décret n ° 06-258 / P-RM du 22 juin 2009: conditions de mise en œuvre de l'audit de l'environnement;

Togo

- Loi n ° 2008-005 du 30 mai 2008: loi-cadre sur l'environnement;
- Décret n ° 2006-058 / PR du 05 juillet 2006: liste des emplois et des activités soumis à l'évaluation d'impact sur l'environnement (EIE) et les principales règles pour cette évaluation;
- Ordre n ° 18 / MERF du 09 octobre 2006: termes et procédures d'information et participation du public au processus d'EIE;
- Ordre n ° 013 / MERF du 1er septembre 2006: règlement de la procédure, méthodologie et contenu des études d'impact environnemental;
- Loi n ° 2007-011 du 13 mars 2007: décentralisation et libertés locales.

The regulatory framework in terms of taking into account the environmental and social aspects at the level of these 6 countries of the Volta basin, will allow for implementation of project activities respecting environmental and social values. These texts are consistent with those of regional and international institutions in safeguarding environmental and social matters. Environmental assessment of the Volta project relies on these regulations of Member States and in accordance with principle 1 of the ESP.

3. METHODOLOGY AND WORK PLAN

To achieve the objectives of the Environment Impact Assessment (EIA) and Social Impact Assessment (SIA) study, the methodological approach implemented by the consultant was participatory and inclusive. It takes into account the methodological approach suggested in the ToR by involving all stakeholders in the 6 countries of the Volta Basin and especially local vulnerable communities: women and the elderly and technical and administrative officials, INGO and NGO stakeholders, the associations and local groups, National and International institutions and universities related to the subject. The methodological approach is based on the following steps:

Step1: preparation and planning of the mission

- ***Scoping meeting of the study***

For greater ownership of the context of this study as well as the comprehensive approach, the consultant took part in a scoping meeting for clarification and appropriation of the approach. This meeting was attended by officials of the VBA, the GWP-WAF and the WMO team experts involved in the development of the Volta project. Exchanges helped to gain a common vision and understanding of the content of the environmental assessment mission and establish arrangements for the organization of the consultation meetings with the stakeholders following the 3 phases of the mission. To facilitate the collection of data in the field, letters were addressed to various authorities of the 6 countries to introduce the consultant and explain the purpose of the study.

- ***Development of an inception report***

At the end of the scoping meeting, the consultant prepared an inception report which describes the different phases of the implementation of the EIA and SIA study. It is on this occasion that the Gantt chart of the mission and the related tasks have been prepared and better specified.

Step 2: Literature review and data collection

The phase I of the mission according to the ToR is to perform desk study mainly literature review relevant to the project Volta. This includes the current characteristics and the basic situations, practices and interdisciplinary approaches related to the use of ecosystems (natural) resources and other environmental resources and social and cultural well-being (livelihoods and the social system) of the Volta Basin region. Some documents such as national reports on the gestion intégrée des crues (GIC) of the 6 member countries, the Charter of the water and other specific reports were provided to the consultant by the VBA. The endorsed concept note of the Volta project was also provided by WMO.

The review of these documents helped in identifying concerned people and structures to be contacted at the level of each site and in each of the countries of the basin. A sample of at least 15 people had been planned initially for the consultation on each site of the six Volta Basin countries. This consultation may vary with the realities of the sites and the need for precision in the data collection. In some cases, the consultant had to use channels of communication such as the telephone or the internet to have some necessary information.

Step 3: Sites Visits and reporting

The third step in the mission for phases II and III was conducted as stipulated in the ToR of the study mission. The consultant visited the pilot sites at the various level (urban, rural, semi-urban) of the Volta Basin, exchanging with the local communities, the institutions involved, receiving feedback on Environment and Social risks from these to finalize the ESIA report and then the ESRMP. The planned visits to the different sites were provided in the inception report and this in accordance with the recommendations of the executing entities of the Volta Basin project. At this stage, the raw information collected helped in drafting the mission report which has been developed in the next phase.

Step 4: Development of the report on Environment and Social assessment

At the end of the field mission of collecting the data and the drafting of the interim report of the ESIA, this phase consisted in the development of the ESIA report which is accompanied by an ESRMP of the project. This allows to analyze the environmental impacts and to propose mitigation measures for the 15 ESP principles of the Adaptation Fund. A mechanism for filing complaint likely to be generated by the project activities and complaint management is developed with the institutional arrangements with their roles and responsibilities for handling any reporting of complaints.

4- Summary of the investigations at the level of the sites selected for the mission.

4.1- Concerns of the stakeholders

Consultations with stakeholders were conducted on the basis of a participative methodological approach which relied, firstly, on field visits and exploitation of the basic documents, and on the other hand, on interviews with the different local communities, technical services, organizations of agricultural producers and associations of women and young people. The participatory involvement of the stakeholders during the design of the project helped in highlighting or understanding environmental and social issues, if any and their contribution for the long term sustainability of the project. For each of the meetings, the objectives and activities of

the project, in terms of economic, social and environmental issues were presented and discussed with stakeholders.

Views and perception of stakeholders, who took part in these consultations, are unanimous in recognizing the opportunity and relevance of the project "integrated flood and drought management and early warning for Climate adaptation in the Volta Basin" which WMO, VBA, GWP and the national partners of the six countries wish to implement. The reasons that have been mentioned to justify such a posture are mentioned below:

- The poor results recorded in all countries by the many initiatives occurring after the floods and droughts;
- The lack of coordination between the various stakeholders in the management of floods and drought (all 6 countries);
- The unsustainable nature of control strategies against the floods and drought that are being carried out (Togo, Mali, Burkina Faso and Ghana);
- The low level of involvement of local communities in the implementation of projects (all 6 countries);
- The strong recurrence of floods (Togo, Mali, Burkina Faso and Ghana) or drought (Benin, Côte-D'Ivoire and Ghana) in the area
- The lack of data on areas at risk of flooding and drought in all the countries of the Volta basin.

4.2- Fears and concerns of the stakeholders

The fears and concerns of stakeholders related to issues of flooding and drought is at two levels. On one hand, there are those institutional actors including town halls, prefectures and technical services and the other those of riparian actors producers and associations.

Institutional actors of the 6 countries of the basin particularly focus on the following points:

- The risk of displacement of the population with the mapping of areas at risk ;
- The support to the populations in case of early warning ;
- The risk of land dispute in case of displacement ;
- The risk of degradation of the environment in the event of the temporary movement of population.

Riparian stakeholders of the basin watercourses point out concerns listed in a summarized way in the following points:

- The reduction or loss of the areas of the fields;

- Destruction of property and displacement of people during the implementation of the project;
- The reduction of access to certain natural resources (water, forest products, etc.)
- The politicization of the project which could compromise its serene implementation.

4.3- Suggestions and recommendations of the stakeholders

The suggestions and recommendations of stakeholders can be categorized into actions that should be prime responsibility of the project which are as below:

4.3.1- Project implementation strategies

- Involve local populations in the mapping of areas at risk (NGO and producers associations, local administration, etc) ;
- Involve and sensitize the authorities, religious leaders, women's organizations and the populations on the stakes of the project (technical services, customary leaders and groups);
- Promote sustainable and intensive agriculture to limit agricultural expansion (farmers in all countries, agriculture and forest management technical services).
- The quick start of the actions of the project, especially the early alert/warning system (populations of all countries) ;

4.3.2- Development actions

- The awareness of the local populations on the clearing of the banks of the watercourse and compliance of the protective and restrictive strip zones along the watercourses and the water bodies;
- The restoration of the banks by actions of reforestation with adapted local plant species;
- The use of enhanced or even early seeds so that the harvests occur before the flood;
- Channel if possible floodwaters to points of storage for use during the off-season production period;
- Working closely with the community basic structures by promoting development projects (local associations and NGO).

6- Initial state of the socio-economic environment

6.1- National portion of Togo

The commune of Mandouri is located downstream of the Kompienga in the North - East of Togo. The climate is tropical with a long dry season. The vegetation consists of dry forest, dry savannahs and especially dominated by the agricultural landscape. The hydrological regime is of tropical type with a period of high waters between the months of August and October. The floods are cyclical and the last date of event was in 2015. They became frequent since the construction of the Kompienga dam in the Burkina Faso region. The consequences of these floods are especially important such as loss of crops, damage to houses and livestock's. The population is mostly farmers. The main agriculture crops are maize, rice, millet and cotton.

6.2- National portion of Benin

The commune of Tanguiéta and Materi are all in the Northwest of Benin in the Atacora region. Their climate is characterized by the alternation of a dry season and a rainy season. The vegetation characteristic is dominated by the degraded natural formations made up of treed and shrubby savannas, forest bands, plantations and especially of forest reserves. There is also the hunting area and Pendjari Park. Nowadays, this vegetation is under a strong human influence, especially in the town of Materi. The natural vegetation is endangered and replaced by fields, fallows, and settlements. The population is mostly farmers who produce corn, yams, cassava, sorghum, millet, rice and cowpeas. Floods are frequent especially in districts that are located on the edge of the Pendjari and cause of many damage of property and loss of life.

6.3- National portion of Mali

The basin of the river Volta is represented in Mali by the sub-basin of the river Sourou located in the Region of Mopti, a tributary of the river Volta flowing for about 80 km in Mali before joining in Mouhoun region of Burkina Faso (previously called Black Volta).

Sourou in its whole hydrographic configuration is a tributary of the stream called Mouhoun (ex - Black Volta) in Burkina Faso. The Mouhoun itself is a perennial important arm of the river Volta, which gains the permanence of its flows to many springs located in his upper stream in Burkina Faso basin. It drains about a territory of 15 256 square kilometers in Burkina Faso and 15 392 km² in the Republic of Mali (equivalent to 1% of the total area of the basin), is a region of almost 30 648 shared km² almost ' equal area between Burkina Faso (49.8%) and Mali (50.2%).

In Mali, the basin of the Sourou is located in the southern part of the 5th Region of Mali (Mopti), some 675 km to the northeast of Bamako. It is limited to the West and Northwest by the cliff of Bandiagara, North and Northeast by Seno Mango, East, South and Southwest by the Burkina Faso territory. It stretches on nearly 80 km and covers three administrative districts in the Mopti Region, namely the circles of Bankass, Koro, and a small portion of the circle of Douentza (the commune of Mondoro).

In total twenty-six town are located in the basin of the Sourou in Mali and administratively distributed as follows: all 12 communes in the circle of Bankass, 13 municipalities on 16 in Koro circle and the commune of Mondoro in the circle of Douentza.

6.4- National portion of Ghana

The Bui damregion, the Akosombo dam, Northeast, and Northwest of Ghana were slected for the assessment of the environmental and social risks and impacts of the project.

The Region of North - East (EBU), unlike the Region of Akosombo, has the highest proportion of poor people in the country and whose livelihoods are very dependent on climate, including agriculture. Agriculture employs about 80% of the economically active population. The Region borders with Burkina Faso, the first area to be flooded after the opening of the dams in Burkina Faso which occurs almost every year. It has also been shown that the Region is most vulnerable to risks with less food security than other parts of Ghana. In 2007, all eight districts in the region have been affected by floods that have affected more than 40,000 people, damaging more than 11,000 homes (they were completely destroyed for most).

6.5- National portion of Burkina Faso

The Center, North Central and Central-East region of Burkina Faso have been visited for consultation during the mission. In these areas, women are particularly vulnerable, with less access to education, employment and the soil. The extension of the areas prone to flooding in Ouagadougou is great because of its flat topography. In 2009, Ouagadougou suffered the worst flooding in 50 years. The number of people affected is estimated at 150,000. Significant damage occurred on housing infrastructure, agriculture, livestock. In areas exposed to floods, people on semi-urban region, their decisions appear to be conditioned by poverty and not by their level of knowledge of the risk.

Bagré level which has a multi-purpose dam on the White Volta, located near the Bagré Village in Burkina Faso, practice the gravity irrigation to nearly 1 440 hectares of farmland with 10% of the electricity provided to the country to help ensure energy

and food security. The release of the waters of the dam and its spill are controlled and information about the spill are shared with Ghana and therefore residents downstream.

In the early 1970s, Burkina Faso has suffered from a series of droughts, with devastating consequences for the inhabitants of the entire region.

6.6- National portion of Côte d'Ivoire

At the level of the Côte d'Ivoire, the regions of Bouna and Bondoukou have been visited for the data collection. This part of the country lies in the area of Savannah with a rainfall level that tends to decrease.

The relief of the Ivorian party in the basin is generally low with altitudes ranging from 200 to 300 meters. The general slope index is between 25 and 50 cm/km. Two major types of relief stand out in this part. In the northern part of the basin or area of Savannah, there is presence of relief to medium or strong slopes which is a factor in the deep soil and moisture that allows agricultural use of soil.

The presence of low slopes combined with a significant hardening of surface is clearly unfavorable to Agriculture. The main thalwegs are generally small and made up of coarse, sandy and very filtering soils. This area is little hilly so monotonous. However, its offers a few mountains: mountain Tehini, mountain Boutourou and mountain Yevele.

There are also enough secondary depressions which are areas prone of moisture.

The vegetation is made up of two types of Savannas: the Sudano-Guinean savanna and wooded Savannah. We must also add the clear forest to these 2 types of savannahs. Plagued by abusive deforestation vegetation is replaced by shrubs and herbs

Shallow gravel formations can be found in this part of the soil and frequent outcrops of lateritic hardening. Encountered soils are soils especially Browns eutrophic, deep soils with good physical properties (coffee plantation - cocoa). We also found in this part, an association of ferreous soils, strongly or moderately unsaturated in the South of Bondoukou.

7- Identification and analysis of the environmental and social impacts of the project

The social impacts are the consequences for people, an event that changes their way of life and work, their relationships, their organization and their role as members of the society.

7. 1- Assessment of the impacts according to the stakeholders consulted

Table 2 : Assessment of the impacts by the stakeholders consulted

Expected results of the project	Environnemental impacts		Social Impacts	
	Positive	Negative	Positive	Negative
Better knowledge of the risks, the impacts of climate change and the management of risk through the sharing of knowledge and participatory mechanisms	Major for the reduction of the consequences of disasters on the biophysical environment		Major for the reduction of the consequences of disasters on the human environment	
Filling the gap for the integration of knowledge about future scenarios (economic, urban, climate, etc)			Major for the acquisition of knowledge and the increase of resilience	
Strategies of risk management in the short, medium and long term to be integrate into development plans (economic, social and environmental aspects)	Major for the reduction of the environmental consequences	Minor because the national development plans include the management of environmental impacts	Major by minimizing the social consequences	Minor because might include low risk
Improvement of instruments of forecasting of floods and drought and the SAP and coordination at the transboundary level to reduce disaster risk in vulnerable communities			Major for effective management of disasters	Minor because it involves social risk
Development of adaptation and mitigation measures in the medium and long term (structural and non-structural) in the priority areas and updates based on the lessons learned and the monitoring tools	Major for the increase of protection measures for watercourses and forests	Minor related to abiotic factors	Major for the reduction of the consequences of disasters on the biophysical environment	Minor for the management of the residual effects of the impacts
Increased awareness of vulnerable populations to the hydrometeorological risks, strategies of prevention, preparation, response and mitigation through educational programmes using participatory solutions			Major for the increase of resilience of the populations and the understanding of the real scientific causes of extreme events	Minor because risk of exacerbating tensions between populations
Tools for planning and operational mechanisms improved and tested to ensure effective preparation and response to the floods and drought	Major for the prevention of disaster management		Major for the mitigation of the social impacts	
Local, national and regional institutions (including weather and hydrological) are trained in risk management and have a clear understanding of their role and their coordination mechanisms	Major for the prevention of disaster management		Major for the mitigation of the social impacts	

A collaborative process is developed to ensure that these instruments and strategies are accepted by local communities and adapted to the context			Major for the mitigation of the social impacts	Minor because there is a risk of internal conflicts

7.2- The environmental and social impacts of the project

A cross-analysis of the actions foreseen by the project and the field investigations at the level of the national parts of the Volta basin in the 6 countries, helped to identify positive and negative impacts of the project of integrated management of floods and droughts. These impacts are environmental and social, and are ranked positive or negative. The analysis of these impacts will allow to propose mitigation measures, compensation or bonus according to the impact categories.

The identified negative impacts are:

- Reduction of the areas of the fields and other farms (indirect alignment with the principle 10 and 15 of AF ESP)
- The risks of land disputes between farmers and national agencies (in-direct alignment with the principle 15 of AF ESP)
- TThe disruption of the habits and customs of populations victims of disasters (in-direct alignment with the principle 10 of AF ESP)
- The risk of epidemics after disasters (concentration of population in the reception sites) (in-direct alignment with the principle 13 of AF ESP)

The positive impacts are following:

- Reduction of losses in human lives and property damage associated with floods and drought;
- Development of behavior change ;
- Poverty reduction, as well as the improvement of the well-being of the people especially the vulnerable
- Protection and stabilization of the banks of the watercourses and limitation of the disabled and floods
- Promotion of intensive agriculture that will limit the expansion of the agricultural spaces
- Capacity-building of the people and the authorities
- Promotion of food self-sufficiency
- Promotion of the activities of reforestation and recovery of areas degraded by human activities
- Reduction of the vulnerability of the people living in the Volta basin

- Strengthening governance in the management of natural disasters
- Capacity-building in the management of household waste and the fight against various forms of water pollution

7.3- Mitigation and enhancement of the identified impacts

The impacts identified above in the light of the implementation of the project in the area of the Volta basin should be accompanied by mitigation (for negative impacts) actions and bonus (for those positive). The following table provides a proposal of these measures in terms of each impact.

Table 3 : Mitigation and enhancement of the impacts

Item	Impacts	Impact Type	Mitigation /enhancement actions
1	Reduction of the vulnerability of the people living in the basin of the Volta	Positive-Direct	Enhancement actions: - Promote project methodologies and tools for the other part of the countries (region outside of the Volta Basin) -Training and information gathering of the actors for the post-project evaluation - Dissemination of good practices through social media, school curriculum, consultation meeting between beneficiaries -Foster preventive actions through national institution in the risk areas leading to more resilient industrial infrastructures and activities (similar to flood proofing)
2	Strengthening governance in the management of natural disasters	Positive-Direct	Enhancement actions: -Training of actors for the new or revised policies, plans and guidelines in the framework of future implementation -Awareness-raising through local media, during national conferences and seminars. - Ensure changes are adhered in the future national and international development projects
3	Capacity-building in the management of household waste and the fight against various forms of water	Positive - Direct	Enhancement actions: -Awareness-raising for the populations -Support for sanitation of towns and villages for clean-up operations, landscaping and plantation -Identify added value to the waste with appropriate techniques (recycling)

	pollution		
4	Reduction of the areas of the fields and other farms	Indirect-negative	Mitigation actions: - Safeguard actions (dripped irrigation for drought period, growing crops appropriate to the reduced cultivation period) to be defined with local stakeholders -A campaign of communication organized with the community services during and after the project activities -Avoid pilot sites and activities that would lead to incompatible uses of land, unacceptable social conflicts, and conflicts with respect to land tenure -Consultation (consult women and men, and ensure their participation in planning and implementation) and awareness support to agricultural intensification
5	The risks of land disputes between farmers and agencies	Indirect	Mitigation actions: -Creation of a framework for consultation and social dialogue between operators for the management of land conflicts - Presenting set of potential solutions (national laws, policies, human rights) using evidence-base to avoid land disputes
6	The disruption of the habits and customs of populations victims of disasters	Indirect	Mitigation actions: -Cooperation with the custodians of traditions - Formation of the local committee to analyze the issue and provide safeguard solutions in agreement with the stakeholders
7	The risk of epidemics after disasters (concentration in the reception sites)	Indirect	Mitigation actions: -Develop a health monitoring program in the case of natural disaster - Awareness through local media or health volunteers about the epidemics and precaution measures - Participation of the representatives from the health department during the project consultation meetings

8	The reduction of losses in human lives and property damage associated with floods and drought	Positive-Direct	Enhancement actions: - Revise preparedness plan for better response to the early warning information supporting the timely evacuation of vulnerable people and assets. -Drills and simulation exercises to increase preparedness -Feedback reports and integration of main conclusions in the disaster management plan -Raise awareness with emphasis on the most vulnerable areas and people. - Capacity-building on flood proofing
9	Development of a change in people's behaviour	Positive-Direct	Enhancement actions: -Raising awareness on specific topics (risks maps, climate scenarios, EWS, ecosystem services, bio-diversity, protection of natural habitat) - Participation into the local committee and women associations meetings and continuous engagement in the activities
10	Poverty reduction, as well as the improvement of the well-being of the people especially the vulnerable	Positive-Direct	Enhancement actions: -Selection of appropriate resilient crops and cultivation techniques that improves income and well-being -More development projects for poverty reduction and coordination with the other concerned agencies -Support for the income generating activities for women and youth with better indicators for climate variabilities -Youth training to various new jobs linked to adaptation measures and operational hydrology
11	Protection and stabilization of the banks of the watercourses and limitation of the sediment transport, silting and floods	Positive-Indirect	Enhancement actions: -Awareness through risks maps will help in plantations, and development of agricultural sites for the promotion of intensive agriculture - Sharing success stories over the basin

12	Promotion of intensive agriculture that will limit the expansion of the agricultural spaces	Positive-indirect	Enhancement actions: -Support with agricultural equipment for better management of agricultural areas -Capacity building of relevant stakeholders and beneficiaries on high-yield crops and irrigation techniques
13	Capacity-building of the people and the authorities	Positive-direct	Enhancement actions: -Sharing experiences of the stakeholders in the pool training meeting on themes related to development, disaster management and climate change adaptation - targeting school and universities for more courses and research studies on biodiversity and ecosystem services
14	Promotion of food self-sufficiency	Positive-indirect	Enhancement actions: -Support to agricultural intensification - Use of high yield, climate adaptive and resilient seeds - Support to obtain agricultural (bio) fertilizers and other intrants and provide technical support for an ecologically sustainable use - Micro-insurance support by the government
15	Promotion of the activities of reforestation and recovery of areas degraded by human activities	Positive-direct	Enhancement actions: -Awareness with the flood and drought risks map and Flood Green Guide testing involving groups and associations in the reforestation and recovery of land - Support for the selection of climate-resilient species - Rehabilitation of polluted areas

4. MODALITIES OF PUBLIC CONSULTATION

For public consultations on sites identified in the national parts of the basin of the Volta, a guide has been prepared for the collection of data. This guide is supported by a survey sheet developed by WMO which was also used in the field. At the level of each site, collection of information and exchanges concerned resource people, vulnerable people, associations, local administration, law enforcement agencies to assist populations in case of emergency, services of security, etc. An indicative list of contacts at the level of each site was provided by the VBA following the inception meeting. At the level of each site, a sample of at least 15 people (the representatives

of the population and agencies) were contacted within varied structures (check Annex for the list of people consulted). For interviews, a participatory approach such as focus group discussions and semi-structured interviews was selected. The matrix SWOT (strength, weakness, opportunity and threat) was used also to deepen the discussions in some communities at the level of the sites. These tools are intended to effectively take into account the concerns of the different social layers, minorities and particularly vulnerable people of each project site. Some officials of structures were joined by phone or e-mail in order to collect their views and concerns on specific issues.

5. Checklist of the environmental and social principles of the AF

Following the field visits and discussions with partners on the activities of the project in relation to the ESP of the Adaptation Fund, it was noted that all principles are applicable in all countries and for all the sites of the regions of the basin of the Volta. The following table gives an overview of potential risks to take into account in the mitigation plan according to each environment, social and gender principles of the AF.

Table 4: Checklist of the ESP

Checklist of environmental and social principles	No further assessment required for compliance	Potential impacts and risks – further assessment and management required for compliance
Compliance with the Law	No further assessment is required. The project will ensure that the existing national and transboundary laws, policies and guidelines of Volta Basin will be followed during the implementation of adaptation measures or in capacity development activities. The project will not require any prior environmental and construction legal and regulatory permission as there are no physical or structural construction planned in the project activities. If required international laws on data sharing protocol among different countries will be consulted. During the design of the project especially component 3.1: both regional and national stakeholders will be consulted to update data sharing protocol/laws between the six countries.	

Access and Equity	No further assessment is required. The project activities will provide impartial and equitable access to project benefits. The project design is developed to allow representative of vulnerable groups in every capacity development trainings/workshops. The selected participants will be expected to disseminate the training knowledge to other members of communities or organisations so that everyone will have fair and equitable access to all project benefits. The selection of beneficiaries will also be made in consultation with local practices, traditions and access to social facilities. Pilot testing in each country will provide opportunities to involve all stakeholders including vulnerable groups.	However, the project has capacity development activities to which only small percentage of the communities will be able to participate. The project will ensure that these representatives of communities will further disseminate the information to wider groups.
Marginalized and Vulnerable Groups	No further assessment is required. The project will contribute to the reduction of existing inequalities for EWS for floods and drought, particularly those affecting marginalized or vulnerable groups dependent on agriculture or living in urban areas. The EWS system for floods and drought will be available through technological sources. The members of communities and local agencies will be provided with adequate knowledge and explanations about the systems to use it for their own benefits. Community-based flood and drought management activities will support the participation of marginalized and vulnerable groups and their appropriation of projects benefits.	There is a risk that vulnerable and marginalized groups will have insufficient knowledge and access to technological devices such as mobile phones or lack of good cellular connectivity specially required for component 2.1 of the proposed activities. To avoid the exclusion of marginalized and vulnerable communities, local radio channels and traditional practices will be implemented to reach these groups especially women, girls, elderly, physically challenged individuals.
Human Rights	No further assessment is required. The proposed activities are or will not be against any of the established international human rights. Moreover, the proposed project will promote the basic human rights of access to water,	

	food and information. The project will provide opportunity for every individual to give their views, perceptions and needs in developing better climate change adaptation measures.	
Gender Equity and Women's Empowerment	No further assessment is required. The proposed project will improve the gender equity and women empowerment through the WMO developed tool: Training Manual for mainstreaming gender in End to End Early Warning system for Floods and integrated Flood Management through a participatory design approach. This will help in increasing the participation of women, girls and other vulnerable groups in Flood and Drought management activities as well as decision making processes.	The proposed project is targeting region where men occupy the majority of the leadership positions. Women participation to disaster preparedness and decision making is often limited due to cultural and social norms. There is therefore a risk that women will not benefit equitably from the proposed adaptation measures and capacity-development interventions. Planning of the participative activities will ensure that women and representative of women associations will be sufficiently well represented
Core Labour Rights	No further assessment is required. The project will be implemented and managed in compliance with the countries designated labour laws. No individual will be hired without pay and the payment will be according to the countries labour legislation/laws. Children's labour will be forbidden and it will not be accepted from other project partner agencies. Local communities will be involved in the adaptation measures but will not be exposed to any risk of accidents. Core labour rights will be respected and considered in project design and implementation.	
Indigenous Peoples	No further assessment is required. The indigenous population in the region will be consulted and involved during the design and implementation of the project activities. The traditional knowledge of indigenous people on Flood and Drought will be useful when preparing the risk maps, the early warnings and	There is a risk that the traditional use of water resources; irrigation system and land use pattern will be challenged. Therefore, a detailed analysis will be carried out by local and national agencies to understand the traditional use of natural resources especially regarding to water

	information dissemination.	and land use.
Involuntary Resettlement	There are no activities proposed in the project which will create direct involuntary resettlement of communities. However, the risks of displacement of the population after the mapping of floods and drought risk areas could be possible as some areas could be classified as high risk for the loss of life. On the basis of evidence-based and scientific information, the agencies will propose new prevention plan to prohibit future settlement in the high risk areas.	A built-in safeguard approach will be defined for minimizing the negative effects of involuntary settlements. In case of involuntary resettlement, the population will be informed of their rights in a timely manner, made aware of grievance mechanism, consulted on their options and, offered technical, economically resettlement alternatives or fair and adequate compensation. The displaced population will face challenge in terms of acquiring resources for living (house, food and livelihood) and social integration with the new communities. The project will ensure that activities, especially with the local administrative services provide support in terms of strategies or actions in case of population displacement
Protection of Natural Habitats	There are no potential direct risks to the protection of ecosystems and its natural habitats and biological diversity through the project activities. There is a possibility of in-direct risks through the revised policies and plans at national and transboundary scale decreasing the protection level of critical habitats, Natural and nature-based solutions will be promoted using the Flood Green Guide by WWF, but they will not be implemented in the course of the Volta project as they would need detailed ecological assessment.	The existing and new policies, plans and activities to protect natural habitats will be screened with the stakeholders to ensure that the critical habitats are legally protected through convention on wetlands such as RAMSAR, Iran, 1971. and consultation with authoritative sources like IUCN, UNESCO as well as indigenous communities. Furthermore the activities under output 1.2.3 will consider native species characteristics and critical values for defining environmental thresholds.

Conservation of Biological Diversity	There will be no direct risks associated with the conservation of biological diversity as the project activities will not involve any physical action on natural resources and introduce any known invasive species. The project activities (activities under output 1.1.1, 1.2.1, 1.2.2, 1.2.3, 2.1.3, 2.1.4) will provide opportunities to improve the understanding of natural processes in relationship with the water cycle. Nevertheless, the project activities could trigger changes of agricultural and irrigation practices and use of pesticides. Also, The outcomes (flood and drought risks maps, EWS information) of the project might lead to encroachment on the protected areas, buffer zones and natural habitats.	The project activities will ensure that the principles of the Convention on Biological diversity (CBD) which has been signed by the six countries between 2011 and 2017[1] will be followed and supported. Furthermore, the National Biodiversity Strategy and Action Plan of the countries will provide valuable information and methodologies, opportunities to disseminate information as well as coordination at the national level and for the transboundary level. The project will promote planning for activities of biodiversity conservation, such as reforestation, nature based solutions through an assessment at pilot sites with national concerned agencies. The project will promote capacity building and peer learning to strengthen the efficient management of natural resources, including aquatic species, animals and forests.
Climate Change	No further assessment is required. The proposed project activities will not result in any greenhouse gas emission to the atmosphere and deforestation, so there will not be any impact to climate change. Furthermore, the project does not only increase the flood and drought adaptation capacity and resilience of the local population but also contributes to develop better governance structure, policies and plan at both national and regional level for climate change adaptation.	Actions to increase the resilience of populations are to be expected at the local level (development of agricultural perimeters, support of disadvantaged groups to income-generating activities.)
Pollution Prevention and Resource Efficiency	No further assessment is required. The project activities are not expected to result in water, air and soil pollution.	The project will create awareness through risks maps and also provide technical support to the water management committee in the clearance or collection of household waste that fills the rivers and are often source of floods and spreading of polluted waters.

[1] https://www.cbd.int/nbsap/about/latest/default.shtml

		The project (through component 2 and 3) will strengthen the technical and organizational capacities for the rational use of water at both national and transboundary level with clear guidelines, policies and action plans.
Public Health	No further assessment is required. The project activities should not have negative effect on public health. On the contrary, it will contribute to prevent the population from natural disasters, to improve income for getting access to health facilities, etc. Nevertheless in case of disaster, the displacements of the populations can be sources of epidemics due to the lack of hygiene	The project will identify the communities at risks which are prone to inundation and provide awareness of best practices for health related safety during various capacity building activities. The project will promote planning for a health surveillance program to deal with the disasters. The project will regularly promote, inform and sensitize the populations on diseases related to the presence of flood water (malaria, typhoid fever, Amoebiasis, Cholera etc.);
Physical and Cultural Heritage	No further assessment is required. The project does not have any activity related to affecting physical and cultural heritages. The purpose of the project is to develop better management of water resources and have traditional and cultural integration among the individuals.	Participatory design and mapping approach under output 2.2.3–will involve local communities and authorities to identify areas of physical and cultural significance and ensure that community-based flood and drought management activities will not negatively impact them.
Lands and Soil Conservation	No further assessment is required. The project will promote the conservation of soil and land resources, especially through the selection of natural and nature-based solution with environmental-friendly solutions.	The project will contribute to improve agricultural practice and help to build the capacity of farmers and technicians.

CONCLUSION

The environmental and social assessment report of the project is the result of consultations and collect data at the various level of each of the 6 countries of the Volta basin. These consultations have served to support the synthesis of reports and other documents which were consulted by the consultant before, during and after his mission.

The purpose of the ESIA report is to identify the potential impacts that may be caused by the implementation of the project on integrated management of the flood and drought in the area of the Volta Basin. It should be noted that this project carried by the WMO and his collaborators, is supported by all stakeholders consulted because of the relevance of the actions envisaged and the context of news of extreme climate events that are major constraints to any action of production for the benefit of the citizens. Few concerns were raised and recommendations have been made by the consulted stakeholders, and this served to the identification of expected impacts and the proposal of measures for proper management during the implementation of the project. An environmental and social risk management plan is developed in support of this report, which summarizes the procedure to resolve any risks encountered during the implementation of the project.

ANNEXES

1. *ToR of the mission*
2. *Map of the sites selected for the field operation*
3. *Interview guide*
4. *Chronogram of the mission*
5. *List of contacts consulted from the various sites*

ANNEX 1 : ToR of the mission

Terms of Reference (ToR) for the Individual Consultant

Introduction

This Terms of Reference (ToR) is drafted to define the overall responsibilities of external Consultant hired to conduct Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) studies under the Adaptation Fund (AF) funded programme 'Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin' along with the development of the Environment and Social Risk Management Plan (ESRMP).

The Adaptation Fund is a finance mechanism provided for concrete adaptation projects and programme under Kyoto protocol of the United Nations Framework Convention on Climate Change (UNFCCC). World Meteorological Organization (WMO) is accredited as a Multilateral Implementing Entity (MIE) since 2010.

Programme Background

During 2014-2016 assessment of capacity building needs of the six riparian countries and the Volta Basin was performed respectively by national experts and a regional expert in a consultative process with the main relevant stakeholders to form the basis for integrated flood management projects. A need for improving and complementing the adaptation plans, strategies, policies investments and measures on the climate-based threats especially floods and drought events in the Volta Basin region was identified.

The overall goal of the Volta project is to strengthen target agencies and communities' resilience and adaptation capacity to the impact of climate change events with integrated management of Floods and Drought.

Programme Objectives:

- Assist the six Volta river riparian countries (Benin, Burkina Faso, Cote d'Ivoire, Ghana, Mali and Togo) in the implementation of coordinated and joint measures to improve environmental social and economic development through flood and drought risk maps and future scenarios for the climate variability and change.
- Support in developing appropriate End-to-End Early Warning Systems for Floods and Droughts and capacity development activities for climate adaptation measures and mainstreaming gender.
- Providing policy and management guidance by sharing scientific information, knowledge and best practices for integrated disaster risk reduction and climate adaptation.

Under the Operational and Policy Guidelines of the Adaptation Fund, it is requested that each project or programme funded by the Adaptation Fund should carry out

Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) studies in compliance with the Fund's Environmental and Social Policy (ESP), designed and implemented to meet Adaptation Funds Environmental and Social principles.

EIA and SIA studies shall be conducted between April-May 2018 (the final preparation stage) in order to present the result in the programme proposal. The EIA and SIA consultation will involve meetings with agencies (ministries of natural resources and environment, water and irrigation, economy and finance, planning and development, tourism, women and child development etc.) and field visits to communities (involving women, marginalized, minority and indigenous people) dependent on natural resources and prone to regular climate variability and change events. It will be useful to present the proposed programme activities, identify the environmental and social risks which could arise from the Volta programme activities and to draft necessary action plan, legislation and institutional capacities to mitigate the environmental and social risks and negative impacts as well as to enhance positive impacts and opportunities within a reasonable timeframe.

Scope of the Work

Under the supervision of the Project Officer in close collaboration with executing entities and national partners of the six countries the consultant will undertake the following tasks:

Phase -I (10 working days)

1. Review relevant documentation and literature related to the Volta programme including the present characteristics and baseline situations, interdisciplinary practices and approaches associated with the use of natural resources (ecosystems and other environmental resources) and social and cultural welfare (livelihood and social system) in the Volta Basin region.
2. Screen and assess the programme activities compliance against the Adaptation Fund ESP and its 15 principles.
3. Consultation with the relevant stakeholders (list of contacts will be provided by WMO in collaboration with Volta Basin Authority Global Water Partnership West Africa and national partners) about the process of conducting EIA and SIA studies and preparing the Environmental and social risk management plan.
4. Develop based on EIA and SIA best practices a screening, impact assessment and monitoring procedure or method to identify potential environmental and social effects and impacts of the programme activities, and to determine the severity of those risks on the communities and ecosystem, potential measures to mitigate them as well as a clear plan for the project to monitor the follow-up. This shall also cover the identification of relevant

measures to enhance potential positive impacts and opportunities related to the programme activities.

5. Based on the tasks above perform a desk study to start the screening of the programme.

Phase -II (15 working days)

1. Visit to 5 to 10 locations within the Volta Basin region and engage with the relevant stakeholders (regional and national agencies and individuals of communities including members of the marginalized, vulnerable and minority groups, expected to reach around 80-100 persons for each of the consultant), to assess the potential risks of the proposed project interventions against the 15 Principles of the ESP of the Adaptation Fund and in accordance with the national regulations or laws on social and environment risk assessments. A first list of pilot areas, identified in the Volta project concept note, is provided in Annex 1, the final selection will be achieved in consultation with Volta Basin Authority (VBA) Global Water Partnership-West Africa (GWP-WAF) and partners before the beginning of the consultancy.
2. Carry out an assessment of the potential environment and social risks to identify their impacts.
3. The consultant will additionally request the feedback of the consulted individuals about the benefits of the future Volta programme output, such as the VoltAlarm Early Warning System prototype as per the instructions of the contracting organization.
4. Compile the finding into an Environmental and Social Impact Assessment (ESIA) report, which
    a. Contains an executive summary that clearly outlines the information necessary for the general public to understand the decision making process leading to the proposed programme.
    b. Summarizes the applicable domestic and international law on environment and social segment.
    c. Explains which principles have been initiated during the screening, impact assessment.
    d. Describes the screening and impact assessment procedure, includes pictures and profile.
    e. Contains detailed and well-structured findings of the ESIA.
    f. Describes possible risk mitigation measures as well as possible measure for enhancing positive impacts and opportunities of the programme activities that shall be taken to ensure consistency with the ESP Principles and applicable host country laws and regulations.

g. Develops a monitoring program commensurate with actions identified in the ESMP to help determine if actions are appropriately mitigating the risk/ impact or if they need to be modified in order to achieve the intended outcome.
h. Conclusion.

i. Presents Endorsement letters from the designated authorities of the six countries

j. Lists consulted individuals from agencies and communities with their details and signature.

Phase -III (15 working days)

5. Submit the draft ESIA report (around 20 pages with detailed information on the screening and impact assessment process and findings should be made available as an annex) to the implementing, executing and national partners/ stakeholders of the six countries for their agreement and endorsement.

6. Develop an Environmental and Social Risk Management Plan (ESRMP of maximum 10 pages), which may be activated to manage those risks and/or impacts that are identified in the assessment process, and that cannot be avoided during the implementation period. The ESRMP will be formulated in keeping with the prescribed format, content and quality required by the Adaptation Fund Board ES Policy. This includes the following tasks and addresses the following information:

   a. Summary description of the project/programme.
   b. Screening and categorization.
   c. Summary of the environmental and social impact assessment.
   d. Environmental and social risk management plan (ESRMP).
   e. Institutional arrangements.
   f. Monitoring and evaluation arrangements (M&E), and
   g. Description of the grievance mechanism.

This document should also include the details of consultations along with the institutional, operational and financial arrangements for the environmental and social safeguarding activities.

Expected Deliverables

The expected deliverables of this assignment in each phase are:

I. An inception report highlighting tentative methodology inclusive of a detailed work plan and a stakeholders consultation plan.

II. A report on the stakeholders consultation conducted on EIA and SIA following the Adaptation Fund related guidance in the six programme countries.
III. -A draft and a final Environmental and Social Impact Assessment (ESIA) report, which will be submitted to all stakeholders to gather their comment and improvements and for their approval.

-Final version of the ESRMP as prescribed in point 5. This shall include a proposed Communication and Consultation and Stakeholders Engagement Plan to support the programme implementation.

Specifications of the Consultancy

Type: The type of consultancy is an individual consultant or a firm registered in one of the six Volta river basin riparian countries.

Number of consultants to be hired: 1 to 2 (each consultant will cover a specific region of the Volta Basin, for example for 2 consultants:

- Burkina Faso/Mali/Benin.
- Ghana/Togo/Côte d'Ivoire).

Duration: The entire consultancy will be undertaken in close collaboration with the Executing Entities. The assessment should be undertaken in parallel with the consultation processes. The number of working days is estimated to cover a period of maximum 40 days.

Qualifications:

a. Post-graduate degree in Environmental Management, Development Studies, or related discipline in social science.
b. At least 5 years of proven experience in conducting social and environmental assessments and demonstrated knowledge of development of an ESMP for a programme of a related nature.
c. Excellent knowledge of the French and English language (both spoken and written) and excellent communication skills.
d. Good knowledge of the environment laws of the six riparian countries and the systems in place for implementation.

e. Knowledge and/or familiarity with the social dynamics in the Volta Basin countries and/or of rural communities such as those where the works may be located.

f. Ability to work well with Government officials and community individuals or groups in the Volta Basin region.

Reporting/ Coordination

The consultant shall forward all the reports to the WMO project officer, in charge of the Adaptation Fund project formulation, and liaise closely with the Volta Basin Authority Executive Directorate Office and the Global Water Partnership (GWP) West Africa Regional Office.

Financial arrangement

The total budget to carry out the assignment is …. to cover the overall costs including fees of Consultants for the assessment study, their travel cost and DSA.

This part needs to be discussed with GWP and VBA, depending on the expert fees, practical issues (visa) and number of potential candidates.

For Background information

• Volta programme document

https://www.adaptation-fund.org/project/benin-burkina-faso-cote-divoire-ghana-mali-togo-integrating-flood-drought-management-early-warning-climate-change-adaptation-volta-basin/

• Policies and Guidance document (including operational policies and guidance on Environmental, Social and Gender Policy) of the Adaptation Fund

https://www.adaptation-fund.org/documents-publications/operational-policies-guidelines/

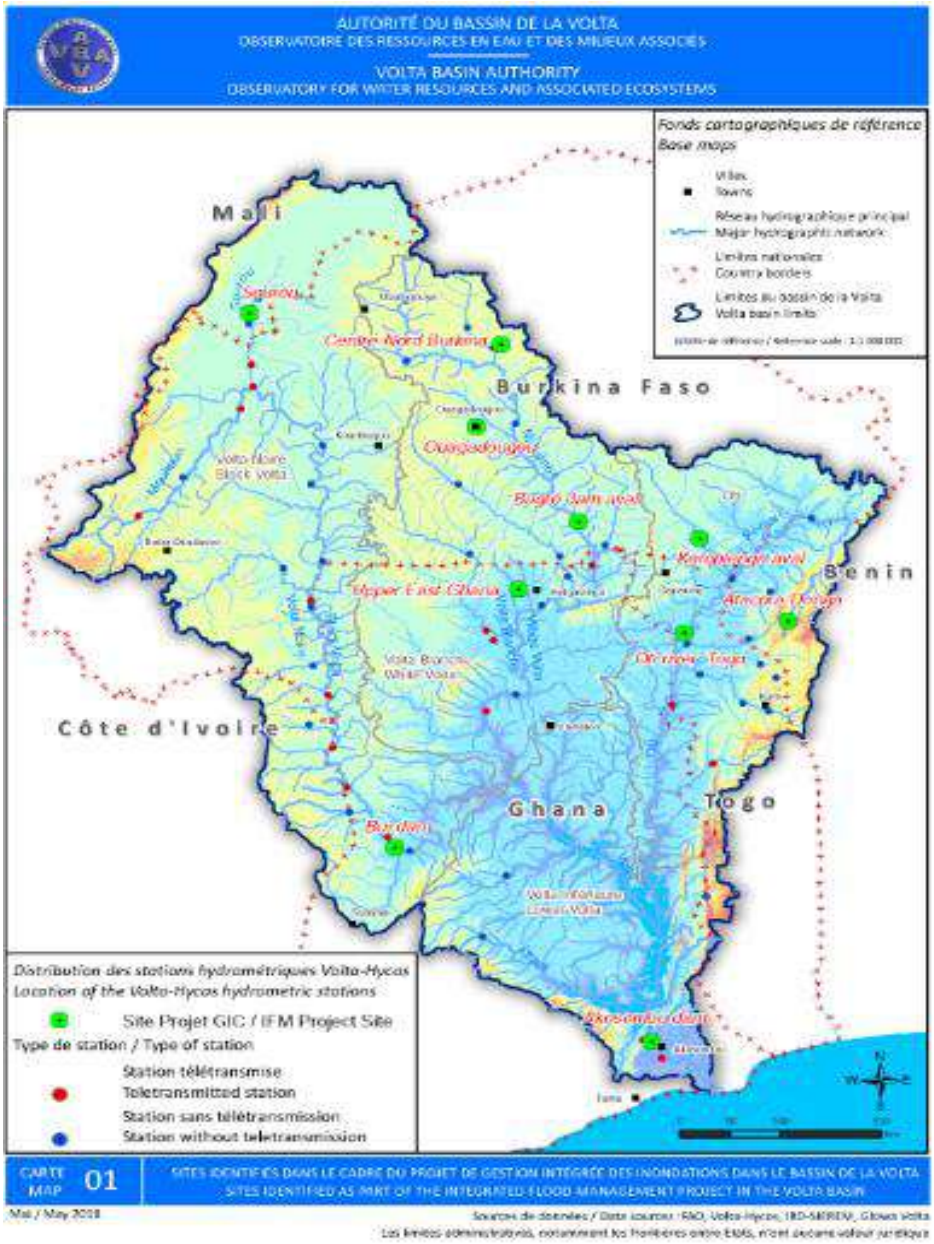
Annex 1: First list of potential Pilot areas in the Volta Basin to conduct EIA and SIA.

Location of pilot sites	Criteria for selection
Ouagadougou, Burkina Faso	Ouagadougou is the capital of Burkina Faso where are concentrated 70% of the industrial activities of the country with a population of 1.5 million inhabitants. In 2020 the capital is expected to reach 3.4 million inhabitants, making it one of the most rapid growing cities in the region. 50% of the population live in poor conditions. Women are particularly exposed, with less access to education, employment and land. The extension of flood prone areas in Ouagadougou is very large due to its flat topography. In 2009, Ouagadougou experienced the worst flooding event in the last 50 years. An estimated 150'000 people were affected. Significant damage was incurred on infrastructure, agriculture, livestock and housing. In flood prone area the people's decisions on urban development seem to be conditioned by poverty and not by their level on risk knowledge.
Bagré dam, Burkina Faso	Bagre Dam is a multipurpose dam on the White Volta located near Bagré Village in Burkina Faso. The dam provides gravity-fed irrigation to some 1'440 hectares of prime agricultural land and 10% of the country's electricity insuring the energy and food security of Burkina Faso. The release or spilling of the dam is controlled and information about the spilling is shared with Ghana and therefore the downstream inhabitants.
Centre-Nord Region, Burkina Faso	In early 1970s, Burkina Faso suffered from a series of drought periods, with devastating consequences for the inhabitants of the whole region. In the early 1980s, 14 out of 18 households in the village of Oualaga (Centre-Nord Region) had a food deficit of more than 50%.

Location of pilot sites	Criteria for selection
Akosombo dam, Ghana	The Akosombo Dam was constructed to supply electricity from the Volta River for industry and to supply power to the towns and cities of Ghana and neighbouring countries. The Akosombo dam is still the major source of electricity of Ghana and two other Volta basin riparian countries (Benin and Togo). Demand for power continues to increase in the country, especially within the urban-industrial sector. Low water levels in the Akosombo dam in 1998 caused a major energy crisis in Ghana, which may have been caused purely by weak capacity to forecast extreme weather phenomenon. In 2017, the Akosombo dam contributed to 30% of the energy requirements of the countries. This is also due to low levels of water in the dam.
Upper East Region (UER), Ghana	Upper East Region (UER) has the highest proportion of poor people in the country who depend on climate-sensitive livelihoods, especially agriculture. Agriculture engages about 80% of the economically active population. UER borders Burkina Faso and is the first area to flood following the opening of Burkinabe dams which occur almost every year. It has also been shown to be more vulnerable to single hazards and less food secure than other parts of Ghana. In the 2007, all eight districts of the region were hit by floods affecting more than 40’000 people, damaging more than 11’000 homes (most of them were completely destroyed). A UNICEF team estimated that 8’000 to 10’000 people were displaced in six of the region’s eight districts. Furthermore, the floods destroyed crops and washed away 12’220 hectares of farmland.
Sourou, Mali	In Mali, the Sourou Basin, classified as RAMSAR site, has a population of 668’000 inhabitants (mostly young and rural). The plain of Sourou has undergone major hydro-agricultural development: more than 3’800 ha of land are managed in total water control and operated by more than 3’000 producers. The Sourou Basin has a total economic value estimated at 19.85 billion FCFA. Among the goods and services identified, land resources are the most important in the area and provide in monetary terms nearly 30% of the resources of the valley.

Location of pilot sites	Criteria for selection
	Although fishing is considered as a very important activity in the area, its contribution to total economic value is only 10%.
Oti River, Togo	Seven communities of the Oti River Basin in Togo are the poorest in the country with the poverty rate more than 90%. Their livelihoods are derived from subsistence farming, animal husbandry and informal labour, all of which are threatened by the impacts of climate change. Most of the dwellings are informal self-housing units, poorly planned and made of mud walls, wooden doors and windows. Consequently, many buildings collapse from the force of the flood water. Heavy rainfall in September 2007 caused the worst flood that Oti River Basin had ever faced. According to the International Federation of Red Cross and Red Crescent Societies (IFRCRCS), by September 2007, 25 people were killed and 97 people were critically injured. In recent years, the most damaging floods were experienced in 2008, 2010 and 2012.
National Part of Volta Basin (NPVB), Benin	The flood events in NPVB are recorded almost every year locally at the village, municipal and even intercommunal level. The areas at high risk of flooding represent approximately 32% of the basin area and are located northwest of the sub-basin, particularly on sedimentary formations with a high density of drainage, where agglomerations and crop areas are concentrated, i.e. 33% of the crops cultivated areas. Populations in Atacora-Donga departments' high flood risk zones are potentially vulnerable to flooding due to poverty, food insecurity and lack of access to drinking water, road and sanitation infrastructure.

ANNEX 2: Investigation Sites for the mission



ANNEX 3: Interview guide for the field (sites)

« Integration of the management of floods, drought and early warning for adaptation to climate change in the Volta basin»

Introduction

The exchanges that we have aimed to collect information about your experience and your suggestions about periods of flooding and drought. Under the project, the project partners plan to develop a tool, called the **VoltAlarm** early warning system to warn citizens of the floods and drought situations.

Axis1: Experience in flood/drought

- Have you ever experienced situations of flood and drought?
- The year of the progress of the disaster ?
- Have you been alerted before the disaster? By who?
- The generated consequences? (loss of property, other losses, etc.)

Axis2: Support provided to deal with the disaster

- What support did you receive? From what structure?
- Are you satisfied with this support? (In both qualitative and quantitative)

Axis 3: Endogenous experience in disaster management

- Are there within your community, local knowledge to prevent and combat the phenomena of drought and flood ? Describe them.
- These endogenous knowledge remain effective to deal with the current disasters ?

Axis 4 : **Expected impact from the integrated flood management project**

Components on environment	Positive Impacts	Negative Impacts
Biophysical environments (vegetation, soil, water, air)		
Populations		

,

Axis 5 : Expectations of actors to increase the resilience of populations

- What are expectations and suggestions for the success of the project?
- The contribution of the community to achieve the expected results?
- The contribution of local authorities to achieve the expected results?
- The contribution of the State to achieve the expected results?

Axis 6: Participation of disadvantaged social strata and gender

- What kind of support expected from the project to increase the resilience of vulnerable?
- How can the participation of women increase the expected results of the project?

Annex 4:Chronogram of the mission

COUNTRY	DATES	SITES TO BE VISITED	TENTATIVE LIST OF PEOPLE CONTACTED
Burkina Faso	12 -14 June 2018 21-23 June 2018	Ouagadougou Zone de Bagré Zone de Kompienga Centre Nord (Village de Oualaga)	DREA de Kaya Mairie de Kaya DRAH de Kaya Services de l'action sociale de Kaya et de Ouagadougou Arrondissements 9 ; 3 et 4 de la commune de Ouagadougou Association Dakupa de Garango Mairie de Garango Mairie de Bagré Mairie de Kompienga, services de l'environnement
Ghana	27-29 June 2018	Région Nord-Est	**Bolgatenga** : Regional Coordination Council , Environmental Protection agencies NGOs women associations, Focal Point etc
	8-10 July	Zone d'Akosombo	**Bui dam** : Regional Coordination Council, Environmental Protection agencies NGOs women associations, Focal Point etc **Akosombo dam** : Regional Coordination Council, Environmental Protection agencies NGOs women associations, Focal Point etc
Togo	28-30 June 2018	Zone du fleuve Oti Zone de la Kompienga (Nord Togo)	**Kara** : Préfecture, mairie, gendarmerie, Service de la météorologie Association des femmes **Mandouri** : Préfecture, mairie, gendarmerie, Service de la météorologie Association des femmes (Présidente : 90 36 71 98), Point focal ABV
Benin	26-28 June 2018	Département d'Attacora	Préfecture, gendarmerie, Service de la météorologie Associations ; Point focal ABV etc
Côte-D'Ivoire	4-6 July 2018	Zone de Bui	Préfecture, gendarmerie, Service de la météorologie Associations, service de l'environnement ; Point focal ABV etc
Mali	30 June-02 July 2018	Bassin du Sourou (Site RAMSAR)	Point focal ABV , Préfecture, gendarmerie, Service de la météorologie, service de l'environnement, Associations ; etc

Annex 5:

The actors contacted in the framework of the ESIA study and development of ESRMP of the Volta basin project

Country	Family Name	First Name	Function	Contacts
Benin	LAISSI	Garou	Stagiaire au CPS/Tanguiéta	96 77 16 19 65 90 06 29
	BODJRENOU	Gildas	Collaborateur CSP/Tanguiéta	64 75 85 85
	GNONLE POUNTE	Fabrice Yimpabou	Chargé de programme-Chef d'antenne ATACORA-DONGA	97 32 15 87 96 47 54 73
	N'TCHA K.	M'borrinati	Directeur Exécutif-Jura-Afrique/ONG	96 32 79 72
	WOMBO	Miteliba	CATGOU/Mairie Tanguiéta	97 39 37 96 96 67 98 47
	SAHGUI	N. Paul	Maire/Tanguiéta	97 24 04 02 94 60 72 14
	YOTTO	S. Michel	SG Mairie/Tanguiéta	97 11 26 26
	N'DAH	Kouagou Bertin	RSE/Jura-Afrique/ONG	96 973 08 50
	YARGO	Francine	Présidente de l'union des associations et réseaux des groupements de femmes	97 24 20 23 64 10 53 83
Burkina Faso	BAMBARA	Joanny Alain	Agent/Mairie/Garango	71 01 78 44 76 68 12 65
	DJIGUEMDE	Bertrand	Chargé de communication/Radio mairie/Garango	70 51 13 33 Bertrandedjiguemde@gmail.com
	SAWADOGO	Abdoul Karim	Animateur/Association DAKUPA	70 29 21 39
	KABORE	Ferdinand	Responsable Projet DAKUPA	70 28 97 01 ferdikabore@yahoo.fr
	OUEDRAOGO	Edmond	Chef de service Eau, Hygiène et assainissement	lamoussa.ouedraogo@yahoo.fr
	KOAMA	Fidèle	Directeur Régional Eau et assainissement/Centre-Est	71 29 35 60 Koamason8@yahoo.fr
	PARE	Raymond	Chef de service	70 87 37 89
	BAKOUAN	B. Lacina	Socilogue/DREA-	70 27 40 10

			CN/Kaya	lacinabakouan@gmail.com
	SAWADOGO	Arzouma	Ingénieur Génie rural/DREA/CN/Kaya	70 79 34 93 arzouma_sla@yahoo.fr
	KONDITAMDE	P Yolande	Ingénieur Génie rural/DREA/CN/Kaya	71 33 71 60 kyolade@yahoo.fr
	KOUDOUGOU	Marie Jacob	SG/Mairie Arrdt 4 Ouaga	70 07 78 52
	DOUMBIA/D	Sandra	Chef de service SASES	70 05 58 64
	NIKIEMA	Boukari	Responsable Action sanitaire/Arrdt 4 Ouaga	78 26 77 02
	BAMOGO	Adama	Environnementaliste	60 27 32 22
	YAMEOGO	Marc	Educateur social	70 35 89 12
	NIKIEMA	Momouni	Président de faune	78 77 46 81/71 35 89 12
	YAMEOGO	Ida Djénéba	Mairie Arrdt 3 Ouaga	70 25 74 85/76 84 74 28 idaklass@yahoo.fr
	BARRY	Nadine C. H. Madina	Travailleur social	70 30 13 98 78 82 41 64
	OUEDRAOGO	Elie	Conseiller municipal	70 10 60 28
Côte d'Ivoire	KAMENA	Kré Etienne	SG/Préfecture Bondoukou	05 36 99 28
	OUATTARA/KOUA	Ebi A. A.	S/P Appimadoum	08 75 57 74
	OUATTARA	Abou	Représentant/Député Bondoukou	47 45 32 28/06 63 47 87
	KOUASSI	Kra Vincent	Conseiller régional Bondoukou	0006 16 10 77/07 57 98 70
	ATSIN	Florian E.	Administrateur Civil	45 76 58 97
	BINI	Koffi Guy Florent	Chargé d'étude	08 93 29 24
	KOUAME	Abena	Superviseur/SIBES	09 51 65 56
	DRIE	Albert	Chef de service Energie	09 65 90 64
	DEMBELE	Ibrahima	Représentant des Eaux et Forêts Bondoukou	58 05 59 91 dembele5805@yahoo.fr
	GUEYE	Ange	Chef de service Industrie	07 45 64 36 angeguey@lot.com
	KAMAGATE	El Hadji Dieou Ali	Directeur/ Radio zanzan	08 22 73 27/05 72 49 69 Radiozanzan03@yahoo.fr
	YEO	Kahatié	MINSEDD Gontougo	05 88 16 19 kahatiey1@gmail.com
	YAO	Guemelin	Conseil régional	09 26 26 77 Guemelin63@gmail.com
	KOUASSI	Ama Sewa	FAGEFEG	09 64 66 83/03 46 18 59

		Jacqueline		Jacquelinemay15@gmail.com
	BOUAH	Yaoua Marceline	ONG le Bonheur	57 22 24 36
	OUATTARA	Drissa	Jeunesse communale	49 19 05 68
	PODA	Jonas	Représentant DR/MINADER, Chef de service foncier/ Bondoukou	06 72 45 61
	KAMBOU	L. Michel	Chefferie de Pouan/Bouna	06924212
	COULIBALY	Seydou	Mairie de Bouna/SG	05908848
	KOFFI	Yao Julien	Préfecture de Bouna/SG	07537299
	GUEI	Sylvain	Préfecture Bouna	08760021
	ZEKRE	Sylvestre	Parcs et Réserves/Comoé	09474632
	KAMBIRE	Siata	Association Sinieninkha/Bouna	06072434
	HIEN	Héri Florence	Sinieninkha/Bouna	47354775
	KAMBOU	Hoho Brigitte	Sinieninkha/Bouna	45656171
	KAMBIRE	Fatoumata	Sinieninkha/Bouna	48341094
GHANA	ASWINESS	Andrew	Water Resource Manager/WRC Bolgatenga	0244507141
	AORON	Bundi Aduner	Hydrologist/ WRC	0242074137/0208234447
	GBOLOTA	Esekiel Soun	Student/Intern	0500159961
	ASAMANI	Jerry	NADMO Disasters	0241424910/0906352645
	ALHEYI	Ibrahim Habib	Civil Servant	0243306404
	YEBAH	Emmanuel	Public Servant	024633778
MALI	KANE	Aboubacar	Préfet /Bankass	75 11 38 17 cercleboukane@gmail.com
	SOMBORO	Antoine	SG/Consul de cercle Bankass	65 72 02 50
	GUINDO	Oumarou	Régisseur/Bankass	66 01 48 25
	MAIGA	Mamadou	Responsable agriculture	76 31 88 91
	BOCOUM	Malick	Agent du Service d'assainissement/Bankass	77 48 73 55
	BAFALE	Mariko	Chef de service Hydraulique/Bankass	76 14 36 96
TOGO	YOUA	Yacoubou	Préfet/Kpendjal	90 05 52 06
	LEGUIBIELI	Nadédjo	Commissaire de	90 18 12 96

			Police/Maudouri	
	NADJAGOU	Kanliéni Lolle	Directeur préfectorale de l'agriculture	90 20 09 45
	DJAKPERE	Tignoati	Chef de canton/Maudouri	90 33 24 36
	DAGOU	Kansounti	Président du comité cantonal de développement	92 99 71 69
	ALEYAO	Essozimna	CB Gendarmerie nationale/Maudouri	90 01 98 31/99 05 60 71
	NABEDE	Essowè	DP/Action sociale/Kpendjal	90 83 45 48/99 54 01 47
	GBENIN	Benjamin	MERF/Kpendjal	90 24 44 12/99 01 50 64
	ANDOUE	Bakpinti	PF/MOBAJES/ANA DEB	91 98 08 31/98 80 07 98
	AKPO	A.Soulé	Chef d'agence ACAT	90 33 95 75/98 46 05 90
	DJESSIBO	Alidjo	Chef Météo	90 89 10 97
	VABAGOU	Souni	Président de la fédération des unions des associations	9 36 71 88/97 65 79 11
	KAMBATE	Awa	Présidente des unions cantonales	91 98 93 87
	KOMBATE	Badi	Agriculteur	90 00 14 04/99 00 39 08
	ABDOULAYE	Dramane	Imam	90 34 29 78
	SONGUI	Aladji Seydou	Adjoint Imam	90 27 04 98
	SOULEMANE	Amidou	Cultivateur	91 94 24 71/98 10 12 19
	NANDA	Akoh	Agent Météo	92 62 37 92/99 92 86 93
	DAGOU	Kansounti	Président CCD	92 99 71 69/99 75 51 41

Composition of persons contacted during the EIA and SIA study

Country	Total number of people consulted	Female	Male	Issues of interest raised on the Early Warning System (EWS) (ecosystem services, productivity, adaptation options)
Bénin	9	1	8	-Protection of stream banks through reforestation -Community management of floods and related consequences
Burkina Faso	19	4	15	-Protection of stream banks through reforestation -Promoting high-yielding agricultural crops and proper farming practices -Need to strengthen the capacities of actors involved in the management of natural

				disasters
Côte-D'Ivoire	26	8	18	-Protection of stream banks through reforestation -Promoting high-yielding agricultural crops and proper farming practices -Promoting the maintenance of sanitation facilities and waste management by urban and rural populations
Ghana	6	0	6	-Protection of stream banks through reforestation -Increasing inter-community solidarity in collaboration with customary authorities -Capacity building of organizations (such as NADMO) responsible for natural disaster management
Mali	6	0	6	Protection of stream banks through reforestation Promoting high-yielding agricultural crops and proper farming practices
Togo	19	1	18	Protection of stream banks through reforestation Coordination and monitoring of water releases from the Kompienga dam by Burkina Faso and Togo to avoid the floods caused

Sources : Enquêtes terrain, juillet 2018

The attendance sheet of citizens consulted for ESIA is added under the Annex 4.

Environmental and Social Risk Management Plan
REPORT

Version 02 ***August 2018***

ENVIRONMENTAL AND SOCIAL RISKS MANAGEMENT PLAN OF THE PROJECT

1. Background

The integrated management of water resources and measures to reduce natural risks related to floods and drought are essential for the socio-economic and environmental development of the six countries of the Volta Basin. Climate changes add growing pressure on natural resources. The main stakeholders affected are mainly farmers whose production is largely dependent on rain-fed agriculture poorly mechanized and composed of small family farms that are particularly vulnerable to the impacts related to climate, especially the risk of drought and floods events.

The project "integrating floods and drought management and early warning for climate change adaptation in the Volta basin", submitted for funding to the Adaptation Fund, is essentially a program of forecasting, warning and capacity-building for adaptation and resilience of communities and agencies targeting the impact of the climate change extreme events on integrated flood and drought management. As part of the policy guidelines and operations of the adaptation fund, it is requested that each project or program that will be funded by the Adaptation Fund realizes Environmental Impact (EIA) studies and the Social Impact Studies (EIS) in compliance with the environmental and social policy (ESP) of the Adaptation Fund. However, some of the project activities might induce negative impacts on the environment and the socio-economic environment. In order to minimize these potential adverse effects, it has been required to develop the environmental and social risks management Plan (ESRMP).

2. Description of the project

2.1 Situation of the project sites

Serious problems of flooding and drought are increasingly recurrent in the six countries of the Volta Basin in a context of variability and persistent climate changes. These natural disasters impact negatively the populations with material damage of property and loss of life. The assessment of the gaps for capacity-building of the six riparian countries and at the transboundary level show the need to improve and complete adaptation plans, strategies, investments in policies and measures on the threats due to climate change in particular floods and drought. In the light of the needs expressed by each country, it became imperative to proceed to the drafting of a project proposal to be submitted for funding to the Adaptation Fund (AF).

2.2 Project objectives

The overall objective of the project "Integrating flood and drought management and early warning for climate change adaptation in the Volta basin " is to strengthen the capacity of adaptation and resilience of communities and agencies towards the impact of climate change with an integrated flood and drought management.

Specifically, the project aims at:

- Helping the six countries bordering the Volta (**Benin, Burkina Faso, Côte**

d'Ivoire, Ghana, Mali and Togo) in the implementation of joint and coordinated measures to improve the development of the social and economic environment through a mapping of risks of floods and drought and future scenarios for the variability and climate change.

- Support stakeholders in the basin in the development of integrated end-to-end early warning systems against floods and droughts as well as activities of capacity-building for climate adaptation measures and mainstreaming gender.
- Provide policy and management guidance by sharing scientific information, knowledge and best practices for integrated disaster risk reduction and climate adaptation in the basin.

2.3 Components of the project

Component 1: Build capacity and create frameworks at local, national and regional levels to ensure the risk-informed decision-making

- Better knowledge of the risks, through the development of risk maps, dissemination and sharing of knowledge
- Integration of the knowledge on future climate scenarios (economic, urban, climate, etc.) into the existing risks maps
- Strategies of risk management in the short, medium and long term to be integrated into development plans (economic, social and environmental aspects)

Component 2: Develop concrete actions for adaptation and mitigation respectful of the environment with an integrated approach

- Better instruments for forecasting floods, droughts and the EWS and cross-border coordination in order to reduce the risk of disasters in vulnerable communities
- Pilot testing of the End-to-End Early Warnins System and community based flood and drought management activities
- Enhanced awareness of the vulnerable people on hydrometeorological risks, prevention, preparedness, response and mitigation strategies through education programmes using participatory solutions

Component 3: Strengthening the policy and institutional capacity for the integrated management of floods and droughts to local, national and cross-border levels

- The newly developed tools for planning and operational activities are confronted to the current plans to ensure a preparedness and an effective response to the floods and droughts
- Local, national and regional institutions (including weather and hydrological) are formed on the management of the risks and have a clear understanding of their role and coordination mechanisms
- A collaborative process is developed to ensure that these instruments and strategies are accepted by local communities and adapted to the context

3. Political, legal and institutional framework

3.1 Environmental and social policy of the Adaptation Fund

The Adaptation Fund (the Fund) funds projects and concrete climate adaptation programs that benefit vulnerable communities in developing countries that are Parties stakeholders of the Kyoto Protocol. Environmental and social policy of the Adaptation Fund fits in a straight line in the search for sustainable economic and social development conditions, compatible with the environmentally sound management of natural resources and of the environment. Similarly, the gender policy (GP) of the Fund based on principles, are intended to the gender mainstreaming and to ensure that the projects and programmes financed by the Fund provide for women and men equal opportunities of building resilience, solve their differentiated vulnerabilities and increase their ability to adapt to the impacts of climate change. This environmental and social policy seeks above all to systematically take into account the environmental issues in any development project. Thus, the environmental and social assessment for the Volta basin project has been conducted in the respect of the guiding principles of the Adaptation Fund and through the 15 principles of the environmental and social policy.

3.2 Analysis of the project in relation to the environmental and social principles

The Adaptation Fund environmental and social policies include 15 principles including the gender policy. These backup policies are designed to protect the environment, and society from the negative effects of projects, plans, programs and policies. The major principles of environmental related policies are:

- **Principle 9: Protection of the Natural Habitats.** The Fund does not fund projects/programs that would include a wrongful transformation or a reduction of critical natural habitats, including those who are (a) legally protected; (b) which are the subject of an official of protection proposal; (c) recognized by sources for their high ecological value, including as critical habitat; or (d) recognized as protected by the local indigenous or traditional communities.
- **Principle 10: Conservation and Biodiversity.** Projects/programs funded by the Fund must be designed and implemented so as to avoid any reduction or significant or unjustified biodiversity loss or the introduction of invasive species.
- **Principle 14: Physical and Cultural Heritage.** Projects/programs funded by the Fund must be designed and implemented so as to avoid the alteration, deterioration, or removal of any physical cultural resources, cultural sites and sites with natural values unique recognized as such at the community, national or international level. Projects/programmes should also not interfere with existing access and usage of these physical and cultural resources at all times.
- **Principle 15: Land and Soil Conservation.** Projects/programs funded by the Fund must be designed and implemented so as to promote the conservation of soils and avoid the degradation or conversion of productive land, or land that make valuable services to the ecosystem.

The other principles of the environmental and social policy of the Adaptation Fund that may apply to the activities of the project in the Volta Basin are: (1) "Compliance with the law" (2) "Access and equity", (3) "Marginalized and vulnerable groups", (4) “Human rights", (5) "Gender equality and women empowerment", (6) "Core labour rights", “Indigenous peoples” (7), “Involuntary resettlement” (8), "Climate Change“ (11), “Pollution prevention and efficient use of resources” (12) and “Public health” (13) .The activities that trigger the policies listed above should be considered by the project.

3.3 Political, legal and institutional framework

The study of the environmental and social impact (ESIA) including the ESRMP performed for projects and development program has become an obligation in the 6 riparian countries and Volta Basin in the light of different national policies on environmental and social management. The ESRMP is developed taking into account the legislation in force, requiring that all projects that might have a negative impact on the environment must include an environmental assessment in accordance with the nature and severity of the impacts expected.
The environmental and social project management of the Volta basin will challenge several categories of stakeholders, including the ministries in charge of the environment, civil protection, agriculture and water resources. Other actors are also addressed, such as: national agencies of meteorology, local authorities, organizations, associations; NGOs in the project area.

4. Environmental and Social Risk management Plan (ESRMP)

4.1 Introduction

Extreme events such as floods and drought in the Sahel countries contribute to vulnerable populations with catastrophic consequences. Thus, the precarious livelihoods of rural populations and the degradation of ecosystems, cause suffering and huge economic losses. To comply with the needs expressed by each country in terms of capacity-building for adaptation, it became imperative to proceed to the drafting of a project proposal to be submitted for funding to the Adaptation Fund (AF). However, some of the project activities may impact negatively on the environment and the socio-economic environment. In order to minimize these potential adverse effects, it is required to develop and implement this environmental and social risks management Plan (ESRMP).

4.2 Objectives of the ESRMP

The development of the environmental and social risk management plan (ESRMP) is to guide the activities of the project in a way that environmental and social issues are taken into account and managed in all the implemented activities. To do this, the risks associated with the implementation of the project will be identified, indicators and procedures will be defined and the mitigation and management measures will have to be implemented. In addition, the ESRMP defines the follow-up and monitoring as well as framework and institutional arrangements, to be taken during the implementation of the programme to mitigate environmental impacts and unfavorable social issues and to reduce them to acceptable levels using locally accepted solutions.

4.3 Methods applied in the preparation of the ESRMP

The methodological approach has been based on the concept of a participatory and interactive approach in consultation with all stakeholders who will be involved in the Volta project on integrated management of floods and drought. Information collected from the analysis of the project documents, from other strategic documents and

management plans at the national or local level and from meetings with institutional and socio-professional actors mainly concerned by the project formed the basis for the drafting of the ESRMP.

4.4 Environmental and social context and basic conditions

Table 1: Environmental and social context and basic conditions

Portion of the volta basin	Risks exposure	Livelihoods / social system	Ecosystems and other environmental resources
Tanguièta and Matéri, National Portion of Benin	Flooding	Extensive breeding of transhumance Low capacity and access to early warning information High level of poverty Poor agricultural practices Inadequate enforcement of environmental laws	Protected ecosystems degradation due to encroachment - in the forest reserves and Pendjari Park Degradation of land, deforestation of the banks of the watercourse
National Portion of Mali	Flooding and Drought	Low capacity and access to early warning information High level of poverty Poor agricultural practices Inadequate enforcement of environmental laws Subsistence farming often deficit	Characteristics of erosion due to the action of the hydrographic system of the former Sourou. Two units agro-ecological dominated by shrub and wooded savannahs on alluvial plains.
Mandouri downstream Kompienga National Portion of Togo	Flooding	Extensive breeding of transhumance Low capacity and access to early warning information High level of poverty Poor agricultural practices Inadequate enforcement of environmental laws	Degradation of land, deforestation of the banks of the watercourse, Soil erosion and deforestation
National Portion of Ghana	Flooding	Rain-fed agriculture ; Poor agricultural practices Inadequate enforcement of	Land degradation, deforestation of the banks of the watercourse,

		environmental laws	Soil Erosion and deforestation
National Portion of Burkina	Flooding and Drought	Extensive agriculture and breeding, Low capacity and access to early warning information, High level of poverty Poor agricultural practices Inadequate enforcement of environmental laws.	Land degradation, deforestation of the banks of the watercourse, Soil Erosion and deforestation
National Portion of Côte d'Ivoire	Flooding and Drought	Extensive agriculture and breeding, Low capacity and access to early warning information, High level of poverty Poor agricultural practices Inadequate enforcement of environmental laws.	Vegetation consisting of Sudano-Guinean savanna and wooded Savannah, Abusive Deforestation, vegetation giving way to shrubs and grass

4.5 Potential environmental and social impacts of the project

The implementation of the project should have environmental and social impacts:

- The reduction of losses in human lives and property damage associated with floods and drought;
- The development of behavior change;
- The reduction of poverty, as well as the improvement of the well-being of the people especially the vulnerable ones
- The protection and stabilization of the banks of the watercourses and limitation of the silting and floods
- The promotion of intensive agriculture that will limit the expansion of the agricultural spaces
- Building the capacity of populations and authorities
- The promotion of food self-sufficiency
- The promotion of the activities of reforestation and recovery of areas degraded by human activities
- The reduction of the vulnerability of the people living in the basin of the Volta
- Strengthening governance in the management of natural disasters
- The strengthening of capacities in the management of household waste and the fight against various forms of water pollution

The following **indirect negative environmental and social impacts** can also be expected if the project is implemented:

- Reduction of the areas of the fields and other farms
- The risks of land disputes between farmers
- The disruption of the habits and customs of populations victims of disasters
- Epidemics as a result of natural disaster

4.6 Mitigation programmes of the negative impacts of the project

Table 2 :

Item	Impacts	Mitigation actions	Entities in charge	Implementation sites	Entities in charge of monitoring	Tracking indicators
1	Reduction of the areas of the fields and other farms	- Safeguard actions (dripped irrigation for drought period, growing crops appropriate to the reduced cultivation period) to be defined with local stakeholders -A campaign of communication organized with the community services during and after the project activities -Avoid pilot sites and activities that would lead to incompatible uses of land, unacceptable social conflicts, and conflicts with respect to land tenure -Consultation (consult women and men, and ensure their	The local authorities, technical services of the communities and resources persons, VBA and GWP	Volta basin	VBA, WMO and GWP	Number of meetings

		participation in planning and implementation) and awareness support to agricultural intensification				
2	The risks of land disputes between farmers	-Creation of a framework for consultation and social dialogue between operators for the management of land conflicts - Presenting set of potential solutions (national laws, policies, human rights) using evidence-base to avoid land disputes	The local authorities, technical services of the communities and resources persons	Volta basin	VBA, WMO and GWP	Existence of a functional framework between actors
3	The disruption of the habits and customs of populations victims of disasters	-Cooperation with the custodians of traditions - Formation of the local committee to analyze the issue and provide safeguard solutions in agreement with the stakeholders	The authorities of local communities, and resources persons, religious leaders	Volta basin	VBA, WMO and GWP	Minutes of the consultations
4	The risk of epidemics after disasters (concentration in the reception sites)	-Develop a health monitoring program in the case of natural	Town halls and health service	Volta basin	VBA, WMO and GWP	Activity reports

		disaster - Awareness through local media or health volunteers about the epidemics and precaution measures - Participation of the representatives from the health department during the project consultation meetings				

4.7 Monitoring and follow-up programme

Follow-up of the ESRMP of the project activities will be undertaken by the WMO-GWP-VBA consortium at all levels of the project. This consortium will be supported by the various national authorities responsible for the environmental and social protection.

It should be mentioned that enhancement and mitigation measures described in the table above are part of the project design, including the budget. Implementation of the ESRMP activities is included in the monitoring and evaluation of the project budget. Monitoring activities are based on indicators that measure changes over time of the main environmental and social components and will include the following points:

4.8 Institutional framework for the implementation of the ESRMP

The implementation of the ESRMP is under the responsibility of Implementing and Executing entities along with Ministry of water and environmental agencies in each country. They will be supported by the key actors (Civil protection, National Meteorological and Hydrological services) involved in each country to mitigate environmental and social risks. The table below provides information on the partners responsible for implementing the ESRMP and their respective roles.

Table 3: Institutions involved in the implementation of the ESRMP

Actor involved	Responsibility/Assignments for risks identification and monitoring under sub-projects/project	Supporting Entity	Responsibility/Assignments for implementing measures
WMO (The project coordination unit)	Development of Environment and Social Management systems (ESMS) comprising • Identifying (Screening in compliance with ESP of AF and national laws) environment and social risks for the sub-projects • Preparation of ESIA and ESRMP for the sub-projects prior to the start of the sub-projects activities • Regular monitoring and dissemination of the ESIA and ESRMP (with grievance mechanism) for the sub-projects and projects.	-External Consultant -Other executing agencies -National Environment and Social agencies of each country -Task team (formed under activity 1.1.2.5)	- Ensure safeguard action are defined in compliance with the national regulations and implemented for the activities which can create social and environmental risks -Supervise the implementation of the response activities under the ESRMP in coordination with the bodies responsible for the management of water, environment and social welfare of each country - Monitor the progress of the risks minimizing actions or measures with the executing partners - Carry out further assessment for the risks which have been encountered to avoid similar cases in other activities
VBA	• Support for the study • Contact lists of people to consult for ESIA in the countries • Inception and validation meeting of the ESIA report • Distribution and awareness of the ESIA and ESRMP	-Other executing agencies -National Environment and Social agencies of each country	Follow-up of the study and implementation of the activities of the ESRMP in relation to the bodies responsible for the management of water and environment of each country -- Monitor the progress of the risks minimizing actions and

	report to the stakeholders		measures with the help of checklists or consultation
GWP	• Support for the study • Contact lists of people to consult for ESIA in the countries • Inception and validation meeting of the ESIA report • Distribution and awareness of the ESIA and ESRMP report to the stakeholders	-Other executing agencies -National Environment and Social agencies of each country	Follow-up of the study and implementation of the activities of the ESRMP in relation to the bodies responsible for the management of water and environment of each country -- Monitor the progress of the risks minimizing actions and measures with the help of checklists or consultation
National Meteorological and Hydrological Services (NMHSs)	• Provide support for the study • Divulge information on the potential risks which could result • Inception and validation of the ESIA report	-External Consultant -Executing agencies	Identify potential risks which could result from the activities at the very initial stages especially at the design or planning stage Monitor the implementation of the activities during and after the completion
The Environment, Water, Civil Protection and Forest service	• Provide support for the study • Divulge information on the potential risks which could result • Inception and validation meeting of the ESIA report	-External Consultant -Executing agencies	Contribute to the positive actions of natural resources protection (water, ecosystem and human life) Adhere to the compliance of the implementation actions under the ESRMP Monitor the implementation of the activities during and after the completion
Local administration (city halls, Prefectures, governorate, agriculture, breeding, etc.)	• Provide support for the study • Contribution to identification of the safeguard action through evidence-based knowledge • Divulge information on the potential risks which could result	-Executing agencies	Implementation of supportive actions to the populations in order to leverage the impact
Associations and NGO	• Provide support for the study • Implementation of awareness-raising	-Executing agencies	Implementation of supportive actions to the populations in order to leverage the impact
Task team	• Provide support for the study • Implementation of awareness-raising	-Executing agencies	-Monitor the implementation of the activities and their updates during and after the completion

5. Grievance Mechanism for the stakeholders

Comments and complaints management is an essential part of any structure or organization's commitment to be accountable to its stakeholders. From this point of view, the project will undertake sessions information and awareness in the direction of communities and other stakeholders to let them know about the availability to take any action, if necessary, to improve the quality of its intervention and improve the level of social acceptability.

The Grievance mechanism has been developed for the beneficiaries of the project to address or report any complaints or discrimination directly to the Designated Authorities, Implementing entity (WMO) and funding agency (Adaptation fund). The right of the people (particularly vulnerable groups: children, young girls and boys, elderly, women, disabled, single mothers, marginalized groups, etc.) to issue complaints if commitments or standards are not respected by the project and/or some of its members, or if they feel excluded from one or more activities that affect them. The participants have been made aware of this Grievance Mechanism during several consultation carried out in the project preparation phase.

There are several means (using emails, social media or postmail) through which people can report the concerns they may have or find during activity design and implementation phase. A dedicated telephone number will be available 24*7 so that the concerns are reported anytime and can be addressed in a short time. In addition, complaints/grievances books will be provided at the level of the focal point of VBA, GWP, the main towns of rural communities, the sub-prefectures, prefectures office. At the end of every activity, there will be a feedback mechanism through short survey questionnaire to receive comments or suggestions from the participants (individually or in groups) so as to improve the shortcomings in future activities. The response and feedback to any concerns will be carried out in a transparent and effective manner, making sure that the identity of the person will be kept confidential, if requested.

These grievance mechanisms will be made available to all communities (or additional mechanism will be identified during the course of the project) especially to consider the special needs of different groups as well as have gender sensitive approach in the project area.
At the Implementing Agency level, the grievance mechanism will be regularly monitored for the complaints from the beneficiaries or stakeholders who will share their feedbacks directly through the post mail, phone, fax or email using the below details.

World Meteorological Organization
Associated Programme on Flood Management /Integrated Drought Management Programme
7bis, avenue de la Paix
Case Postale No. 2300
CH-1211 Geneva 2, Switzerland
Tel.: + 41 (0) 22 730 81 11
Fax: + 41 (0) 22 730 81 81
E-mail: wmo@wmo.int, floodmanagement@wmo.int ; droughtmanagement@wmo.int.
Moreover, the form at https://public.wmo.int/en/about-us/contact-us can be filled for reporting and to receive prompt action or fulfil the needs of the beneficiaries.

The complaints can also be directly submitted to the secretariat of Adaptation Fund at the following address:

Adaptation Fund Secretariat/Board
c/o Global Environment Facility
MSN P-4-400 1818 H Street NW
Washington DC 20433 USA
Tel: +1.202.478.7347
Fax: +1.202.522.3240
Email: afbsec@adaptation-fund.org

The complaints reported or received will be handled by the project coordination and management unit, who will firstly investigate through an on-site visit. The visiting committee

may invite other relevant agencies (local/national/transboundary) to participate in the investigation. During the investigation, the root causes of the risks or issues will be identified and the concerned individuals or agencies responsible for correcting or resolving the issue will be assigned. The committee will produce a report of its findings such as causes of issues, involvement of concern agencies, time taken to resolve, recommendations and actions. Complainants may request or will be sent a copy of the reports related to the complaint. All the complaints (if received any) and measures taken will be stored in a database of the project coordination and management unit and will also be reported to Adaptation Fund along with the yearly progress report.

Conclusion

The present ESRMP enables to be in compliance with the ESP principles of the AF. The principles of the Adaptation Fund's environmental and social policies that may be applied to the actions that will be carried out under the Volta project "integrating flood and drought management and early warning for climate change adaptation in the Volta basin" are applicable. If any results or issues are found, it will be mitigated in a reasonable time with appropriate action by the actors and stakeholders.

Annex 7 Commitment letters for Long-term Sustainability of Early Warning System (EWS)

Bénin Burkina Faso Côte d'Ivoire Ghana Mali Togo

O/Ref.: 2018/113/ABV/DE/DO/fr-az Date.....03 JUL 2018

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Dear Madam/Sir,

Subject: Commitment to provide operational support for the Early Warning Systems to be developed under the project 'Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin'

The Volta Basin Authority (VBA) one of the executing agencies of the abovementioned project submitted for funding to the Adaptation Fund, will be involved in the development and operation of the VoltAlarm Early Warning System for Flood and Drought during the course of the project foreseen until 2023.

In order to guarantee sustainable functioning and maintenance of the software platform and related databases, VBA will ensure the integration of the system into the day to day operations of the Volta basin Observatory. VBA also agrees to provide technical and institutional support to the early warning system to be established and proposes to include operational and maintenance costs in other on-going and future projects which will be linked to the early warning system to be developed under the Volta project.

The implementing and executing partners will also receive the commitment of the National Meteorological and Hydrological Services (NMHSs) of Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, and Togo to ensure the long-term sustainability of the system.

Yours faithfully,

AUTORITE DU BASSIN DE LA VOLTA ★ Le Directeur Exécutif ★ 10 BP 13621 Ouaga 10

Mr. Robert Y. Dessouassi
Executive Director

Cotonou, le 23 JUIL 2018

Destinataire: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Objet: Engagement à fournir un soutien opérationnel aux systèmes d'alerte précoce qui seront développés dans le cadre du projet « Gestion Intégration des Crues et de la sécheresse et de l'alerte précoce pour l'adaptation aux changements climatiques dans le bassin de la Volta».

Les Services Météorologiques et Hydrologiques Nationaux (SMHN) du Bénin, dans leurs missions régaliennes restent solidaires à l'Autorité du Bassin de la Volta pour soutenir le développement et l'opérationnalisation du système de prévision et d'alerte précoce des inondations et de la sécheresse dans le bassin de la Volta.

Pour ce faire, les SMHN s'engagent notamment à fournir des données météorologiques, climatologiques et hydrologiques recueillies au niveau du réseau national d'observation ainsi que des informations connexes nécessaires à l'exploitation durable du « Système d'alerte précoce VoltAlarm». Ils fourniront en permanence l'appui nécessaire pour mener à bien l'ensemble des activités proposées dans le cadre du Projet Volta soumis au Fonds d'Adaptation, y compris l'élaboration d'une cartographie des risques et l'intégration de scénarios climatiques.

Les SMHN veilleront enfin à la maintenance du système d'alerte précoce VoltAlarm après l'achèvement du projet.

Cordialement,

Ont signé

Directeur Général de l'Eau **Philippe Armand ADJOMAYI**	Directeur Général de l'Agence Nationale de la Météorologie, METEO BENIN **Kokou Marcellin NAKPON**

MINISTERE DES EAUX ET FORETS

LE MINISTRE

REPUBLIQUE DE COTE D'IVOIRE
Union - Discipline - Travail

F- - 01501
N° /MINEF/CAB00/DGRE/DPARE-atbg

Abidjan, le: 03 AOUT 2018

A
The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Objet: Engagement à fournir un soutien opérationnel aux systèmes d'alerte précoce qui seront développés dans le cadre du projet « Gestion Intégration des Crues et de la sécheresse et de l'alerte précoce pour l'adaptation aux changements climatiques dans le bassin de la Volta»

Monsieur le Secrétaire,

Les Services Météorologiques et Hydrologiques Nationaux (SMHN) de la République de Côte d'Ivoire dans leurs missions régaliennes restent solidaires à l'Autorité du Bassin de la Volta pour soutenir le développement et l'opérationnalisation du système de prévision et d'alerte précoce des inondations et de la sécheresse dans le bassin de la Volta.

Pour ce faire, les SMHN s'engagent notamment à fournir des données météorologiques, climatologiques et hydrologiques recueillies au niveau du réseau national d'observation ainsi que des informations connexes nécessaires à l'exploitation durable du « Système d'alerte précoce VoltAlarm ». Ils fourniront en permanence l'appui nécessaire pour mener à bien l'ensemble des activités proposées dans le cadre du Projet Volta soumis au Fonds d'Adaptation, y compris l'élaboration d'une cartographie des risques et l'intégration de scénarios climatiques.

Les SMHN veilleront enfin à la maintenance du système d'alerte précoce VoltAlarm après l'achèvement du projet.

Je vous prie d'agréer, **Monsieur le Secrétaire**, l'expression de mes cordiales salutations

P/Le Ministre & Par Délégation
Le Directeur de Cabinet

REPUBLIQUE DE COTE D'IVOIRE
LE DIRECTEUR DE CABINET
MINISTERE DES EAUX ET FORETS

Didier Lohoury GBOGOU

In case of reply the number and date of this letter should be quoted

REPUBLIC OF GHANA

HYDROLOGICAL SERVICES DEPARTMENT

P. O. BOX MB501

ACCRA, GHANA.

Tel: 050-3262396
Email: ghana.hsd@gmail.com

Our Ref. No HSD/HQ/452/357

Your Ref. No.....

1 – 08 – 2018

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Dear Sir/Madam,

Subject: Commitment to provide operational support for the Early Warning Systems to be developed under the project 'Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin'

The Hydrological Services Department, Ghana in its sovereign mission remains in solidarity with the Volta Basin Authority to support the development and operationalization of the Integrated Flood and Drought Management and Early for Climate Change Adaptation in the Volta Basin.

In fact, Hydrological Services Department, Ghana is committed to providing hydrological data collected at the national observing network and related information necessary for the sustainable use of the "VoltAlarm Early Warning System". We will provide ongoing support to carry out all activities proposed under the Volta Project submitted to the Adaptation Fund, including the development of risk mapping and the integration of climate scenarios.

Hydrological Services Department, Ghana will also maintain the VoltAlarm Early Warning System after completion of the project.

HUBERT OSEI-WUSUANSA
ACTING DIRECTOR

GHANA METEOROLOGICAL AGENCY

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Tel: +233-0302-511981
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E-mail: Gmet@meteo.gov.gh
Website: www.meteo.gov.gh.com
Digital Address: GA-485-3581

Our Ref : **MET.12.1/1**

01 **August , 2018.**

Your Ref:

THE ADAPTATION FUND BOARD
C/O ADAPTATION FUND BOARD SECRETARIAT
EMAIL: secretariat@ adaptationfund.org
FAX: 2025223240/5

Dear Sir/Madam,

SUBJECT: COMMITMENT TO PROVIDE OPERATIONAL SUPPORT FOR THE EARLY WARNING SYSTEMS TO BE DEVELOPED UNDER THE PROJECT "INTEGRATING FLOOD AND DROUGHT MANAGEMENT AND EARLY WARNING FOR CLIMATE CHANGE ADAPTATION IN THE VOLTA BASIN".

The Ghana Meteorological Agency (GMet) is in solidarity with the Volta Basin Authority to support the development and operationalization of the flood forecasting and early warning system for Floods and Drought in the Volta Basin.

In this regard, GMet is committed to providing meteorological and climatological data collected at the national observing network and related information necessary for the sustainable use of "VoltAlarm Early Warning System". It will provide ongoing support to carry out all meteorological activities proposed under the Volta Project submitted to the Adaptation Fund, including the development of risk mapping and the integration of climate scenarios.

GMet will also contribute in maintaining the VoltAlarm Early Warning System after completion of the project.

Yours faithfully,

MICHAEL TANU (PhD)
AG. DIRECTOR -GENERAL

WATER RESOURCES COMMISSION

Registered Office/Courier Address
No. E4 Leshie Crescent
Labone Estates
Accra-Ghana

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P.O. Box CT 5630
Cantonments
Accra-Ghana

Our Ref: WRC/WI/V4/05

Your Ref:

Date: August 01, 2018

The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Dear Sir/Madam,

Subject: Commitment to provide operational support for the Early Warning Systems to be developed under the project 'Integrating Flood and Drought Management and Early Warning for Climate Change Adaptation in the Volta Basin'

The Water Resources Commission, Ghana in its sovereign mission as the agency in charge of the management and regulation of the country's water resources and the national focal point for transboundary waters remains in solidarity with the Volta Basin Authority to support the development and operationalization of the Integrated Flood and Drought Management and Early for Climate Change Adaptation in the Volta Basin.

In fact, Water Resources Commission, Ghana is committed to coordinating the provision of meteorological, climatological and hydrological data collected at the national observing network and related information necessary for the sustainable use of the "VoltAlarm Early Warning System". The Commission will also provide ongoing support to carry out all activities proposed under the Volta Project submitted to the Adaptation Fund, including the development of risk mapping and the integration of climate scenarios.

Water Resources Commission, Ghana will also support the maintenance of the VoltAlarm Early Warning System after completion of the project.

Yours faithfully,

Ben Ampomah
Executive Secretary

MINISTÈRE DE L'ENERGIE ET DE L'EAU

DIRECTION NATIONALE DE L'HYDRAULIQUE

REPUBLIQUE DU MALI
Un Peuple - Un But - Une Foi

Bamako, le 09 JUL 2018

N° 8--00728/ DNH

Le Directeur National de l'Hydraulique

A The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Objet : Engagement à fournir un soutien opérationnel aux systèmes d'alerte précoce qui seront développés dans le cadre du projet « Gestion Intégration des Crues et de la sécheresse et de l'alerte précoce pour l'adaptation aux changements climatiques dans le bassin de la Volta »

La Direction Nationale de l'Hydraulique (DNH) du Mali, dans ses missions régaliennes, reste solidaire à l'Autorité du Bassin de la Volta pour soutenir le développement et l'opérationnalisation du système de prévision et d'alerte précoce des inondations et de la sécheresse dans le bassin de la Volta.

Pour ce faire, la DNH s'engage, notamment, à fournir des données hydrologiques recueillies au niveau du réseau national d'observation ainsi que des informations connexes nécessaires à l'exploitation durable du « Système d'alerte précoce VoltAlarm ». Elle fournira en permanence l'appui nécessaire pour mener à bien l'ensemble des activités proposées dans le cadre du Projet Volta soumis au Fonds d'Adaptation, y compris l'élaboration d'une cartographie des risques et l'intégration de scénarios climatiques.

La DNH veillera à la maintenance du système d'alerte précoce VoltAlarm, après l'achèvement du projet.

Vous en souhaitant bonne réception, je vous prie d'agréer Monsieur/Madame, l'assurance de ma considération distinguée.

Ampliations :
MEE .....1/Pour compte rendu

Yaya BOUBACAR
Chevalier de l'Ordre National

Direction Nationale de l'Hydraulique BP. 66 Bamako Mali - Tel.: (+223) 20 21 25 88 / 20 21 48 77 - Fax: (+223) 20 21 86 35
E-mail: dnh@afribone.net.ml - Site web: www.dnh-mali.org

Direction Générale
de la Météorologie Nationale

Direction
des Ressources en Eau

Lomé, le 02 AOUT 2018

Destinataire: The Adaptation Fund Board
c/o Adaptation Fund Board Secretariat
Email: Secretariat@Adaptation-Fund.org
Fax: 202 522 3240/5

Objet: Lettre d'engagement à fournir un soutien opérationnel aux systèmes d'alerte précoce qui seront développés dans la cadre du projet « Gestion Intégration des Crues et de la sécheresse et de l'alerte précoce pour l'adaptation aux changements climatiques dans le bassin de la Volta»

Les Services Météorologiques et Hydrologiques Nationaux (SMHN) du Togo, dans leurs missions régaliennes, restent solidaires à l'Autorité du Bassin de la Volta pour soutenir le développement et l'opérationnalisation du système de prévision et d'alerte précoce des inondations et de la sécheresse dans le bassin de la Volta.

Pour ce faire, les SMHN s'engagent notamment à fournir des données météorologiques, climatologiques et hydrologiques recueillies au niveau du réseau national d'observation ainsi que des informations connexes nécessaires à l'exploitation durable du « Système d'alerte précoce VoltAlarm ». Ils fourniront en permanence l'appui nécessaire pour mener à bien l'ensemble des activités proposées dans le cadre du Projet Volta soumis au Fonds d'Adaptation, y compris l'élaboration d'une cartographie des risques et l'intégration de scénarios climatiques.

Les SMHN veilleront enfin à la maintenance du système d'alerte précoce VoltAlarm après l'achèvement du projet.

Cordialement,

Ont signé

Le Directeur des Ressources en Eau

AKAKPO Wohou

Le Directeur Général de la Météorologie Nationale, Représentant Permanent du Togo auprès de l'OMM

Dr Latifou ISSAOU