United Nations Development Programme

Country: Benin

PROJECT DOCUMENT[1]

Project Title: Strengthening Climate Information And Early Warning Systems in Africa for Climate Resilient Development and Adaptation to Climate Change: Benin

UNDAF Outcome(s):
UNDAF Pillar 1 Outcome 4 By 2015, national institutions and local communities use an integrated approach for sustainable natural resource management and take into account adaptation to climatic change

UNDAF Pillar 1 Outcome 5 By 2015, national authorities and local communities are better prepared and can respond efficiently to emergencies and natural catastrophes

UNDP Strategic Plan Environment and Sustainable Development Primary Outcome: strengthened national capacities, including the participation of women to prevent, reduce, mitigate and cope with the impact of the systemic shocks form natural hazards.

UNDP Strategic Plan Secondary Outcome: Strengthened capacity of developing countries to mainstream climate change adaptation policies into national development plans.

Expected CP Outcome(s):
5) Local capacities are developed in terms of environment preservation and better adaptation to climate change
9) Government and local capacities are reinforced for improved prevention and management of crises and natural catastrophes

Expected CPAP Output(s):
2) In response to climate change risks, adaptation strategies and measures are developed and implemented in the most vulnerable zones

Executing Entity/Implementing Partner:
Ministry of Water(MW)

Implementing Entity/Responsible Partners:
Ministry of Interior (MI),
Ministry of Transport (MT)
Ministry of Scientific Research (MSR)
Ministry of Environment, Housing and Urbanism (MEHU)
Ministry of Agriculture, Livestock and Fishing (MAEP)
Ministry of Decentralization (MD)

[1]For UNDP supported GEF funded projects as this includes GEF-specific requirements

Brief Description

It is expected that as climate change unfolds, the variability of the frequency and intensity of climate related shocks will increase, thereby necessitating various socio-economic sectors to adapt. In a developing country such as Benin, climate change impacts are exacerbated by limited outreach mechanisms to local levels and a country dependence on subsistence agriculture. For Benin, improving Climate Information (CI) and developing an Early Warning System (EWS) is an effective way to build the general population's weather /climate risk awareness so that they prepare accordingly and better manage long-term climate change risks and associated uncertainties. Currently, a national EWS/CI for multi-risk forecasting (e.g. coastal erosion and water storage) and the capacities to produce and disseminate weather/climate information does not exist in Benin. In order to have an effective system, it is necessary to improve the existing network of weather/climate monitoring infrastructure and to help build technical and operational capacitiesto efficiently produce and deliver targeted forecasts for planning. This project, with financing from the Least Developed Country Fund (LDCF), will address such needs. One component of the project will be used to improve weather, climate and environmental monitoring. A second component will be used to strengthen/develop national systems to package forecast warnings based on user-needs and to effectively disseminate warnings and other relevant information and data to assist decision-making processes. In conjunction with other ongoing initiatives of relevance outlined in this project document, LDCF resources are expected to enhance the adaptive capacity of vulnerable populations throughout Benin to respond to extreme weather events as well as to facilitate long-term climate resilient development planning at the national and sectoral levels.

Programme Period:	2013-2017
Atlas Award ID:	00074268
Project ID:	00086748
PIMS #	5105
Start date:	September 2013
End Date	September 2017
Management Arrangements	NIM
PAC Meeting Date	15th June 2013

Total resources required	$18,511,549
Total allocated resources:	$18,511,549
• Regular	
• Other:	
○ GEF	$4,000,000
○ Government	$676,549
○ In-kind	
○ Other	$13,835,000
In-kind contributions	_____

Agreed by (Government):

Date/Month/Year

Agreed by (Executing Entity/Implementing Partner):

Date/Month/Year

Agreed by (UNDP): Date/Month/Year

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List of Acronyms

ACMAD		African Center for Meteorological Applications and Development
ANPC		National Agency for Civil Protection
ASECNA		Agency for Aviation and Navigation Security in Africa
CAP	:	ConsolidatedAppealProcess
CCC	:	Communication pour un Changement de Comportement
CEB		Power Community of Benin
CES		Conseil Économique et Social
CI		Climate Information
CPAP	:	Country Program Action Plan
CPD	:	Country Program Document
CRHOB		Benin Oceanographic and Fishing Research Center
CSO		Civil Society Organization
DNM		National Directorate on Meteorology
DG-Eau		General Directorate on Water
EWS		Early Warning System
GTPA		Zonal Agro-meteorological Technical Group
HDI		HumanDevelopment Index
IPC	:	Indice de Perception de la Corruption
MAF/CAO	:	Cadre d'Accélération des OMD
MAEP	:	Ministère de l'Agriculture, de l'Elevage et de la Peche
MI	:	Ministère de l'Interior
MDG		Millenium Development Goals
MEHU	:	Ministère de l'Environnement, de l'Habitat et de l'Urbanisme
NAPA		National Adaptation Programme of Action
NGO		Non-GovernmentalOrganization
NGSPR		Agricultural Revival Strategy
OCHA	:	Bureau de la Coordination des Affaires Humanitaire
ONASA		National Office for Food Security
PANA		Programme d'Action National d'Adaptation
PAP		Priority Action Programme
PDNA	:	Post DisasterNeedsAssessment
PIB	:	Produit Intérieur Brut / Gross Domestic Product
PCA	:	Paquets Minimum d'Activités
PNSR	:	Programme National du Secteur Rural
PNRCC		Plate-forme Nationale de Réduction des Risques de Catastrophe et d'Adaptation au Changement Climatique (National Platform on Catastrophe RiskReduction and Adaptation to Climate Change)
PRESAO		Seasonal Precipitation Forecast in West Africa
PRSP		Poverty Reduction Strategy Paper (SCRP en francais)
PUGEMU		Emergency UrbanEnvironment Program (Projet d'Urgence de Gestion Environnementale en Milieu Urbain)
RGPH		Recensement Général de la Population et de l'Habitat
RRC	:	Réduction de Risques et Catastrophes
SAP	:	Système d'Alerte Précoce
SISA	:	System Intégré System d'Alert
SMART	:	Standardized Monitoring and Assessment of Relief and Transition
SNSA	:	Stratégie Nationale de Sécurité Alimentaire
SNU	:	Système des Nations Unies

UNDAF	:	Plan Cadre des Nations Unies pour l'Aide au Développement
UNDP		United Nations Development Program
UNISDR	:	United Nations International Strategy for Disaster Reduction
WFP		World Food Program

1 SITUATION ANALYSIS

1. Benin is highly exposed to extreme weather and climate change impacts, most notably increasing spatial and temporal variability of the rainy and dry seasons, floods, droughts, strong winds, coastal erosion and sea level rise. All of these impacts have made it difficult to manage natural resource-based productive sectors including agriculture, fisheries, tourism and port trade. For instance, the agricultural value chain alone accounts for approximately 70% of the active workforce in Benin[2].Such dependence on natural resources compounds the difficulty of planning for food security, health epidemics and water resource management. Benin's vulnerability to weather risks was recently demonstrated in 2010 when Benin suffered more than $262m in losses to various socio-economic sectors (e.g., agriculture, commerce, and infrastructure) due to flooding (PDNA 2011). Floods in the past have not only destroyed infrastructure but have spoiled annual harvests and enabled the invasion of pests. According to experts in Benin that were consulted during the preparation of the national adaptation plan of action (NAPA), fish stocks have also been negatively impacted due to temperature changes, siltation and salinity fluctuations (NAPA 2008).Similarly, Benin's coastal region, home to over 3 million inhabitants and one of West and Central Africa's largest trading markets (Dantopka), is victim to coastal erosion and sea level rise. Sea level rise has been shown to be linked with higher salinity levels in inland lakes and soil salinization while satellite images have shown that erosion has caused coastal encroachment by as much as 16 meters per year causing major impacts on fishing, port industries and tourism (Ceda 2007, Dossou2007).

2. It is predicted that extreme weather risks and associated losses are expected to increase in Benin[3][4]. To build the country's capacity to plan for such detrimental impacts/events, this project will strengthen existing Early Warning Systems (EWS)and improve climate information (CI) collection/transmission. The project objective supports the overall goal of increasing the resilience of the most vulnerable populations by empowering them with knowledge on weather forecasts and climate scenarios which enables them to take preventive measures against expected impacts. However, in Benin capacities to strengthen adaptation during crises/catastrophes related to extreme weather at decentralized levels are relatively limited; communes and decentralized line Ministries have limited knowledge of adaptation needs and options. Furthermore, limited disaster management mechanisms exist due to the recent creation of the DRM unit in Benin (December 2011). Consequently, there is no standard communication system to alert/inform end-users through an EWS and no means to provide CI to vulnerable populations to make them less vulnerable to climate-related risks.

1.1 Problem statement

3. In Benin, one of the challenges for enhanced planning and management based on EWS/CI stems from a limited network of hydro-meteorological monitoring infrastructure which can consistently transmit data at a fast enough frequency to effectively provide weather forecasts and help to predict climate scenarios. A lack of meteorological and hydrological monitoring stations has meant that many important regions and populations vulnerable to climate hazards are not monitored (e.g. soil moisture conditions) for important agricultural lands, intense rainfall is not monitored in areas prone to landslides and flooding, and rapid coastal surges as a precursor to flooding go unnoticed. As a result, many potentially threatening hazards have not been anticipated and some foreseen consequences have not been mitigated. A prime example is the 2010 flood event, one of the most destructive floods in Benin's history where no alert was

[2] Essentially linked to cash crops such as cotton, the only cash crop suited to small scale farmers

[3]IPCC, 2012, Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. Cambridge University Press, Cambridge UK

[4]GFDRR report, April 2011. Vulnerability, Risk Reduction, and Adaptati.

disseminated to the population. Similarly, recently an alert was provided 2 weeks before a flood event in late September, early October 2012 impacting over 10,000 people and prompting allocation of an emergency relief fund of approximately $300,000 from DREF[5]. Furthermore, where stations exist, they are often manually operated and do not report measurements for several weeks to one month after the climate hazards have passed. Equipment failure is also common and regular checks and maintenance are often neglected due to insufficient funds, incentives and regulatory policies-- resulting in poor quality and unreliable data for decision-making.

4. Benin also does not currently have the technical capacity and human resources required to prepare weather forecasts for the coming 1-7 days using a combination of Numerical Weather Prediction (NWP) models and predictions either from neighbouring countries or international centres. In situations where forecasts are externally sourced, forecasters are dependent on the applicability of the forecasts to local conditions and restricted in their ability to apply local observations to develop better forecasts (i.e., data assimilation). In the case of Benin, regional seasonal forecasts, such as the regional African Centre of Meteorological Applications for Development's (ACMAD's) PRESAO forecasts are currently utilized by DNM. However, in spite of the fact that DNM provides data to ACMAD, such forecasts are not sufficiently down-scaled and localized to be appropriate for all of Benin's climate zones. Such regional forecasts are only valid in the northern climate regime of Benin where there is one rainy season. For other climate zones in Benin, i.e., the majority of the country, these forecasts are not accurate in predicting the two rainy seasons, nor useful for any further localized analysis that can aid adaptation planning.

5. Given the absence of both the foundational infrastructure and skills sets, it is not surprising that Benin also lacks tailored weather and climate products for specific socio-economic sectors. The forecasts of weather and climate information are given in the same standard formats[6] for different users and this restricts their interpretation and application. For example, agricultural extension officers require information about the start of the rains, or the frequency of days with rain, whereas those monitoring floods require information on rainfall intensity.

6. In order to improve planning/management of climate/weather risks in Benin, it is necessary to have more refined spatial and temporal estimates of expected rainfall intensity, sea surface temperatures and wind speeds to outline with greater certainty regions at risk. Farmers have indicated that they need more localized and crop specific forecasts (see IDID project discussion, Section 2.3.1). Furthermore, there is a limited database of climate information required for long-term planning and better management of water storage, crop selection and cultivation cycles. Most significantly, there are limited trained technical personnel with the skills required to maintain an observational network, generate weather forecasts and climate predictions and interpret data in ways that non-technical stakeholders from various socio-economic sectors can understand. Without sufficient technical expertise, the absence of hydro-meteorological equipment maintenance and gaps in data collection are more likely. In the case of Benin, human capacity is required to:

- Take manual measurements and transmit information by post;
- Replace components of the observing networks when they fail;
- Manage and run forecast models;
- Understand how users best interpret data and design information packages that address user-needs;
- Be able to combine, manipulate and overlay different data to identify areas at risk.

[5] Disaster Relief Emergency Fund Update, 15 October 2012: DREF operation n° MDRBJ009 GLIDE n° FL-2012-000174-BEN

[6] Currently, in Benin weather forecasts are published in bulletins and on television with data concerning the next 24 hours. They provide general information on the minimum and maximum temperature of the current and next day and the quantity of rainfall (mm).

7. In terms of communicating EWS messages, consultations with NGOs/CSOs during project preparation indicated that local populations do not always understand the technical jargon associated with weather forecasts. Also, they do not understand the limitations of forecasting in terms of prediction uncertainty. Furthermore, weather forecasts are currently disseminated in the media (TV, radio, written press, all of which can be public or private), however, there is no mechanism to make the flow of climate information and alerts more efficient and standardized. Most significantly, due to various absent or false alarms (as seen in 2007, 2009,2010 and 2012), confidence in alerts must be rebuilt.

8. Furthermore, Beninois women, just as women in general, are more vulnerable to the effects of climate change relative to men; they constitute the majority of the world's poor (two-thirds, O'Brien 2008) and are more dependent for their livelihood on natural resources that are threatened by climate change, particularly those living in rural regions who have limited mobility. The gendered division of household labour means that women are responsible for the majority of subsistence household chores; women are generally charged with the responsibility to secure water, food and fuel for cooking and heating and often have very little time to devote to alternative sources of income due to domestic and farming responsibilities; in addition, they may be excluded from some activities due to cultural norms, or due to lack of capital and ownership arrangements that confer all rights to men in the family (Buhl 2005; Eriksen et al. 2005, Eriksen et al. 2007). This inequality is compounded by a lack of opportunities arising from limited access to education and information services which prohibit participation in decision-making. Due to all of these reasons, it is thus important to identify gender-sensitive strategies to ensure women are included in measures designed to improve their resilience and capacity to adapt to climate change (UN Women Watch 2008).

1.2 Preferred solution

9. The preferred (normative) solution for Benin is to improve national and decentralized capacities to better manage and plan for extreme weather and climate-related risks through the development of an Early Warning System (EWS) and enhanced Climate Information (CI).Specifically, the solution will include:

- Enhancing the capacity of the hydro-meteorological services and networks to monitor and predict climate variability and extreme weather events, namely floods, droughts, sea level rise and strong winds;
- Ensuring the sustainability of new investments in hydro-meteorological infrastructure including recurring costs associated with expanded networks and new services.
- Developing a rapid and targeted delivery of climate information including early warnings based on user-needs, both public and private;
- Formalizing an efficient communication dissemination protocol involving local focal points to distribute climate/weather information to vulnerable populations (including women) and;
- Strengthening capacities of agencies involved with EWS/CI production and dissemination on technical, institutional and human resource levels, emphasizing local agency capacity development.

1.3 Barriers to achieving the solution

However, this normative solution is hindered by a number of institutional, financial, technological and informational barriers including:

1.3.1 Insufficient coverage of weather, climate and hydrological monitoring infrastructure required to support the generation of reliable forecasts

10. In Benin there is limited infrastructure dedicated to monitoring key climate (including several weather), hydrology, and coastal parameters (e.g. meteorological and hydrological observing stations, satellite receivers etc.). In fact, current weather observations are based on 6 manual, synoptic weather stations located throughout the country and there is only 1 ocean monitoring station located at the port in Cotonou. As shown in Annex 4, there are significant regions of the country that do not have a representative meteorological network. Consequently, forecasting local weather/climate risks is presently limited by the lack of localized hydro-meteorological and coastal data required for model 'ground-truthing' / validation. Based on Stakeholder discussions during project development, limited coverage of hydro-meteorological monitoring has been identified as a key barrier for risk planning; there is widespread agreement in Benin that monitoring networks must be expanded throughout the country, in particular the vulnerable agro-ecological regions (NAPA, 2008).

11. The sparse monitoring network in Benin can be explained by several practical constraints:

i) Limited financial support to purchase new equipment or rehabilitate existing equipment;
ii) Need for reliable power sources required to transmit data and perform maintenance;
iii) Insufficient security of the equipment necessary to prevent against theft. Much of the equipment requires fencing and security guards;
iv) Limited trained personnel required for equipment operation and maintenance. Many technicians/engineers have retired or are in the process of retiring;
v) Limited means to conduct field validations including equipment calibration, station maintenance and data quality checks.

1.3.2 Slow data transmission from manual hydro-meteorological and coastal monitoring infrastructure

12. Data from manual meteorological, hydrological and coastal monitoring stations or instruments are primarily collected on a daily basis by manual observers who have been trained by the National Directorate on Meteorology (DNM) and/or its operational arm, the Agency for Aviation and Navigation Security in Africa (ASENCA) and the Benin Oceanographic and Fishing Research Center (CRHOB), recorded on paper, and sent once a month by mail to the principal NHMS offices in Cotonou. No automatic, real-time measurements take place currently. This prevents decision-making for extreme events occurring with short lead time (e.g., flash floods). Currently, there are also no SMS/GPRS data communication systems in place to improve the rate of transmission of manual data collection.

1.3.3 Poor long-term budget planning

13. The maintenance of monitoring equipment, the human capacity to use and repair this equipment, process data and develop early warning packages, all require sustainable financing mechanisms and capacity development. Costs to support operation and maintenance as well as salaries and capacity building for technical public servants within the NHMS are recurring annual expenditures which require planning and budgeting. At present, given the public nature of hydro-meteorological goods/services in Benin, these expenditures are generally regarded as recurring public expenses which are covered by annual government budget lines. However, the NHMS often struggles to pay for the maintenance and

upgrade of existing equipment[7] due to poor long-term budget planning. Insufficient budgeting for spare parts and improved sensors has led to approximately 70% of the meteorological monitoring equipment to become non-operational.

1.3.4 Insufficient technically skilled human resources

14. Additional human resources are required so that enough technical expertise is available for equipment maintenance/operation and data analysis/modeling/forecasting. In Benin, human resources are one of the main limiting factors for equipment operation, particularly when new equipment is procured. In fact, it is imperative to continue operation of existing equipment when new infrastructure is placed on-line so that climate/weather monitoring services are not interrupted. However, because the National Met Service (DNM) began operation in 2010, their technical capacity is considered weak. Furthermore, running forecast models is a highly skilled task and requires many years of education and training. Currently, this skill is housed within the ASECNA program, an operational arm of DNM which produces forecasts primarily focusedon aviation purposes. Skills must be gradually transferred by ASECNA to DNM over the course of this project in order for the national population to receive targeted forecasts which relate to their specific socio-economic activities (e.g., fishing, subsistence agriculture).

1.3.5 Limited synergy amongst EWS-relatedinitiatives/agencies

15. Benin does not have a clear legal mandate for the issuing of warnings because the existing alerts for famine and localized flooding act independently. Although alerts exist for famine and localized flooding in Benin, there is no coordination between projects and within technical and government institutions to conform alert production and dissemination to one standard operating procedure. This has led to parallel roles in alert generation and a lack of information sharing and lessons learned. For instance, although a basic agro-meteorological information system exists in Benin, this system is under-performing and leaves farmers without reliable information for day to day land management and agricultural practices[8].Furthermore, there is little collaboration with regional EWS initiatives, such as with ACMAD's regional EWS project, VigiRiSC (African Early Warning and Advisory Climate Services, AEWACS). The implication is that regional alert programs do not build off of localized national alert projects and the projects progress in a compartmentalized fashion.

16. Further down the alert dissemination chain, various NGOs/CSOs act independently to disseminate alert information without being able to report to consistent focal points that can be held accountable for alert communication. Furthermore, feedback from end-users required to validate and improve alerts is entirely lacking in Benin.

1.3.6 Inconsistent cross-sectoral information dissemination and data sharing

17. There is no centralization of hydro-meteorological / environmental data due to various institutions acting as information producers with limited means to transfer data efficiently between institutions. Most of the existing environmental data is not archived securely and awareness of information databases at different departments and institutions is limited. As concluded during Stakeholder conversations, all the information required to assess vulnerability and calculate risks needs to be transparent and accessible through a centralized portal. Accessible data can enable correlations of weather and hydrology data with other important environmental variables (such as the spread of water-borne diseases) or the creation of

[7]CC Dare Project, see Table 2 of this document

[8] NAPA1, LDCF PPG document 2010

environmental variable maps; moreover, interdisciplinary data analysis can have broader relevance and application for local intervention planning and monitoring, as well as fostering a culture of knowledge generation for the future.

18. There is also a need to facilitate data sharing with countries in the region. The majority of West African countries depend on regional climatic zones which have similar weather and climate patterns. Regional forecasts from international and regional centres simulate weather and climate across countries e.g. seasonal forecasts produced through PRESAO and ACMAD. In terms of hydrological modeling and forecasting, the Ministry of Water, DG-Eau needs to develop watershed models for all 4 of Benin's watersheds (Niger, Volta, Mono, Ouémé). The task is not evident because the hydrologic network is linked between countries (Nigeria, Niger, Burkina Faso and Togo). Consequently, it is difficult to have data to set appropriate boundary and initial conditions. Furthermore, presently, Benin does not have centralized data to share and a centralized server which can facilitate the storage and receipt of international data.

1.3.7 Limited capacity and no standard operating procedure to disseminate warnings

19. The Government of Benin has an established decentralized governance system on commune (district) levels to support local communities. However, the budgets available to decentralized governments are limited and consequently they do not have the financial means to buy communication equipment or work with NGOs/CSOs (e.g., Caritas, Care International, Plan Benin, Oxfam, Red Cross) and private media to reach out to local populations and provide them risk information. Also, local community focal points / representatives do not have an official role in communication protocols and community members do not have a means to provide feedback to local representatives on the efficacy of communication.

20. At their national and local branch levels, the Benin Disaster Risk Management Unit, ANPC and NGOs/CSOs (Caritas International, CRS, Plan Benin, IDID, Croix Rouge, Oxfam) currently lack technical capacity to disseminate alert messages and the means to plan for catastrophes. ANPC came into existence only recently in late December 2011 and has the national mandate to forecast all risks over the national territory and assist committees on Civil Protection with implementing the National Plan for Rescue Organization in the case of catastrophes (Plan ORSEC). However, its national and local branches do not have the technical capacity to interpret, simplify and relay technical, meteorological and climatological information and alerts. Also, ANPC and the NGOs/CSOs do not have the physical means to communicate efficiently so that information can be relayed from national to local levels and vice versa. Based on Stakeholder consultations, a Standard Operating Procedure (SOP) through which ANPC and NGOs/CSOs can have a formalized role in the alert/information communication loop is necessary.

1.3.8 Need forweather/climate information to be tailored to user-needs

21. Benin does not have the technical capacity to generate weather forecasts and climate predictions which are useful to socio-economic sectors (e.g., agricultural, commerce, port trade) for planning purposes. The lack of coordination between agencies has not enabled the integration of satellite imagery which can significantly aid in providing national coverage of useful information such as soil moisture for cultivation planning and sea surface temperatures for fishing and aquaculture. Stakeholder discussions during project development indicated that forecasts/predictions should be translated into specific hazards experienced by different sectors and users e.g. heat units for livestock or wind speeds for agriculture. This information should then be combined with known vulnerabilities to identify areas and communities at risk. Furthermore, the warnings are often too technical for end-users. If products are tailored appropriately, then various sectors will support weather/climate services. In effect, if the government sees the utility and indispensability of climate services, its financial support is more likely ensured.

22. Stakeholder discussions during project development indicated that forecasts/predictions should be translated into specific hazards experienced by different sectors and users e.g. heat units for livestock or wind speeds for agriculture. This information should then be combined with known vulnerabilities to identify areas and communities at risk. Furthermore, the warnings are often too technical for end-users. A breakdown exists in message dissemination because clarification is needed between the producers and communicators of EWS messages. Collaboration between the communication agencies (local, regional and national) and the alert generation agencies must take place so that weather forecasting jargon can be simplified for the general public. Simplified alerts must also be translated into all national languages.

2 STRATEGY

23. No single initiative can completely remove all of the barriers aforementioned. Nonetheless, this project (hereafter referred to as the LDCF2 project) will work in conjunction with other EWS/CI-related initiatives to build off of their advances in removing these barriers.[9]

The LDCF2 project aims to address the above barriers by achieving the following two outcomes:

24. Outcome 1 of the project will procure new climate/weather and hydrological monitoring equipment and the rehabilitation of existing infrastructure. It will also build capacity for more efficient data transmission/treatment and for equipment operation and maintenance.

25. Outcome 2 will strengthen national and local capacities to effectively use and efficiently disseminate hydro-meteorological and environmental information/alerts. EWS/CI will be targeted to end-users so that they can build resilience to extreme weather / climate risks through adaptation measures. The integration of EWS/CI into long-term development plans will also be facilitated.

26. By achieving these outcomes, the project will strengthen the capacity of national and sub-national entities to monitor climate change, generate reliable hydro-meteorological information (including forecasts) and combine this information with other environmental and socio-economic data to improve evidence-based decision-making for early warning and adaptation responses. On a local level, the project will help Benin communities (particularly the most vulnerable ones and targeting women) to adapt and build resilience to climate-induced impacts by providing them with climate/weather risk information and an understanding required for anticipatory and autonomous adaptation.

2.1 Project rationale and policy conformity

27. The Government of Benin became a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and is classified among the non-Annex 1 parties. Benin developed and submitted their National Adaptation Programmes of Action (NAPA) in 2008 and is entitled to benefit from the LDC Fund for the implementation of NAPA priority measures. In implementing priority interventions identified in the NAPAs, the project is consistent with the Conference of Parties (COP-9) and also satisfies criteria outlined in the UNFCCC Decision 7/CP.7 and GEF/C.28/18. The project has been endorsed by the national UNFCCC and GEF focal points in Benin.

28. The project responds to priorities and actions identified in the National Adaptation Programmes of Action (NAPA) of Benin. The NAPA clearly identifies the need for EWS in their number 1 priority

[9] Note that with the approval of this initiative, Benin will have two (2) initiatives under implementation and financed by the LDCF that are based on the priority project profiles identified in the country's NAPA. To avoid confusion, the first NAPA follow up project will be referred to as the **LDCF1** project and the current one on EWS/CI, the subject of this project document will be referred to as the **LDCF2** project.

action, ***Implementation of climatic risk forecasting and an Early Warning System to support food security in 4 vulnerable agro-ecological zones***.

29. This project is specifically aligned with NAPA objectives including i) increased knowledge and understanding of climate variability and change-induced risks at the country level and in targeted vulnerable areas, ii) strengthened adaptive capacity to reduce risks to climate-induced economic losses andiii) successful demonstration, deployment, and transfer of relevant adaptation technologies. The Benin NAPA also articulates the need for securing, transferring and installing critical technologies, as well as developing the necessary systems for climate change-related information to permeate into decision-making processes. The technologies and capacity building required to achieve these aims will increase the capacity of the national early warning network to forewarn and rapidly respond to extreme climate events.

30. Benin has also defined national actions and policies oriented to creating a basis for sustainable development. The Poverty Reduction Strategy Papers (PRSPs) includethe third revision of the "*Stratégie de Croissance pour la Reduction de la Pauvreté (SCRP) (2011-2015)*" and the "*Programmed'ActionPrioritaires (PAP) 2011-2015".* Benin's National economic development plan "*Perspective Alafia 2025*" accompanied by the PRSPs, acknowledge that climate change will impact the country's economy and highlights the prospect for achieving target Millenium Development Goals (MDGs). The PRSPs put climate change center stage in the country's development priorities, particularly in relation to natural resource management and the environment. The SCRP also stresses balanced and sustainable development at the national level in the priority areas of managing natural disasters and risks and strengthening land-use planning.

31. The relevant PRSPpillars from the SCRP document include:

2 - Infrastructure Development (in the project's case installing observation networks),

4 - Improving the Quality of Governance (fostering environmental governance) and

5 - Balanced and Sustainable Development pillar (managing natural disasters and risks).

32. Benin is furthermore focusing on addressing access of the poor to civil protection. According to the decree N°2011-834 of December 30th, 2011, the PNRRC was created to gather in the case of disaster for decision-making. Within the PNRCC, DNM is the President of the Committee of Disaster Prevention and DG-Eau is the Vice-President. As such, DNM is required to provide information about disaster risk to the general population through PNRCC. The more recent decree of N°2012-426 of November6th, 2012 defines the creation of the National Agency for Civil Protection (ANPC). (PNRRC is the Secretariat of ANCP.)Under this recent decree, the roles of ANPC include 1) forecasting all risks over the national territory, 2) assuring the training of its personnel, 3) preparing political administrators and the general public when faced with major risks, 4) assisting committees on Civil Protection and 5) implementing the National Plan for Rescue Organization in the case of catastrophes (Plan ORSEC).

LDCF conformity

This project is fully consistent with LDCF objectives and priorities:

33. Component 1 of this project supports LDCF/SCCF area objective 3 by promoting the transfer and adoption of adaptation technologies. The technologies to be adopted in this project include hydro-meteorological infrastructure required to support a national EWS.

34. Component 2 of this project supports LDCF/SCCF area objective 2 by increasing the adaptive capacity to respond to the impacts of climate change, including variability, at local, regional and national levels. Specifically, Component 2 will facilitate mainstreaming EWS/CI into development frameworks (PEI, SCADD) to support adaptive measures in vulnerable areas. Furthermore, Component 2 of this project promotes strengthened awareness of adaptation and climate risk reduction measures at the local level.

35. Outcomes 1 and 2 of this project are aligned with the GEF/LDCF portfolio level outcomes/outputs, namely

- Disaster prevention and response improved through updated and expanded DRM policies and plans that incorporate climate change risks and incentivize lower-risk development and;
- Capacity development at the local level to implement climate-related disaster prevention measures

GEF conformity

36. The project has been designed to meet overall GEF requirements in terms of design and implementation. For example:

Sustainability: The project has been designed to be sustainable at village and at national levels by building the capacity of national and local information dissemination organizations (e.g., ANPC, NGOs/CSOs), extending the hydro-meteorological network nationally and developing an open-access data portal to enhance the utility of EWS/CI. Standard Operating Procedures will be put into place for alert communication and equipment operation and maintenance and can be easily followed after project completion. Training will also be provided to tailor climate product services geared towards public/private user-needs.

Monitoring and Evaluation: The project is accompanied by an effective and resourced M&E framework, that will enable an on-going adaptive management of the project, ensuring that lessons are learnt, management decisions are taken based on relevant and up-to-date information, and regular progress reports are available for concerned parties.

Replicability: Great attention has been paid in the project design to ensure that lessons are replicable, sufficient training builds capacity to transfer expertise into other initiatives and that necessary replication mechanisms are in place.

Stakeholder involvement: Following on from the NAPA process, the design of this project was undertaken in a participatory manner. Moreover, the design of the project has ensured the appropriate involvement of stakeholders (actors and users) in project development and implementation (See Section 2.9).

Multi-disciplinary approach: the project will undertake a number of activities to ensure various Ministries, NGOs/CSOs are fully engaged, have capacities built and can contribute to an efficient EWS and the delivery of climate products useful to a range of socio-economic sectors and end-users.

Gender equality: the project Outcomes will contribute to an understanding of weather/climate related risks and required adaptation responses. Public awareness campaigns and the integration of women's groups (e.g. Plan Benin, Care International and Caritas) will strengthen gender equality in terms of women's ability to react to extreme weather and adapt to climate change. The project has also ensured and will continue to ensure that women are part of interventions and management committees and can voice their suggestions/concerns on the effectiveness of EWS/CI with the development of an end-user feedback mechanism.

Complementary approach: In order to build upon existing plans and avoid the duplication of efforts, the project will work in conjunction with relevant on-going projects in Benin and will create a multi-agency platform to ensure synergy among EWS agencies and with EWS-related initiatives.

37. This project is also aligned with the GEF Result Based Management Framework for Adaptation to Climate Change by including activities which are aligned with key GEF indicators.

- Incorporating climate information, warning, and climate change projections into DRM plans, policies and programmes (GEF indicator 1.1 and 4.4, Project Output 2.3)
- Strengthening stakeholder comprehension, particularly those most vulnerable, of alerts and climate information by clarifying technical forecast jargon in training sessions (GEF indicator 1.2, Project Output 2.2)
- Sustaining the technical and operational capacity built within DNM, DG-Eau, CRHOB and ANPC and the availability of skills and resources beyond the project lifetime through the development of Standard Operating Procedures (GEF indicator 4.3, Project Outputs 1.6, 2.1, 2.5)

38. The proposed project has been prepared fully in line with guidance provided by GEF and the LDCF Trust Fund. The project follows the guidance from the 'Programming Paper for Funding the Implementation of NAPA's under the LDC Trust Fund (GEF/LDCF 2006). The project focus is also aligned with the scope of expected interventions as articulated in the LDCF programming paper and decision 5/CP.9. As climate impacts fall disproportionately on the poor, the project recognizes the links between adaptation and poverty reduction (GEF/C.28/18, 1(b), 29).

2.2 Country ownership: country drivennessand country eligibility

39. This project was identified and conceived through the participatory NAPA process in Benin. It was designed to be consistent with, and supportive of, national development strategies, as expressed in the PRSPs, the National Charter on Environmental Governance and the National Environmental Management Program. It is fully aligned with the UNDAF, CPAP and CP outcomes, which address adaptation to climate change specified in the National Strategy on Climate Change as a matter of priority. Similarly, this project will coincide with the CP Outcomes and CPAP Outputs by reinforcing government institutions to understand climate change risks so that national and decentralized levels have adaptation strategies and measures to prevent crises/natural catastrophes.

40. The project also addresses the urgent and immediate activities identified in the NAPA, and is in line with the priority sectors identified in GEF/LDFC (2006) at a global basis. Notably, this project focuses on urgently needed adaptive capacities in the most vulnerable agro-ecological zones in Benin, and addresses priorities identified in the agriculture, coastal and food security sectors. It builds local community adaptation capacities as well as strengthens Commune and decentralized government services to be able to address adaptation. As such, the project is designed to be an integral part of, and support to, the on-going development process in Benin and supports the decentralized governance system. It will also support the integration of climate, weather and coastal monitoring information into established policies and programs.

2.2.1 Country Drivenness

41. The Project is linked to country priorities of the UNDAF outcome 2.1 "Improved sustainable natural resource utilization and food security", 2.2 "Improved access to sustainable livelihoods opportunities in an innovative and competitive private sector", and UNDAF outcome 2.3 "Improved access to sustainable basic infrastructure". EWS/CI will support all outcomes by providing forecasts (short-term and seasonal) based on end-user needs.

42. The project also directly addresses priorities in the Second National Communication (SNC) for Benin (2011) created under the UNFCCC and developed within the Climate Change Unit of the Ministry on the Environment. Key areas of vulnerability in Benin identified in the SNC include coastal zones, water resources, agriculture and forestry.

43. Specifically, the project's formulation has been driven to address urgently needed adaptive capacities in four agro-ecological zones in Benin, and addresses three of the top five priorities identified in the NAPA. It will build local community adaptation capacities as well as strengthens Commune and decentralized government services to be able and address adaptation in a well informed and knowledgeable way. The systemic capacity to address adaptation in Benin will be strengthened through targeted interventions at the policy, planning and budgeting levels.

44. The project is aligned with the Millennium Development Goals and strategies for sustainable development in Benin, including the Strategic Framework for the Fight against Poverty and the PRSPs previously mentioned. Implementation of the first NAPA project entitled, *Integrated Adaptation Programme to Combat the Effects of Climate Change on Agricultural Production and Food Security* has already begun.

45. The project will facilitate the integration of EWS/CI into the National Environmental Management Program (PNDC-GEM, 2008) to improve long-term planning for sustainable development. This program focuses on global environmental management and the implementation of environmentally and socially sustainable activities linked to the Priority Action Programmes (PAPs).

2.2.2 Country Eligibility

46. Benin became a signatory to the United Nations Framework Convention on Climate Change on 13 June 1992, and ratified the Convention on 30 June 1994. Since then, the Government of Benin has acknowledged the risk from climate change and has been implementing resilience and adaptation building measures for close to one decade. In 2004, Benin implemented a process for establishing a national level environmental strategy; at this time, the National Charter on Environmental Governance was developed and emphasizes a framework for decentralization. This Charter specifies the roles and responsibilities of line ministries, locally elected representatives and civil societies in the area of environmental management. Hence, the State, through its decentralized structures, plays the support and advisory role for the Communes in the implementation of their development projects. This support and advisory role is accompanied by skill transfer, which has occurred gradually within all development sectors. Over the years, the Communes have gained capacities and have developed their Communal Development Plans (PDCs). This project will use a decentralized approach to involve Commune authorities (e.g., the emergency focal points at the commune level and local focal points for NGOs such as Care and Plan Benin and CARITAS) in early warning dissemination through strengthened capacities at the community and municipal levels. Additionally, the project will support the update of PDCs to integrate EWS/CI in their activities and planning.

47. Benin subsequently developed a NAPA, published in 2008 in accordance with the requirements outlined in the UNFCCC COP 7, which listed 21 urgent and immediate adaptation needs expressed by the local populations. Out of those needs, 5 were identified as priorities. . This project addresses 4 of the top 5 priorities as indicated in Table 1.

48. First and foremost, this project will build the technical and operational capacity to develop an Early Warning System which will serve the most vulnerable agro-ecological zones (See Section 2.3.4) and address NAPA priority 1. Simultaneously, it will support i) good water management/storage practices (NAPA Priority 3) by predicting any flooding or prolonged drought periods, ii) the spread of diseases

such as malaria (NAPA Priority 4) by providing open access to the centralized weather/climate/environmental information database for the Ministry of Health so they can relate such information to the spread of vector-borne diseases and iii) coastal erosion mitigation (NAPA Priority 5) by supporting the maintenance of coastal monitoring equipment and the integration of coastal monitoring information into forecasts.

Table 1: NAPA priorities addressed by the LDCF project

NAPA Priority	Activity
1	Mise en place d'un système de prévision des risques climatiques et d'alerte rapide pour la sécurité alimentaire dans quatre zones agro-écologiques vulnérables
3	Mobilisation des eaux de surface aux fins d'adaptation aux changements climatiques dans les communes les plus vulnérable des départements du Centre et du Nord.
4	Protection des enfants de moins de 5 ans et des femmes enceintes contre le paludisme dans les zones vulnérable aux changements climatiques
5	Protection de la côtière face à l'élévation du niveau de la mer.

49. This EWS/CI project, therefore, is not associated with any particular sector; rather, it is intended to intervene nationally by producing early warnings and climate information related to extreme weather (floods, droughts, sea levels and strong winds) to support many areas in addition to food security / agriculture such as the water and coastal zone management, health and energy sectors.

Relevant national legal frameworks

50. Relevant legislative provisions relevant to NAPA priorities, the environment and climate change impacts include

N°	Legal instruments	Provisions/objectives of the legislation
1	Law n°90-32 dated December 11, 1990 relating to the Constitution of the Republic of Benin (articles 27, 28, 29 and 147)	Asserts the right of every person to a sound, satisfying and sustainable environment and his duty to defend it, and prescribes to the States to ensure environment protection (article 27) ;
2	Law n° 98-030 dated February 12, 1999, relating to the framework-law on the environment in the Republic of Benin	General principles: the management of the environment in the Republic of Benin is governed by the general principles hereinafter: The Benin environment is a national patrimony and is part and parcel of the common heritage of humanity; Each citizen has the right to a sound, satisfying and sustainable environment and the duty to defend it; The protection and enhancement of the environment must be part and parcel of the social and economic development plans and of its implementing strategy; The different social groups must be involved at all levels in the design and implementation of the national environment policy; this principle is critical for poverty reduction and promotes the development of the country; The authorities must do their level best to optimize the investment in the development of national capacities with the view to implement a step-by-step and effective environment policy; Any action harming environmental protection involves the direct or indirect

		responsibility of the perpetrator who must ensure the remedying. The objectives targeted through these general principles are: • Environment protection • The restoration of degraded areas and sites • The balance between environment and development, therefore the mainstreaming of environment in economic activities.
3	The law n° 87-016 dated September 21, 1987 relating to the water code in the Republic of Benin	The objective pursued is the sustainable use of water resources. It generally focuses on the qualitative and quantitative protection of water The new water code (in the process of adoption and ratification) provides in chapter V (institutional provisions), section V (basin institutions), articles 46 to 51, the establishment of basin committees and agencies. The basin committee which gathers representatives of local governments, representatives of professions, activities, interests or associations concerned by water management, qualified personalities and State civil servants (art . 49) All the water categories targeted benefit from protective measures, whether groundwater or surface water.
4	Law N°2002-16 dated October 18, 2004 relating to the wildlife regime in the Republic of Benin	According to the law, wildlife is a key element of the biological patrimony of the nation whose conservation is guaranteed by the State ;
5	Decree N°2001-235 dated July 12, 2001	It relates to the organization of the Procedure of an Environmental Impact Assessment. In Benin, no industry can settle without carrying out an Environmental Impact Assessment.
6	Decreen°74/PR/ MTPTPT dated March 7, 1968	Il regulates and defines the limit of the territorial waters of the Republic of Dahomey
7	Decree n° 2000-671 dated December 29, 2000	Regulation of importation, marketing and distribution of second-hand materials and capital goods. One of the objectives of this decree is the limitation within the national territory of the quantity of waste which might be generated by second-hand materials and capital goods.

2.3 Design principles and strategic considerations

2.3.1 Baseline projects and on-going relevant national and regional initiatives

51. At present there are many projects and programmes – both climate and non-climate related – which support EWS/CI. In order to ensure that the LDCF funds are used in a strategic manner, the LDCF project will build upon and complement existing Early Warning System related programs in Benin. Currently, flood alert systems are in place in the Niger River Basin in Benin and maintained by the Authority of the Niger Basin (ABN). DG-Eau has flood alert systems in the Mono and Ouémé River basins and the National Office for Food Security (ONASA) maintains alerts at times of famine. However, the existing systems are focused solely on flood or famine predictions in specific regions within the country and none act in coordination with one another. Furthermore, alerts up until the present have been either lacking or false. One of the most destructive floods in Benin occurred in 2010 when no alert was disseminated to the population. Similarly, an alert was provided 2 weeks before a recent flood event in September 2012. However, the forecasted timing of the recent 2012 flood was inaccurate.

52. Disaster risk and reduction has been handled by the National Agency for Civil Protection (ANPC) since its creation in late December 2011. The role of ANPC is to plan anticipatory and reactive actions for natural catastrophes. However, due to its limited experience, ANPC is in the process of building its personnel and capacity. During the 2012 flood, ANPC demonstrated good recovery planning; however, it was not able to plan effective anticipatory actions. Furthermore, it was unable to implicate many actors and end-users in decision-making during the 2012 flood disaster. Existing projects have limited focus on building the capacity of ANPC for disaster risk prevention on both national and local levels.

53. Various development partners and projects in Benin are investing in: i) hydrological and meteorological infrastructure and training in the country to support the NHMS and address their current capacity gaps; in particular, the Hydrological Service, DG-Eau ii) providing disaster risk reduction to support Benin's Disaster Risk Management Unit, ANPC; and iii) community-based agriculture, health, education, water and sanitation development. Work is still required to assist the DNM, DG-Eau and CRHOB manage meteorological, hydrological and oceanographic data in a way that is relevant to addressing climate change in the country. There is a need to address issues related to the: i) collection of meteorological, hydrological and oceanographic data, as well as data analysis, storage and management; ii) editing and packaging of weather and climate forecasts for use in early warning systems and long-term development plans; and iii) collaboration between EWS agencies, particularly to facilitate data exchange. There is a particular need to: i) strengthen the accuracy and localization of forecasting; ii) link national weather and climate information and early warning systems to existing communities and appropriate communication channels; and iii) develop innovative mechanisms for sustaining these weather and climate forecasting and warning systems.

54. Specifically, building off EWS projects focused on floods funded by the World Bank and GIZ is an integral part to the development of this project. The LDCF project will also build upon the first NAPA project funded by LDCF and a GIZ project which have acquired hydro-meteorological monitoring equipment. Several initiatives have also provided current and forecasted images of current environmental/weather/climate parameters generated by satellite (e.g., AMESD). In addition, the World Bank PUGEMU and GIZ projects are building the capacity of ANPC (albeit in a limited manner). All of these projects are considered "baseline" and will be built upon in the design of this project as detailed in Section 2.4.

55. With the support of these baseline projects, the LDCF project will link and coordinate with activities under the: i) African Center of Meteorological Application Development (ACMAD); ii) Group on Earth Observations' (GEO) AfriGEOSS initiative – and in particular the African Monitoring of the Environment for Sustainable Development (AMESD) and iii) the Monitoring of Environment and Security in Africa (MESA) initiative.

56. There are also various related projects promoting activities to ensure food security and adaptation to climate change activities. As such projects engage with local populations on adaptation, this project will build a strong synergy with all of the following relevant on-going or soon-to-be implemented initiatives listed in Table 2.

57. It must be stressed that the NAPA initiative funded through the GEF-LDCF (LDCF1[10]), ***Integrated Adaptation Programme to Combat the Effects of Climate Change on Agricultural Production and Food Security in Benin" ($3.18 LDCF; 2010-2014)*** highly complements the current

[10]Note that with the approval of this initiative, Benin will have two (2) initiatives under implementation and financed by the LDCF that are based on the priority project profiles identified in the country's NAPA. To avoid confusion, the first NAPA follow up project will be referred to as the **LDCF1** project and the current one on EWS/CI, the subject of this project document will be referred to as the **LDCF2** project.

project. The LDCF1 project will strengthen the capacity of agricultural production in selected communities to adapt to extreme events and climate change in four vulnerable agro-ecological zones in Benin. It involves developing agricultural strategies, improving the delivery and relevance of agro-meteorological information for project pilot areas and strengthening the capacity of DICAF on adaptation measures in the agricultural and food security context. Relative to this project, 9 rain gauges (1 in each pilot village) are being installed throughout the 4 pilot zones to improve agro-meteorological monitoring (originally, the installation of agro-meteorological stations was planned but the project is waiting for continued financing). Also, the project includes the development of risk maps and calendars of seasonal climate trends to tell farmers what to plant and when. Most significantly, commune technical committees known as Agro-meteorological Technical Groups (GTPA) have been created in each of the 4 zones to i) transfer data from the commune level to the national level, ii) receive information from the national level to help with commune level decision-making, and iii) aide in zone-specific information dissemination (i.e., via community radio) (See Figure 1). The LDCF2 project will use the GTPA groups to help with EWS/CI information dissemination and to facilitate the local feedback mechanism in the communication chain. The LDCF2 project will also place additional weather stations in complementary locations to the rain gauges installed under the LDCF1 initiative in order to establish national monitoring coverage. Finally, EWS/CI will be tailored using the lessons learned from DICAF on how to best develop localized, crop-specific forecasts adapted to agricultural needs.

Table 2: Related initiatives

Project name	**Source**	**Estimated budget**	**Synergy with Project**	**Status**
Projet Pluriannuel Eau et Assainissement de la Gestion Intégrée des Ressources en Eau, PPEA2 project	Dutch Ministry of Foreign Affairs		PPEA2 focuses on constructing reservoirs and dams in the Ouémébassin to manage the distribution of water resources.11 The LDCF2 project will enable EWS/CI to be open-access so that the dam/reservoir authorities can regulate flows to mitigate hydrologic risks downstream during flood periods	Currently being implemented
Africa Adaptation Programme (AAP) – Benin	UNDP	$2.9m	AAP seeks to mainstream climate change information into national development policies, including disaster risk reduction actions. The LDCF2 project will serve to generate EWS/CI for integration into policies[12]	Completed in 2012
Centre Regional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle (AGRHYMET)	Danish government	$4m	Developed the CILLS International Committee created to invest in research which promotes food security and fights against droughts and desertification in the Sahel. In February 2013, they launched an adaptation to climate change project in West Africa to improve climate	2013 – 2015

[11]http://www.gwppnebenin.org/IMG/pdf/Fiche_signaletique_sur_le_PPEA2-2.pdf

[12]"http://www.adaptationlearning.net/project/strengthening-capacity-address-climate-change-adaptation-concerns-preparation-and-implementa" http://www.adaptationlearning.net/project/strengthening-capacity-address-climate-change-adaptation-concerns-preparation-and-implementation

			information. AGRHYMET hydrological and agro-meteorological monitoring data and forecasts, as well as satellite data will be used to enhance EWS/CI in Benin.	
Climate Change Adaptation and Development (CC DARE) – (e.g., IDID (NGO) project, Strengthening the climate change adaptive capacities of the communities of Alibori District)	UNEP / UNDP	Varies per project	The CC DARE initiative provides technical and financial support to implement targeted actions to remove barriers and create opportunities for integrating climate change adaptation into national development planning and decision-making frameworks. The LDCF2 project will work with CC DARE to support integration of EWS/CI into development planning. Also, it will use lessons learned from the IDID project on how to effectively organize climate risk management committees and implicate radio for adaptation	Project completedby NGO, IDID

58. Other regional related projects focusing on climate and coastal monitoring will be exploited in the LDCF2 project to improve national forecasts and climate scenario predictions. These include:

- Climate for Development in Africa Programme (ClimDev-Africa): Promoting the use of climate information for development;
- SERVIR project: Developing an integrated platform for data service discovery, acquisition, sharing, and use;
- Global Climate Observing System (GCOS): Coordinating body for the climate observing system worldwide;
- Global Information and Early Warning System (GIEWS) (FAO): Information website providing data on Food Security worldwide including information specific in Benin;
- Adaptation to Climate Change in Coastal Zones of West Africa (ACCC) project: promoting multiple adaptation responses to mitigate coastal erosion and sea level rise impacts;
- The West African Economic and Monetary Union, with its project on coastal erosion;
- The International Development Research Centre (IDRC), with its programme on Adaptation to Climate Change in Africa; and
- Le Programmerégional de Conservation de la zone Côtièreet Marine en Afrique de l'Ouest, which is a consortium of NGOs focused on protecting the marine and coastal areas of West Africa.

2.3.2 Completed Projects / Studies providing lessons learned

59. The **GFDRR** project providing "**Lessons from an Agro-meteorological Early Warning System using Local Climate and Cultivation Knowledge"**(2007-2010), was a project managed by the NGO, Initiatives for Integrated Sustainable Development (IDID). The goal of the project was to establish an EWS providing targeted agro-meteorological information for six departments (35 communes). The project focused on using end-user feedback to define usefulforecasts which enabled the agricultural

population to adapt to new climate conditions. Bulletins were created monthly using data from 20 ASECNA climate stations, forecast information from DNM and ACMAD and regional forecasts from WMO. Two groups were formed to generate and disseminate weather/climate information, i) a National Committee on Early Warning and Agro-meteorology interpretation (CNAP) formed to generate information included technical representatives from DNM/ASECNA, MAEP (DICAF), ANPC, national and rural radio, universities and NGOs and ii) a Communal Committee on Early Warning and Agro-meteorology interpretation (CCPA) which was given the role to understand and disseminate the information to local populations. Lessons learned from this project include that more localized and crop-specific forecasts are required for agricultural needs. Also, a major issue hindering communication channels was that local radios stations required payment and were only 30% effective in distributing information. The LDCF2 project will integrate the lessons learned from this project such as when and how often to distribute alerts and weather bulletins to local populations. Compared with this localized EWS initiative, the LDCF2 project builds NHMS capacity to improve forecasts for multi-risk extreme weather.

60. A report by the Government of Benin, the World Bank and the United Nations System entitled **Inundations in Benin, Evaluation Report on Post-Catastrophic Needs (a Post-Disaster Needs Assessment)**, April 2011 was written to address post catastrophe needs after the devastating flood event in 2010. Although the report was primarily post-event focused, the technical team of experts recommended preventive measures in an Annex with a list of steps to establish a flood Early Warning System in Benin. Innovative and progressive suggestions which have been integrated into LDCF2 project activities include:

- Organize and codify the information exchangebetween the main actors involved in theprocessing and usage of data;
- Conscientiously develop alerts to gain credibility and especially avoid unjustified panic reactions;
- Reinforce ANPC's human, material and financial capacity;
- Promote a changedbehavior and people's participation in reducing their vulnerability because infrastructure solutions are very expensive and will be operational only medium term;
- Assess the appropriateness and the relevance of a system of insurance against floods in the context of Benin

2.3.3 Financing

61. The total amount of funding requested, as articulated in the Letter of Endorsement and not including PPG and agency fees is USD 4,000,000. The project is designed to build on several other baseline projects and programs (Section 2.4). Co-financing for this project includes more than $14.5m.

2.3.4 National and local benefits

62. This project supports national development goals and plans to achieve Millennium Development Goals (MDGs) 1, 3, 6 and 7.

- MDG 1: Eradicate extreme poverty and hunger –This project aims to improve EWS nationally, providing useful climate information such as seasonal forecasts such as seasonal forecasts to two-thirds of the population who are dependent on the agricultural value chain (NAPA 2008). Seasonal forecasts can enable the rural population to take adaptive farming measures to ensure productivity

- MDG 3: Promote gender equality and empower women – EWS/CI will be tailored to end-user needs, in particular the needs of women who have little access to farming, particularly on fertile land. Women focused NGOs have been implicated in the project (Plan Benin, CARE International, CARITAS).
- MDG 6: Combat HIV/AIDS, malaria and other diseases – Malaria and other vector-borne diseases are heavily linked with climate variables such as temperature. This project will provide open-access data for institutions such as the Ministry of Health to use climate/weather forecasts to be able to predict the spread of such diseases.
- MDG 7: Ensure environmental sustainability – The foundation of this project is to ensure environmental sustainability by integrating EWS/CI into national policies, planning and decision-making. Such endeavors can assist in the sustainable use of natural resources through good water management practices.

63. Specifically, this project will be used to extend the national hydro-meteorological service networks and to build capacity for institutions throughout Benin on national, regional and local levels. On national levels, the project will be used to build capacity in DNM (approximately 25 engineers, technicians and local focal points), DG-Eau (25 engineers, technicians and researchers), CHROB (6 researchers and 3 technicians) and ANPC (4 Officers at Cotonou and 77 focal points corresponding to the whole municipality of Benin). This accounts for 140 people which will gain operational and technical capacities.

64. Data sharing will also extend weather/climate information to the Ministries of Health and Agriculture (DICAF) which account for 82 beneficiaries (5 officers in Cotonou and 77 acting as heads of local agriculture communities).

65. On regional and local levels, the capacity of EWS/CI focal points will be built within ANPC and NGOs/CSOs (e.g., Oxfam (3 advisers in the Central Office and 25 members in the humanitarian task force), Care International (2 advisers in the Central Office and 8 focal points in Aguegues, Bonou, Dangbo, Adjohoun, Ouinhi, Zagnanado, Malanville and Karimama), Plan Benin (4 focal points in charge of disaster prevention and management in Cotonou, Couffo, Atacora and Zou-Collines) and CARITAS (2 advisers and 77 focal points in Benin). This accounts for 121 beneficiaries in total.

66. Every part of Benin requires monitoring for extreme events because as recent events have proven, the entire country could be subject to devastating floods, dry spells, and strong winds. Benin's NAPA has outlined that, currently, four key regions require improved forecasting of floods, droughts and/or strong winds (see Figure 1). These regions have been chosen because the weather risks and prevailing livelihood strategies differ in the four zones (Figure 2). As a result, they have specific needs for risk forecasting and rapid warning for food security in accordance with Benin's National Adaptation Programme of Action (NAPA 2008). The project will build Early Warning services based on the needs of the principal end-users: the rural populations including farmers and producers in these regions/zones. The particular communities to be used as target areas for project indicators are those with representative municipalities in each zone.

- Zone I: Soudano-sahelian zone of the extreme north Benin (6000 km²)
- Communities in Malanville: Association of rice-growing farmers
- Zone IV: Soudano-sahelian zone of northwest Benin (31200 km²)

- Communities in Tanguieta: Union of Villages Associations of Fauna Reserves Management (U-AVIGREF) which is the federation of farmers, fishermen, pastoralists and food transformer committees around the National Park of Pendjari
- Zone V: Soudano-guinean zone of transition in central Benin (16900 km²)
- Communities in Savalou: Tuber Farmer's Association
- Zone VIII: Sandy littoral and River-Lake zone of Benin (3600 km²)
- Communities in Grand-Popo, Adjohoun and Aguegues: Association of Market Garden, Committee of Fishermen (sea fishing in Grand Popo and River fisherman in Adjohoun and Aguégués)

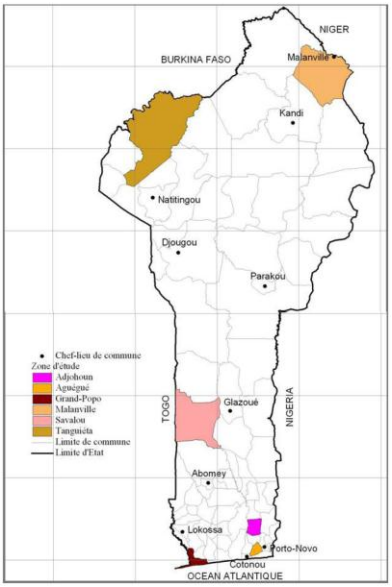


Figure 1: The most vulnerable representative agro-ecological areas in Benin (Source: Benin NAPA)

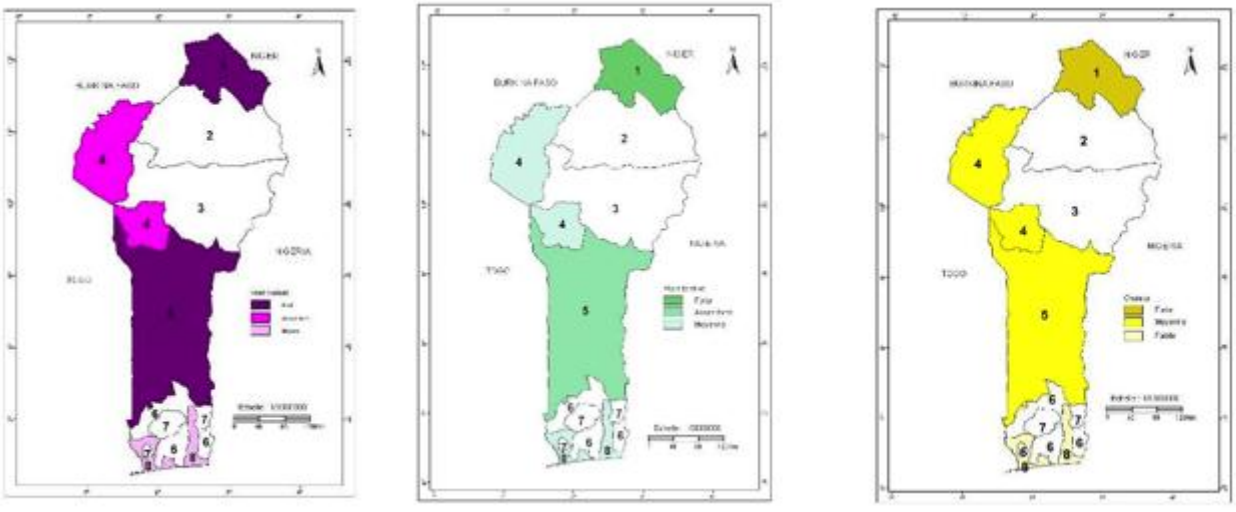


Figure 2: Maps of the relative risk of (left) strong winds, (center) heavy rainfall events and (right) increased temperatures compared amongst the four target zones. Darker colors indicate higher risks.(Source: NAPA1 PPG document, Benin)

67. Zones I, IV and V are predominantly rural. Zone VIII is also victim to sea level rise and suffers significant health risks during storm or flood periods due to the presence of densely populated regions. To assist with the evaluation of project indicators and EWS/CI information dissemination, the GTPA, commune technical committees established under the NAPA1 project will be implicated. By the time, the LDCF project is implemented; these technical groups formed under NAPA will have gained much experience in how to maximize information dissemination in the 4 zones.

68. Overall, the project will improve the adaptation to extreme weather events for some of the most vulnerable communities in Benin. Directly, it is expected to provide alerts and climate information to over 70% rural and 30% urban people, an estimated 50% of who will be women in the target communities (with the potential for up-scaling). Indirectly; through building the capacity of sub-national institutions to understand and efficiently disseminate alerts, namely for ANPC and NGO local branches, the project will benefit over 3.2 million residents. This project will thereby contribute towards Benin's targets for MDG 1 ("Eradicate extreme poverty and hunger"), MDG 3 ("Promote gender equality and empower women"), MDG 6 ("Combat HIV/AIDS, malaria and other diseases") and MDG 7 ("Ensure environmental sustainability").

69. The private sector will also be potential beneficiaries for the project. During project preparation, it was noted that private cotton and weather insurance companies would have the potential interest in using tailored weather/climate products. The LDCF project therefore has the potential to provide benefits at least several hundredclients using tailored products.During project implementation once working sessions are held between the information producers (DNM, ASENCA/DG-Eau) and private sector clients are held, a more precise idea on the potential number of private sector beneficiaries will be generated.

70. Finally, activities for this project will build EWS agency capacity to inform long-term development plans for disaster risk prevention, Benin's National economic development plan "Perspective Alafia 2025", its PRSP, the "Stratégie de Croissance pour la Reduction de la Pauvreté (SCRP) (2011-2015), the Programmed'ActionPrioritaires (PAP) 2011 -2015 and the Agricultural Revival Strategy (to be implemented by 2016). These benefits have long-term positive benefits for the entire country.

2.3.5 UNDP Comparative Advantage

71. The proposed project is aligned with UNDP's comparative advantage, as articulated in the GEF matrix, in the area of capacity building, providing technical and policy support as well as expertise in project design and implementation. Additionally UNDP has close links with the Government, as well as a high level of experience managing other LDCF projects in the region, in particular those with an early warning component.

72. UNDP is also working on CI/EWS in many countries and many sectors, strengthening its capability to coordinate and provide flexibility to handle changing needs between countries. The country offices are supported by Regional Technical Advisors at UNDP offices in Pretoria, as well as by policy, adaptation, economics and climate modeling experts in New York, Cape Town and Bangkok. A network of global Senior Technical Advisors provide additional technical oversight and leadership helping to ensure that programs on the ground achieve maximum policy impact. There are other LDCF, SCCF and Adaptation Fund -financed projects within the region with similar objectives currently supported by UNDP, which means that there is substantial in-house technical expertise within UNDP that can be brought to bear to support the Government with the project.

73. UNDP's comparative advantage in implementing this project is also underpinned by UNDP's energy and environment program strategy which aims to mainstream environment and disaster prevention measures into national and local development policies, strategies and plans with an overarching role of capacity development.In fact, in Benin, UNDP has a very large programme of projects focusing on governance, decentralisation, local development, gender, environment and energy and HIV-AIDS. The UNDP Country Programme counts on several partnerships within and outside the UN System which are described in the Country Programme Document (CPD). The Country Office in Cotonou works actively with the government and donors to build national capacity. Specifically, the Country Office is conductingprograms/studiesthatrelate to poverty reduction, food security and flood management, namely the UNDP Millennium villages project, the LDCF1 NAPA project and the UNS study on Inundations in Benin (an Evaluation Report on Post-Catastrophic Needs) respectively. Besides core resources, UNDP Beninalso manages funds from the EU, the World Bank, GFDRR, GIZ, and the Dutch Ministry of Foreign Affairs.The proposed capacity development activities in all components of the LDCF2 project will benefit from UNDP's overarching and strategic role in this area, helping to ensure that related outcomes are sustainable in the long-term.

2.4 Project Objective, Outcomes and Outputs/activities

Project Objective[13]

The project objective is to strengthen the weather, climate and hydrological monitoring capabilities, early warning systems and available information for responding to extreme weather and planning adaptation to climate change in Benin.

74. The project aims to secure, transfer and install critical monitoring technologies in conjunction with developing weather risk / climate change information service delivery to strengthen decision-making processes and long term planning. A set of complementary outcomes and outputs will be used to strengthen monitoring and forecasting capabilities as well as to build capacity within technical agencies to combine cross-sectoral data to improve evidence-based decision-making. National and decentralized authorities (prefects, communities, women-focused organizations, NGOs/CSOs, media, farmers' associations) and the private sector have been important stakeholders in defining these outcomes and outputs during project development. These Stakeholders will continue to be consulted during project implementation and will be provided with the space and opportunity to contribute to the design of project activities.

Component 1: Transfer of technologies for climate, weather and environmental monitoring

Outcome 1: Enhanced capacity of national hydro-meteorological services (DNM/DG-Eau) and environmental institutions (CRHOB) to monitor extreme weather and climate change (droughts, floods, sea levels, strong winds)

Co-financing amounts for Outcome 1: $6,957,474

LDCF project grant requested: $2,614,000

[13]*Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR*

2.4.1 Baseline Component 1 - Without LDCF Intervention

75. Currently, independent EWSs are in place in 2 of Benin's 4 watersheds, the Ouémé and Mono basins. Alerts are provided for localized flood warnings. Also, the National Office for Food Security, ONASA, works with DNM/ASECNA to prepare alerts for famine. Overall, there is no government managed initiative focusing on multi-risk extreme weather and climate change impacts on a national scale. There are also no on-going or planned projects which plan to build DNM's capacity in an integrated manner (with DG-Eau and CHROB) to predict a range of extreme weather risks.

76. The General Directorate on Water (DG-Eau) is responsible for operating and maintaining a surface hydrological monitoring network of 46 automatic and 2 manual flow meters (measuring river/lake height) and 1 Acoustic Doppler Current Profiler (ADCP) (measuring flow directly). Approximately 96% of the existing equipment automatically records data. Thirteen of the flow meters are located on the Benin coast.

77. At present, a number of challenges limit the DG-Eau's water resource monitoring and assessment capacity. Coverage of the country is very limited. Only 46 of the 86 subcatchments are monitored. Also, projects such as those funded by GIZ (Mono flood EWS) and the World Bank (PUGEMU) are focusing capacity reinforcement efforts solely in the Ouémé and Mono watersheds. Furthermore, DG-Eau has modelling experience with HECRES and MIKEBASIN software, however, training on a limited basis (normally for 2 weeks each year) has not enabled them to make the flood or water management models fully operational.

Table **3:** Status of existing hydrological equipment under the DG-Eau (see Annex 4 for location and operation status of existing equipment).

Station type	Existing	Fully operational
Manual flow meters (measuring river/lake height/stage)	2	2
Automatic flow meters (measuring river/lake height/stage)	46	40
Acoustic Doppler Current Profiler (ADCP) flow meters	1	1

78. Baseline projects related to water resources include the World Bank PUGEMU project which is increasing the level of flood preparedness in the Ouémé watershed including implementation of a small-scale pilot EWS, ii) the PAPDFGC project funded by the EU which has a component to mitigate flood impacts in the Ouémé watershed, iii) the Flood EWS for the Mono River project funded by GIZand iv) the Niger-HYCOS project, a local watershed modelling initiative within the WHYCOS project.

More details on these baseline projects related to hydrological monitoring/flood response are indicated below:

- Following the floods of 2010, the World Bank is funding the **Emergency Urban Environment Program** (Projetcd'Urgence de GestionEnvironnementale en Milieu Urbain, PUGEMU) project implemented by the Directorate of Urbanism of MEHU in the Ouémé River basin. The project, to be implemented over the 2011-2015 period, invests over $5m to increase Benin's level of preparedness to flooding events in five cities including Cotonou. This financing covers i) the rehabilitation and improvement of three drainage networks and wastewater treatment works in Cotonou, ii) the management of drainage-blocking solid waste in all cities, and iii) the implementation of an EWS for floods in the Ouémé watershed. Components of the PUGEMU EWS focus on reinforcing the capacity of DG-Eau in terms of hydrological modeling, integrating

satellite data and developing forecast models and a GIS (Geographic Information System).[14] Capacity building delivered through the WB financed project will enable DG-Eau to run various flood scenarios, have a Digital Terrain Model (DTM) to account for the complexities of the Benin terrain and to effectively map flood risk zones. There is also a small capacity building component for ANPC in terms of being able to interpret risk maps and elaborate management plans.

- Another relevant baseline development project in the context of the proposed outcome is the PAPDFGC project,**Support for Forest Preservation and Production of Numerical Maps** funded by the European Union, for the amount of **$10.8m, 2011-2015**. This project has two broad components, i) to implement employment and income-generating activities to have better food security by using forests sustainably and ii) to mitigate flood impacts in the Ouémé watershed.
- A flood-specific EWS is also being developed in the GIZ funded project, **Implementation of a Flood EWS for the Mono River**. The project concept was developed by DG-Eau after the 2010 major flood event in order to conduct a feasibility study to establish an EWS for floods in the Mono watershed. The project involves conducting an inventory of data, defining risks, and elaborating flood forecasting tools. Its primary goal is to develop a rainfall-runoff forecasting model (with 3 to 5 day forecasts) to aid in the management of dam releases and the regulation of reservoir levels to mitigate flood impacts upstream and downstream of the Nangbeto dam. Through this project, real-time monitoring equipment (GSM data transmission) will be acquired and placed on 5 existing rain gauges near the dam. Also, a water level (limnimetric scale) will be acquired to place on an existing hydrological station and computer/software will be purchased to generate flood risk maps. Training for DG-Eau and the Power Community of Benin (CEB) on flood forecasting and equipment maintenance is included. Capacity will be built for ANPC at the communal levels in the Mono region.
- The **WHYCOS** (World Hydrological Cycle Observing System) project and specifically the Niger-HYCOS project which focuses on cross-boundary watersheds exploit and share satellite information related to hydrology to model common drainage basins which traverse country boundaries

79. The National Directorate on Meteorology (DNM) and the regional Meteorological Forecast Center (ASECNA) are responsible for establishing and maintaining the weather and climate observation network in Benin. This includes data collection, analysis and exchange as well as the production of weather and climate information and products (including warnings) to support social and economic development. DNM oversees operations of ASECNA. As personnel in ASECNA have most of the capacity to produce forecasts and their specific role is to produce forecasts for aviation, the majority of weather products (e.g., bulletins) are targeted to airport operations at present.

80. The weather and climate observation network managed by the DNM/ASECNA includes 6 manual synoptic stations, 17 manual agro-meteorological or climate stations and 55 manual rain gauges. As shown in Annex 4, a study on Systemic Observation and Climate Change in Benin (Akponikpe and Lawin2010) detailed that the synoptic network is largely insufficient in all parts of the country. Similarly, the rain gauge network is insufficient in most regions, particularly the north. Sufficient coverage was determined according to WMO recommendations for network spatial resolution.[15] WMO recommends a maximum distance of 60 kilometers (km) between stations measuring temperature, wind or humidity and a maximum separation distance of 30 km between rain gauges. The average spatial step distance for synoptic stations and rain gauges is 138 km and 51 km respectively. Only the GIZ funded project in the

[14] http://web.worldbank.org/external/projects/main?Projectid=P113145&theSitePK=40941&piPK=73230&pagePK=64283627&menuPK=228424

[15] Plummer N., Allsopp T., Lopez J. A., 2003: Guidelines on Climate Observation Networks and Systems. World Meteorological Organization WMO/TD n° 1185, 57p.

Mono watershed (see hydrological discussion above) and the first NAPA project (LDCF1, See Section 2.3.1) are currently working on expanding the meteorological network.

81. Furthermore, most existing stations are obsolete and in need of rehabilitation (with the exception of newly acquired stations acquired through the first NAPA project). DNM/ASECNA has limited spare parts and insufficient maintenance and calibration equipment. Most significantly, there are no automated monitoring stations. As a result, data is transmitted to DNM/ASECNA from existing weather/climate stations typically once a month by telephone or post. This inhibits the use of hydro-meteorological information for making early warning systems and long-term development plans.

82. There are also no radar or radiosondes in Benin. In the framework of this project and considering the limited funding, Stakeholders concluded that the project should focus on the densification and rehabilitation of the existing meteorological monitoring network. At the same time, Activity 1.2.7 will be developed to facilitate long-term planning and fund mobilization for securinga radar in the future. In addition, radiosonde information will continue to be exploited from neighboring countries (Ivory Coast, Burkina Faso and Niger) through the African Monsoon Multidisciplinary Analysis (AMMA) research program[16]. As the AMMA study noted that radiosonde operations can be debilitated by the difficulty in performing repairs or maintenance in neighboring countries (linked with insufficient spare parts and human resources), creating a new radiosonde station is not considered to be a cost-effective option for this project (see Section 2.6).

83. Stakeholder consultations with DNM/ASECNA indicated that Benin's receipt of satellite data via 2 functioning satellites is sufficient. Benin receives satellite data thanks to the European Union funded project *Preparation for the Use of MSG in Africa (PUMA)* which made data and products from EUMETSAT's latest satellites accessible. The African Monitoring of the Environment for Sustainable Development (AMESD) initiative took PUMA a stage further by significantly extending the use of remote sensing data to environmental and climate monitoring applications. Funding for this project ended in 2012 and will continue in 2013 under the **MESA** project. The MESA project will enable DNM/ASECNA to continue to have access to satellite data. Also, according to consultation with DNM/ASECNA, the MESA project will provide enough support for data analysis at the time of this project. Therefore, Benin has not prioritized the use of LDCF funds to support activities related to satellite data exploitation in this project.

Table **4**: Status of existing meteorological stations under the National Directorate on Meteorology in Benin.

Station type	Existing	Fully operational
Synoptic, manual	6	4
Agro-meteorological and climate, manual	20	14
Rainfall gauges	55	40
Satellite receiving stations	2	2

84. The Benin Oceanographic and Fishing Research Center, CRHOB, currently has the capacity to measure sea surface temperatures daily at 1 m depth with a traverse profile of temperature sensors following the coast. The temperature sensors have been supported due to a partnership with the French Research Institute for Development (IRD). Since 2010, CRHOB also has the capacity to measure erosion and coastal sedimentation.

[16] The AMMA radiosondeprogramme and its implications for the future of atmospheric monitoring over Africa American Meteorological Society, July 2008 p1015-1027 http://www.amma-international.org/IMG/pdf/parkeretalbams2008.pdf

85. Issues for CRHOB include that there is only one sole coastal monitoring station in Benin located at the Cotonou port. Although the station automatically records data hourly, it provides only one data point so interpolation of coastal information is impossible. Furthermore, there are insufficient spare parts (e.g., sensors) and limited qualified personnel which has resulted in discontinuities in data collection.

Table **5**: Status of existing oceanographic stations in Benin.

Station type	Existing	Fully operational
Oceanographic monitoring station	1	1

86. Despite the support of the associated baseline projects, infrastructure and knowledge on the implementation of modern weather, climate and hydrological forecasting is still required. No repair tools or manuals are available, in particular for automated equipment. Very little equipment if any (none in the case of DNM) is automated. Furthermore, despite investment in computer software through existing projects, there are no continuously operational forecast models. Also, limited data from Benin is transmitted internationally to the Global Telecommunications Network (GTS). This is as a result of the obsolete and inadequate status of meteorological infrastructure in the country. Weather and climate observations from Benin are therefore not being effectively incorporated into regional and global circulation models which decreases the accuracy of these models for the Benin context.

2.4.2 Adaptation Alternative Component 1 – With LDCF Intervention

87. Under this component the Government of Benin will be able to use LDCF resources to procure, install and/or rehabilitate critical infrastructure required to build and strengthen the climate-related observational network nationally for multi-risk purposes (floods, droughts, sea level rise / storm surges and strong winds). All existing EWS projects are focused on predicting floods or famine in localizedgeographical areas. In contrast, this component will focus on establishing national hydro-meteorological monitoring capabilities in order to produce EWS/CI for both climate zones in Benin, particularly the most vulnerable agro-ecological zones indicated by the NAPA.

88. Data will be communicated by improving transmission (for existing manual stations) through SMS or GPRS connections (in the case of automatic weather stations). Data will also be transmitted through the acquisition of CB radio communication systems provided for key information producers. Existing written records will be digitized and all data will be stored in secured servers housed within each information production agency. Treated, comprehensible data will be transmitted to a centralized, open-access data server to be created under this project (see Component 2).

89. Specifically. LDCF funds will build on the above mentioned baseline projects in the following manner:

Build offhydrological modeling reinforcements provided by the PUGEMU project and extend the EWS for multi-risks (including droughts and strong winds): The LDCF2 project will build significant technical and operational capacity within DNM/ASECNA/DG-Eau to make effective use of the country-wide hydro-meteorological monitoring network.

- Build off the hydrological monitoring equipment procured through the PAPDFGC project and provided to DG-Eau.
- Continue reinforcing DG-Eau's expertise on flood forecasting: Through the GIZ project DG-Eau developed a hydrological model for the Mono watershed. Calibrated inputs and boundary conditions from the Mono watershed model will serve to develop hydrological models for the other watersheds in Benin which are lacking models.

- Reinforce collaboration with AMESD/MESA and build off DNM/ASECNA's current installation of satellite reception equipment:The LDCF2 project will build capacity within DNM/ASECNA to effectively visualize and analyze satellite data to create risk vulnerability maps for multi-risk events including floods, droughts, strong winds and coastal erosion specific to Benin.Using satellite data DNM/ASECNA will focus on producing short-term seasonal forecast mappings as well as long-term projections of climate change risks.
- Build off the ViGIRisCproject (ACMAD) by exploiting ACMAD's knowledge on EWS in the region and taking advantage of knowledge sharing opportunities sponsored by the ViGIRisC project: The LDCF2 project includes funds to send DNM/ASECNA personnel to ViGIRisC's training courses for West Africa.
- Build on the existing WHYCOS regional hydrology project: The National Hydrological Service (DG-Eau) has gained experience in watershed modeling for the Niger watershed through Niger-HYCOS. The LDCF2 project will reinforce the existing hydrological modeling expertise by updating modeling licenses, adding new equipment to assist with downscaling and training new technical personnel.

90. Following feasibility assessments and stakeholder consultations conducted between September 2012 and January 2013 (see Annex 4), LDCF resources will be used to achieve the following outputs:

Output 1.1 Procurement and installation or rehabilitation of 30 water level monitoring stations with telemetry, 30 automatic rain gauges at hydrological stations and 1 automatic Doppler flow meter with data transmission capabilities and data processing and storage facilities to feed hydrological models *(832,000 USD)*

Under **Output 1.1**an increase in the coverage of the hydrological monitoring network nationally will lay the foundation to better calibrate hydrological models, generate locally relevant flood forecasts, monitor sharp rises and increases in river flow, and generate projections of expected changes water resource availability. In turn this allows the NHMS to identify dangerous floods before they occur, issue warnings to populations and dam managers downstream and alert communities at risk. As in the case of previous equipment procurement, the manufacturers will be responsible for installation and an initial1 to 2 week training on equipment operation, maintenance and data transfer.

Equipment manufacturers will be responsible for providing appropriate means to transfer data to a central server. Manual station data will continue to be collected with volunteer data observers (generally water level readers). New automatic flow meters will be outfitted with GPRS connections so data can be related to DG-Eau in real-time. Such fast transmission of data can enable early warnings for short lead-time events such as flash floods. Digitization of written hydrological records will improve the availability of data for climate predictions and analyses.

This Output will also build operational hydrological modeling capacity by focusing on an integrated approach to model all 4 of Benin's watersheds in real-time. The strategy as defined during project preparation by DG-Eau is to work with a basin approach where each watershed is modeled separately with real-time data to calculate its flow output (i.e., discharge). Watershed model flowsare combined in the end to provide national flood forecasting expertise. In effect, this Output will build off the independent watershed models developed, equipment acquired and capacities developed in the Mono (GIZ project) and the Ouémé (World Bank PUGEMU project and the European Union PAPDFGC project) watersheds.

Indicative activities include:

Activity 1.1.1: Procurement of 30 water level monitoring stations with telemetry, 30automatic rain gauges at hydrological stations and 1 Acoustic Doppler Current Profiler (ADCP) for flow measurements, including the costs of fencing and recruitment of security guards(DG-Eau).(For existing and future locations see Annex4) Salaries for existing security guards are paid by existing government budget lines. It is assumed that the government will continue to support salaries for newly recruited guards based on proper budget planning by DG-Eau (See Output 1.4 which includes capacity reinforcement for sustainable budgeting and planning).

Activity 1.1.2: Field validation visits 3 to 4 weeks after choosing sites to calibrate flow (i.e., discharge) measurements based on comparing river heights with river flows (i.e., rating curves)

Activity 1.1.3: Purchase of GSM portable telephones with solar batteries to enable fast transmission of manually collected hydrological data

Activity 1.1.4: Purchase of a secure main data server and a back-up server to build a long-term flow database which can help in the prediction of flood probabilities and to assist with data quality control

Activity 1.1.5: Digitization of written hydrological data to be stored in secure data server with back-up capabilities

Activity 1.1.6: Renewal and purchase of hydrological modelling licenses (MIKE BASIN) including training for three (3) DG-Eau engineers and two (2)DG-Eau technicians with modelling software

Activity 1.1.7: Knowledge sharing between the DG-Eau and the Applied Hydrology Laboratory (LHA) on calibration and validation of hydrological models

Output 1.2: Procurement / installation of 3 automatic agro-climate stations, 2 automatic synoptic stations and 25 automatic rain gauges and rehabilitation of 6 manual synoptic stations and 20 manual agro-climate stations, all stations/gauges equipped with telemetry and improved data transmission/processing/storage facilities. (DNM) (For equipment arrangements, see Annex 4)*(1,227,000 USD)*

During the preparatory phase, stakeholders prioritized the procurement of Automatic Weather Stations (AWS) using GPRS mobile telecommunication systems. Based on the experiences of the first LDCF project in Benin (which had a component on expanding the rain gauge network) the DNM realizes the intensive time required for training with new equipment. As such, they have proposed a mix of automatic and manual stations. In their budgets they weighed the future running costs and the ease of maintenance. The number, type and placement of stations were debated and considered including an analysis of cost-effectiveness. In cases where stations have been neglected but the site (fences, towers etc.) are still functional, LDCF resources will be used to replace existing sensors. Also, SMS (for manual) and GPRS (for automatic) transmission mechanisms have been budgeted to provide daily to hourly data frequency transmission. Written meteorological data will be digitized to create longer time series for climate statistical analysis. Costs for purchasing additional weather stations include estimates for spare sensors and parts recruitment of locally-employed security guards. Fencing and security costs have been included for each station. Manufacturers will be responsible for installation and initial 1 to 2 week training on equipment operation, maintenance and data transfer.

*Activity 1.2.1:*Procurement / installation of 3 automatic agro-climate stations, 2 synoptic stations and 25 automatic rain gauges and rehabilitation of 6 synoptic stations and 20 agro-climate stations.

Activity 1.2.2: Field consultations with village representatives prior to equipment installation to verify weather equipment are installed in useful and secure locations

Activity 1.2.3: Construction of secure fencing around weather stations to prevent theft of solar panels, mercury from thermometers, rainfall gauges, etc. Enclosure costs are approximately 500,000 FCFA (1,000 USD) per station. Costs include recruitment of full-time locally-employed security guards at each

station.Salaries for existing security guards are paid by existing government budget lines. It is assumed that the government will continue to support salaries for newly recruited guards based on proper budget planning by DNM/ASECNA (See Output 1.4 which includes capacity reinforcement for sustainable budgeting and planning).

Activity 1.2.4: Development of improved data transmission capacity by mobile phone, internet/intranet and GSM including 3 field computers and 4 information computers in Cotonou

Activity 1.2.5: Purchase of a secure data server and back-up server to build a long-term database to assist in climate risk and climate change predictions.

Activity 1.2.6: Digitization of written meteorological data (such as data stored in France) to create longer time series for detecting climate change trends. Data will be stored in the secure data server financed by LDCF funds.

Activity 1.2.7: Capacity reinforcement on long-term planning and financial budgeting for DNM to have the ability to procure radar in the future.

Activity 1.2.8: Knowledge sharing between DNM/ASECNA and the Climatology Laboratory (CL) on the use and treatment of climate observation data and the development of climate risk and vulnerability scenarios.

Output 1.3: Acquisition of maintenance, communication and data collection/treatment equipment (Differential Global Position System Monitoring, Acoustic Doppler Current and Velocity Profilers) for water level and coast erosion monitoring by CRHOB *(309,000 USD)*

Equipment for sea level and coastal erosion monitoring are functional at the Oceanographic and Fishing Research Center in Benin (CRHOB). They have been monitoring water temperature since 2010 and have an existing partnership with the Port at Cotonou to use data from the sole oceanographic weather station in Benin.LDCF resources in **Output 1.3** will build the capacity of CRHOB to maintain their equipment, have additional field markers to better gauge ocean monitoring and have enhanced equipment for flow measurement and positioning. Furthermore, this output includes an activity to formalize a partnership for data sharing between DNM/ASECNA/DG-Eau and CRHOB because inter-agency collaboration is currently limited. As indicated during project development, up until this point, there have been no initiatives to create the partnership in spite of the fact that DNM/ASECNA realizes that sea surface temperature information has a strong impact on weather and DG-Eau is aware that sea levels are good indicators for coastal flooding.

Activity 1.3.1: Maintenance tools (batteries, oil and grease for coastal conditions) and data collection/treatment equipment (Differential Global Position System Monitoring, Acoustic Doppler Current and Velocity Profilers, Zodiac boat, pressure sensors) for water level and coast erosion monitoring

Activity 1.3.2: Purchase of CB radios and SMS communication services to enable fast transmission of manual data from the existing coastal monitoring station at the Cotonou Port and data sharing between CRHOB, the Port Authority at Cotonou and DNM/ASECNA/DG-Eau.

Activity 1.3.3: Field measuring marker equipment to improve analyses of sea levels and coastal erosion

Output 1.4: Training for DNM (4 engineers / 4 technicians), DG-Eau (2 engineers / 3 technicians) and CRHOB (2 researchers / 2 technicians) on information collection, data storage/analysis, operation and maintenance (O&M) and maintenance/monitoring principles including development of Standard Operating Procedures (SOPs) for equipment and capacity reinforcement for long-term budgeting*(246,000 USD)*

Under **Output 1.4**, training will stress that cost-effective technologies are utilized, which are able to interface with existing systems and which minimize dependence on external suppliers of hard and software. Training will be provided annually over a 2 week period due to the staggered procurement of equipment. Capacities for all information production agencies to plan long-term budgets for O&M will also be reinforced because as indicated in Section 1.1, an inability to plan for recurring costs has been the cause of inoperability in Benin (as evidenced by 70% of meteorological equipment not functioning).

It must be noted that salaries for DNM/ASECNA, DG-Eau and CRHOB are currently covered under existing Ministry of Transport, Ministry of Water and research budget lines respectively. The staff of DNM/ASECNA and DG-Eau are considered government officials, engaged as Permanent Staff of the Benin Republic (Agent Permanent de l'Etat). Thus, they have fixed contracts for 30 years, are salaried employees and get their salaries from the National budget through the Public Revenue Department. Each ministry must annually define lines in the National budget for specific activities such as Operation and Maintenance costs for National Directorates like DNM/ASECNA and DG-Eau. Through **Output 1.4**, the capacity of DNM/ASECNA and DG-Eau will be reinforced to plan for recurring costs in order to ensure long-term financing from the Benin government. Also, new recruited personnel will be mandated to stay in their specified positions for 10 years in order to ensure knowledge sharing as per the TORs (Annex 6).

Also,in accordance with decree number 029(Arrete 2012 No. 029, Annex 2), DNM is obliged to manage all meteorological/climate monitoring and monitor and control aeronautical activities. DNM assigns the management of aeronautical activities to its operational arm, ASECNA. ASECNA has significant forecasting expertise with 10 forecasters, however, forecasts are generally concerned with the needs of civil aviation. Through this project, ASECNA will transfer forecasting skills, technical support and human resources to assist DNM in creating a national forecast center for multi-risks, namely to forecast floods, droughts, strong winds and coastal flooding/storm surges. In order to ensure that engineers/technicians who work in collaboration with DNM/ASECNA transfer knowledge gained through trainingprovided by the LDCF2 project, Terms of Reference (TORs) have been developed to mandate all newly trained DNM/ASECNA employees to stay to support the national forecast center for at least 5 years after training (Annex 6).

Activity 1.4.1: Training of at least 2 DG-Eau engineers and 3 DG-Eau technicians on flow meter information collection, data treatment (including data quality check) and operation and maintenance (O&M) tasks. Standard Operating Procedures (SOPs) will be put into place for 1) O&M and 2) data storage and collection.

Activity 1.4.2: Training of at least 4 engineers / 4 technicians within DNM/ASECNA to operate, maintain and repair the weather stations. Training will focus on information collection, data treatment (including data quality checks) and operation and maintenance (O&M) tasks for weather equipment. Standard Operating Procedures (SOPs) will be put into place for O&M and data storage and collection.

Activity 1.4.3: Training of at least 2 researchers / 2 technicians within CRHOB to operate, maintain and repair coastal monitoring equipment. Training will focus on information collection, data treatment (including data quality checks) and operation and maintenance (O&M) tasks. Standard Operating Procedures (SOPs) will be put into place for O&M and data storage and collection.

Activity 1.4.4: Capacity reinforcement for DGM/DGRE/DCIME by a National financial expert on sustainable budgeting and planning for Operation and Maintenance of EWS monitoring and IT equipment (weather stations, flow meters, satellite receiving stations, servers).

Component 2: Hydro-meteorological weather and climate information integrated into development plans and early warning systems

Outcome 2:

Efficient and effective use of hydro-meteorological and coastal monitoring information for making early warnings andseasonalforecasts which feed into long-term development plans

Co-financing amounts for Outcome 2: $7,554,075

LDCF project grant requested: $1,196,000

2.4.3 Baseline Component 2 – Without LDCF Intervention

91. Much of the value of early warnings (whether a user changes their actions or lives/assets are safeguarded) is dependent on the quality, packaging, communication and dissemination of those warnings. Currently, forecasts are not quantified, communication mechanisms are weak particularly to decentralized agencies/NGOs/CSOs and there is no targeting of EWS/CI based on end-user needs, particularly those most vulnerable. Furthermore, local capacity to understand alerts and the utility of climate information for adaptive planning is extremely limited.

92. A few initiatives in the past by the National Office on Food Security (ONASA) focused on generating climate predictions for famine with the assistance of the National Meteorological Service's (DNM's) operational arm, ASECNA. At present, forecasting expertise lies within ASECNA, however, quality forecasts are focused on aviation needs; the general population receives daily weather bulletins with limited information (see Section 1.3). Flood forecasts are also generated by DG-Eau due to the support of several on-going flood EWS-related projects in Benin supported by the World Bank (PUGEMU), EU (PAPGFDC) and GIZ (Mono project). However, flood forecasts are focused on single watersheds in pilot studies, and practically speaking, flood forecasts nationally have been either lacking or late.

93. A previous pilot project implemented by the NGO, IDID, based on the CC Dare program developed a small scale EWS targeted to farmers. Feedback after completion of this project noted that weather bulletins are viewed by the local populations to be infrequent and not readily useful by rural populations (See IDID project under Section 2.3.2). A potential baseline project to improve the utility of forecasts is WMO's Global Framework for Climate Services (GFCS) which is aiming to improve communication between different sectors (health, agriculture, food security, private) based on their needs for climate services. Other goals of this project are to: strengthen capacity for disaster risk reduction and early warning, perform large-scale data recovery and digitization, develop National Climate and Health Working Group and partner climate services and water resources management. A pilot project is possible in the future for Benin, but plans are not definitive.

94. Currently, there is very little synergy among EWS-related initiatives and between EWS agencies and data is not shared between weather/climate information production agencies. For instance, sea surface temperature data from the oceanographic weather station at the port in Cotonou is not shared with DNM/ASECNA. Also, EWS initiatives nationally and regionally (e.g., ACMAD's regional ViGiRisc project) are working independently with little collaboration.

95. Furthermore, initiatives trying to build ANPC'scapacity in Benin are limited in scope due to their pilot-scale nature (e.g., GIZ and EU projects). ANPC was recently founded in December 2012, and as such, is lacking significant technical and operational capacities for disaster prevention. To date, it has focused only on disaster management and has limited technical capacity to disseminate alert information.

96. Additionally, during the project preparation phase, workshops and bilateral consultations indicated that a formalized Standard Operating Procedure for alert communication is necessary. At the

moment, alert information is distributed ad-hoc by various NGOs/CSOs in a compartmentalized fashion.An example is the Millenium Villages Project (MVP) (UNDP, $9.7m) which is contributing to the eradication of extreme poverty in the town of Banikoaraby increasing incomes and improving household living conditions through agriculture, health, education, water and sanitation development. The project has established a community-based network to implement the grass-roots project.Although the network is effective, its reach is presently limited on a national scale and it cannot yet support communication and outreach to the vastly spread rural populations in Benin.

2.4.4 Adaptation Alternative Component 2 – With LDCF Intervention

97. LDCF resources will be used to ensure that a multi-risk system for EWS/CI is developed and used effectively by vulnerable populations in the four targeted agro-ecological zones. This will in part involve that information providersfocus on service delivery to produce relevant information which can be easily understood and integrated into climate/weather risk and disaster prevention planning. Forecasting capacity will be reinforced through internal and external knowledge sharing sessions. Based on the forecasting expertise built through this project, information producers will develop the skills to tailor early warning and climate information products on short-term and seasonal scales for both public and private user-needs.

98. Concretely, in order to improve the current coordination issues between local entities involved in EWS (including between the port/CHROB and DNM/ASECNA), Component 2 will include the establishment of a multi-agency synergy promotion committee (Comité Inter institutionnel et Multi Disciplinairepourpromouvoir la Synergie, CIMS). CIMS will act as the task force for coordinating EWS-related activities and budgets and a platform for facilitating EWS/CI knowledge sharing. It will meet bi-annually and during critical seasonal periods when disaster risksare high.

99. Additionally, Component 2 will focus on improving national and decentralized technical and operational capacities of ANPC and locally-based NGOs/CSOs to disseminate alerts. This will include having knowledge transfer sessions where DNM/ASECNA and DG-Eau will teach information/alert providers howtocommunicate the technical jargon of weather bulletins and other climate-related information.In order to have an effective EWS/CI communication process where roles are clearly identified and alerts are well-understood, a Standard Operating Procedure (SOP) for alert communication and a standardized national alert guide will be developed. ANPC and NGOs/CSOs will also be provided privileged communication equipment to effectively disseminate alerts. A feedback mechanism (via SMS, toll-free numbers and local EWS focal points) will be provided to ensure that end-users are engaged and are able to provide their suggestions on how to improve communication and alerts.

100. Specifically. LDCF funds will build on the above mentioned baseline projects in the following manner:

- Coordinate with the PUGEMU and Mono projects (EU and GIZ respectively)bybuilding off the capacity reinforcement activities for ANPC to work with DG-Eau and distribute flood alerts. The LDCF2 project will continue to enhance alert dissemination and will build collaborationsbetween ANPC and DNM/ASECNA, CRHOB and relevant NGOs/CSOs (e.g., NGOs focused on seasonal droughts).
- Incorporate lessons learned from the PAPDFGC project on how communal groups have taken a role in managing floods on a local level. Communal groups including the ConseilAdministratifDepartemental and the Communal Committees on Crisis Management will be included in the LDCF2 project for dissemination of EWS/CI.

- Build off of the LDCF1 project by improving information flows between climate monitoring, forecasting and early warning services to policy-makers and farmer communities in high-risk areas: Results from the LDCF2 project with regards to the pilot study on tailoring climate/weather products and market research for the development of mobile phone based agricultural advisories will provide useful forecasts/information that the LDCF1 project will be able to exploit.
- Build off of regional EWS-related efforts: It will form a solid collaboration with ACMAD's ViGIRisC (African Early Warning and Advisory Climate Services (AEWACS) project. DNM/ASECNA is already active in working with ACMAD to develop regional seasonal forecasts called PRESAO. This project will coordinate with ViGIRisC to gain knowledge on EWS in the region. This project will exploit the ViGIRisC project at the regional level by using ACMAD facilities, and sending forecasters to ACMAD's forecast training courses for West Africa.
- Exploit the grass-roots based community networks established through the Millenium Villages Project to try to eradicate poverty in one of Benin's poorest towns, Banikoara. Concretely, the LDCF2 project will use the established community-based networks in the selected regions to facilitate information dissemination.

101. Following feasibility assessments and stakeholder consultations, LDCF resources will be used to achieve the following outputs relative to Component 2:

102. Output 2.1:DNM/ASECNAand DG-Eau technical capacity to make and use climate forecasts (on hourly, daily and seasonal timescales) is strengthened by training 4 forecasters/ 4 technicians through national, regional and international knowledge sharing. (The Government will assist with recruitment and will mandate that trained personnel must remain working within their respective institution for at least 5 years after training. Training of personnel will occur on national and regional levels.)(213,000 USD)

Output 2.1will enable DNM/ASECNA to produce early warnings on short-term scales, (hourly, daily and weekly) and for DG-Eau to produce flood forecasts and weather forecast bulletins indicating rainfall intensity and wind speeds. DNM/ASECNA/DG-Eau will also gain the ability to produce long-term seasonal forecasts for extreme weather (droughts). CRHOB will gain the ability to produce long-term climate predictions for coastal erosion and sea level rise.

The Output will link to ongoing activities at the NHMS and will ensure a formalized collaboration with regional and international forecast centers for data sharing. Based on conclusions reached during the preparatory phase (see Annex 4), it is envisioned that ASECNA will continue to forecast. Simultaneously, by government decree (see Annex 10) ASECNA is required to transfer skills toDNM forecasters because DNM is the over-arching weather service in Benin. Newly trained engineers/technicians will be required to transfer their skills to DNM/ASECNA and support national forecasting efforts for 5 years (as mandated in the TORs, Annex 6). Capacity development is also included for DNM and DG-Eau to formalize an alert guide for extreme weather and to map hydro-meteorological risks. Data from models will be shared between DNM and the Laboratory of Climatology in order to share expertise on calibrating and validating weather/climate forecasting. Data sharing with regional NHMSs will be facilitated. Knowledge sharing with regional training program such as ACMAD's ViGIRisC will be supported.

Activity 2.1.1: Acquisition of IT equipment and Numerical Weather Prediction model licenses for weather forecasting

Activity 2.1.2: Knowledge sharing for DNM on Numerical Weather Prediction models (e.g., WRF and COSMO) with international centers (e.g., MeteoFrance) and regional centers (ACMAD, responsible for the African Early Warning and Advisory Climate Services, AEWACS or ViGIRisC project and for the ClimDevAfrica programme) to build forecasting expertise

Activity 2.1.3: Capacity development for DNM and DG-Eau to build a formalized alert guide and thresholds for extreme weather events, most notably drought, flooding, sea level, storm surge and strong wind probabilities

Output 2.2: Tailored agricultural and extreme weather risk advisories that link climate, environmental and socio-economic information on short-term and seasonal timescales are developed to support end-user needs, including research development of a mobile-phone based advisory platform(DNM/ASECNA/DG-Eau/CRHOB/DGE) *(150,000 USD)*

Output 2.2will strengthen DNM/ASECNA, DG-Eau, DGE and CRHOB's capacities to tailor early warnings and CI to public and private end-users from various socio-economic sectors. A pilot project will be implemented to demonstrate the potential for targeted service delivery of climate/weather information products (e.g., for weather-index based insurance). Only a previous pilot project by the IDID NGO has tried to build climate service delivery capacity in Benin (See Section 2.3.2). Also, DNM has already gained experience in working with the private sector as indicated in Stakeholder discussions.

Collaboration between DNM/ASECNA, DG-Eau, DGE, NGOs (IDID, Care International, CRS, Plan Benin, Oxfam, CARITAS), Civil Society Organizations (Communal and Local Communities on Civil Protection, Regional Committee on Disaster Management, and the Village Credit Association called "Avec"), the Directorate of Agricultural Council and Professional Training (DICAF), the National Office for Food Security (ONASA) and the Oceanography Institute (CRHOB) will ensure forecast bulletin or alert information is provided in useful quantitative units (e.g., crop yield, area of flood plain, wind velocity) at desired frequencies for various economic sectors (e.g., agricultural) including the rural populations who are most vulnerable.

*Activity 2.2.1:*Four (4) annual knowledge sharing sessions between the technical staff of DNM/ASECNA/DG-Eau/DGE/CRHOB, NGOs/CSOs and private sector representatives to see the needs for tailored climate products

*Activity 2.2.2:*Feasibility study and capacity development for the technical staff of DNM/ASECNA/DG-Eau/CRHOB to generate targeted forecasts and a suite of products geared towards user-needs both public and private.

Activity 2.2.3: Pilot study to demonstrate the economic potential of tailoring and selling weather/climate information to different agricultural sectors (e.g., cotton), weather insurance companies and a range of private sector clients (See TOR Annex 6)

Activity 2.2.4: Capacity reinforcement by a National financial expert for DGM/DGRE/DCIME on establishing sustainable cost-recovery mechanisms with revenues generated from selling tailored weather/climate products and risk maps

Activity 2.2.5: Household surveys of targeted users of climate information conducted to understand the social and economic costs and benefits of using advisories and warnings to mitigate risks associated with agriculture and water management

Activity 2.2.6: Quarterly roundtable meetings between DNM, DG-Eau, CRHOB, DGE, the Ministry of Health, the Ministry of Agriculture (DICAF) and ONASA for long-term development planning for various socio-economic sectors (e.g., agricultural/fishing/livestock/forestry)

Output 2.3: Development of a multi-agency platform to enhance cooperation (CIMS) and to resolve lack of coordination and data sharing amongst agencies and with EWS-related initiatives(DGE/DNM/ASECNA/DG-Eau/ANPC/Caritas) *(97,000 USD)*

This involves developing a formalized synergy for all EWS agencies to resolve their lack of coordination. In-house focal points dedicated to the LDCF2 project will be assigned in each agency. Currently, no other project is considering the lack of synergy between EWS agencies for any EWS or CI – related initiatives.

Activity 2.3.1: Creation of a multi-agency platform (Comité Inter institutionnelet Multi Disciplinaire, pour promouvoir la Synergie, CIMS) including representatives from DNM/ASECNA, DG-Eau, CRHOB,NGOs/CSOs, (IDID, CARITAS) and other organizations representing national and local levels. The purpose of the platform will be to oversee the development of EWS so that i) there are no redundancies amongst EWS agencies, ii) any institutional conflicts are resolved, and iii) there is coordination with other EWS-related initiatives (in particular, the PUGEMU (WB), PAPDFG5 (EU) and Flood EWS for Mono (GIZ) projects) on mainstreaming disaster reduction in Benin, in terms of discussion and knowledge sharing.

*Activity 2.3.2:*Bi-annual meetings and reports by CIMS on synergy building development and activities to ensure data sharing

Output 2.4: Development of an open-access EWS data portal for sharing data cross-sectorally, including facilitating internet access and mobile phone services with a Public Private Partnership (PPP) and transferring data into the Global Telecommunication System (DGE/DNM/ASECNA/DG-Eau/CRHOB/ANPC) *(116,000 USD).*

Data sharing can enable climate information to have broader relevance (such as relating weather variables with health impacts) and enables the establishment of appropriate initial and boundary conditions for hydro-meteorological models.This project will store all EWS-related information including monitoring and alert dissemination data on a central serverfor open-access data sharing. It will serve to assist the integration of hydro-meteorological climate information into disaster management systems and development plans. It will also store an inventory of concrete preventive measures for catastrophes according to specific alert levels and climate information produced. Furthermore, it will link to the open access spatial datasets from the UN Office for Outer Space Affaires (UN OOSA) and the UN SPIDER project whichare concerned with developing the capacity of countries to use an open network of all types of space-based information to support disaster management activities. All data will be integrated into the international system for meteorological data collection/analysis, the **Global Telecommunication System (GTS)**.

Activity 2.4.1: Development of an EWS centralized data server including connection with the UN Office for Outer Space Affaires (UN OOSA) and the UN SPIDER project. It will be an open-access data portal to all EWS information production agencies (DNM/ASECNA, DG-Eau, CRHOB), DGE and ANPC and data can be transmitted rapidly between institutions, NGOs/CSOs, to other ministries within Benin (e.g., Ministry of Health, Ministry of Agriculture) and abroad. For data sharing abroad, a password-protected FTP connection could be established. All data will be transmitted to GTS.

Activity 2.4.2: Integration of satellite data specific to EWS by DNM from national, regional and international programs: MSG, Eumestat, Météosat

Activity 2.4.3: Establishment of a Public Private Partnership and service level agreement between DNM/ASECNA/DG-Eau/CRHOB and the GSM operator (MTN), an internet and mobile phone service

provider, minimizing start-up costs for mobile phone plans and modems as well as increasing bandwidth for internet connections.

Output 2.5: Reinforcement of operational and technical capacities withinANPC, PNRCCand DGE to assimilate forecasts and monitoring into existing development planning, PRSPs(SCRP, PAP, NGSPR, PDCs), the National Environmental Management Plan (PNDC-GEM) and disaster risk prevention strategies, including support for local and regional collaborations.(235,000 USD)

In order for the national DRM to integrate climate information into their planning, this activity includes capacity building for ANPCto understand climate prediction jargon. The Output will also support DGE to have the capacity to validate risk maps / prevention strategies in the field. Climate monitoring information from Component 1 and forecasts from Output 2.1 will be combined to identify regions where risks are currently high and likely to get worse.

Activity 2.5.1: Integration of EWS/CI into the next PRSPs (SCRP (2015) and PAP (2015), the revised NGSPR (2016)) and the National Environmental Management Plan is facilitated by the Multi-agency Synergy Committee (CIMS) (Output 2.3) who will have the role to promote as a national priority the use of EWS/CI to help prepare for crises/catastrophes.

Activity 2.5.2: Capacity building and knowledge sharing for ANPC and PNRCC to mainstream EWS/CI and adaptation measures into disaster risk management plans (the National Multi-risk Plan) and risk maps including validation of disaster prevention strategies and vulnerable zones in the field.

Activity 2.5.3: EWS capacity development meetings between ANPC and regional disaster risk management (DRM) units such as the Department of Humanitarian and Social Affairs of ECOWAS, the International Federation of Red Cross IFRC, and with neighbouring national DRMs (CONASUR in Burkina Faso) to strengthen EWS on local levels.

Output 2.6: Communication channels and standard procedures for issuing warnings by ANPC, DGE and NGOs/CSOs are enabled through public/private partnerships with radio, newspaper, television and mobile phone services including the development of a feedback mechanism via toll-free numbers, SMS, contact with local EWS focal points and field analysis on the utility of early warning advisories and warnings. (As a basis, the communication protocol proposed by DG-Eau for flood alert communication will be used, see Annex 10)*(265,000 USD)*

Output 2.6 will build ANPC, DGE, DNM and NGO/CSOcapacity to use SMS, emailing, toll-free numbers, and radio/television/press (both public and private) to disseminate alerts in all national languages. CB radio communication systems will be provided to all EWS information dissemination agencies who require them, particularly on decentralized levels. This output will also include the development of a SOP for alert communication and training for focal points from all dissemination agencies on alert understanding. Furthermore, an information chain with a feedback mechanism for local populations to communicate with the focal points for alert generation and dissemination will be formalized. They will be able to communicate by SMS, toll-free numbers or direct contact with their EWS local representatives. This will build on the work undertaken by the PUGEMU, PPEA2, PAPDFGC and the Millennium Villages projects in working with locals and exploiting existing decentralized communication mechanisms. In particular, as discussed during the Validation workshop, the communication protocol proposed by DG-Eau for flood alert communication will be used as a baseline (See Annex 10). Adaptations to this protocol must be to include a direct communication mechanism between DNM/ASECNA and ANPC and to include ONASA as a recipient of alert information.

Activity 2.6.1: Provision of privileged communication systems (e.g., CB radios) to ANPC (main and local focal points), a representative of the Directorate of Communication and the focal points of relevant NGOs (IDID, Care International, CRS, Plan Benin, Oxfam, CARITAS) and Civil Society Organizations (Communal and Local Communities on Civil Protection, Regional Committee on Disaster Management, and the Village Credit Association called "Avec") to build their warning transmission capacity

Activity 2.6.2: Development of a toll-free number for alert information and updates at ANPC and DNM.

Activity 2.6.3: Formalized partnerships (contracts) between ANPC, DGE, NGOs/CSOs and local radio stations and funds to support local radio emissions

Activity 2.6.4: Development of a standardized communication operation procedure (SOP) involving all EWS agencies from national to local levels and the establishment of local EWS focal points. DNM with assistance from DG-Eau will act as the agency responsible for alert generation and ANPCwith the support of DGE will be the responsible focal point for alert dissemination.

Activity 2.6.5: Implementation of a formalized feedback mechanism so that local focal points in NGOs/CSOs and government representatives in each department and in critical communes can relay lessons learned and suggestions/comments on alert transmission and climate information products (e.g. useful seasonal bulletins) End-users will be able to provide feedback by SMS, toll-free numbers or contacting their local EWS/GTPA focal points. (See Figure 3)

Activity 2.6.6: Group training for leaders of all dissemination agencies (NGOs/CSOs) and the Journalist Network and equipment to improve their understanding and means to effectively disseminate alerts (e.g., various risk level flags such as yellow, red or green) through multiple media outlets (e.g., SMS, toll-free number, local radio, public/private media, vocal messages by mobile phone and television announcements)

Activity 2.6.7: Field visits and stakeholder consultations undertaken to understand how users of early warning advisories and warnings use the information for managing climate and weather related risks and how their decision frameworks affect the interpretation of advisories and warnings

Activity 2.6.8: Market research for mobile-phone platform development to integrate EWS/CI into agricultural advisories (See TOR Annex 6)

Output 2.7: Rural community capacity to adapt to climate shocks is strengthened by supporting NGOs/CSOs to promote understanding of alert signals and disaster risk prevention planning and gauge the receipt of alerts in a gender disaggregated survey *(120,000 USD)*

Currently, the alert systems for floods are not well-understood or trusted by the general population. This output will include training for the local focal points to relay the utility of weather/climate information to build the resilience of local populations to climate change. A public awareness campaign will focus on the same task with the ability for communities to get involved in project implementation and provide feedback by SMS, toll-free numbers or contacting their local EWS focal points in the target agro-ecological zones.

Activity 2.7.1: Local ANPC focal points and NGO representatives at the village level, are provided training to better understand the technical jargon of weather bulletins, effective alert communication and the use of climate information to build the resilience of local populations to climate change (i.e., for adaptation purposes such as rainwater harvesting, the development of short cycle crops and sustainable management of water resources)

Activity 2.7.2: Project public awareness campaign is developed in each of the vulnerable agro-ecological zones to promote the utility of climate information and the Early Warning System for adaptation to climate change and to introduce concrete ways in which the communities can get involved in project

implementation and provide feedback (feedback by SMS, toll-free numbers or contacting their local EWS/GTPA focal points)

Activity 2.7.3: Gender disaggregated survey on receipt of alerts, differentiated by type (floods, droughts, strong winds) in all of the pilot zones

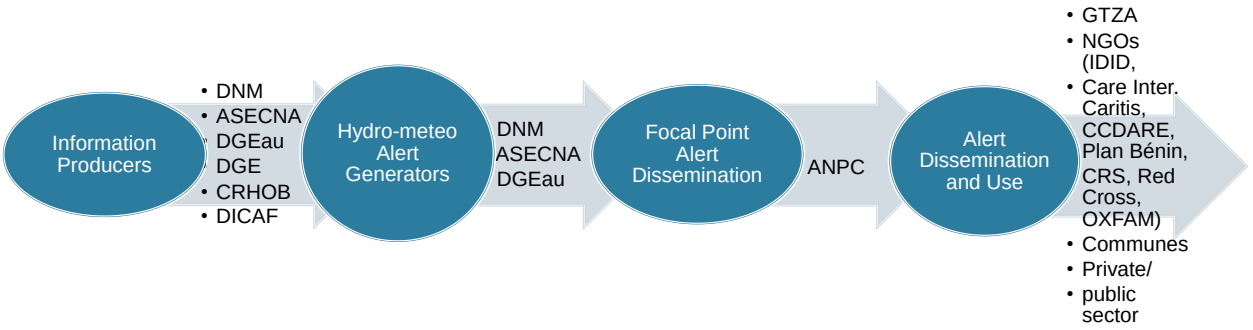


Figure 3: Standard operating procedure for alert generation/ communication (Conclusion from PPG Workshop 2, Cotonou, Benin, January 2013)

A summary of the Outcomes, Outputs and the financial resources per Output is provided in Table 6 below.

Table **6**: Summary of Outcomes, Outputs and Output costs

OUTCOMES	OUTPUTS	COST (USD)
1. Enhanced capacity of national hydro-meteorological services (DNM/DG-Eau) and coastal monitoring institutions (CRHOB) to monitor extreme weather and climate change (droughts, floods, strong winds, coastal erosion, seal level rise)	1.1 Procurement and installation or rehabilitation of 30 water level monitoring stations with telemetry, 40 automatic rain gauges at hydrological stations and 1 automatic Doppler flow meter with data transmission capabilities and data processing and storage facilities to feed hydrological models (DG-Eau)	832,000
	1.2 Procurement / installation of 3 automatic agro-climate stations, 2 synoptic stations and 25 automatic rain gauges and rehabilitation of 6 synoptic stations and 20 agro-climate stations, all stations/gauges equipped with telemetry and improved data transmission/processing/storage facilities (DNM)	1,227,000
	1.3 Acquisition of maintenance, communication and data collection/treatment equipment (Differential Global Position System Monitoring, Acoustic Doppler Current and Velocity Profilers) for water level and coast erosion monitoring by	309,000

	CRHOB .	
	1.4 Training for DNM (4 engineers / 4 technicians), DG-Eau (2 engineers / 3 technicians) and CRHOB (2 researchers / 2 technicians) on information collection, data storage/analysis, operation and maintenance (O&M) and maintenance/monitoring principles including development of Standard Operating Procedures (SOPs) for equipment and capacity reinforcement for long-term budgeting	246,000
2. Efficient and effective use of hydro-meteorological and environmental information for making early and seasonal warnings which feed into long-term development plans	2.1 DNM/ASECNA and DG-Eau technical capacity to make and use climate forecasts (on hourly, daily and seasonal timescales) is strengthened by training 4 forecasters / 4 technicians through national, regional and international knowledge sharing. (The Government will assist with recruitment and will mandate that trained personnel must remain working within their respective institution for at least 5 years after training. Training of personnel will occur on national and regional levels.)	213,000
	2.2 Tailored agricultural and extreme weather risk advisories that link climate, environmental and socio-economic information on short-term and seasonal timescales are developed to support end-user needs, including research development of a mobile-phone based advisory platform. (DNM/ASECNA/DG-Eau/CRHOB/DGE)	150,000
	2.3 Development of a multi-agency platform to enhance cooperation (CIMS) and to resolve lack of coordination and data sharing amongst agencies and with EWS-related initiatives (DGE/DNM/ASECNA/DG-Eau/ANPC/Caritas …)	97,000
	2.4 Development of an open-access EWS data portal for sharing data cross-sectorally, including facilitating internet access and mobile phone services with a Public Private Partnership (PPP) and transferring data into the Global Telecommunication System (DGE/DNM/ASECNA/DG-Eau/CRHOB/ANPC)	116,000
	2.5 Reinforcement of operational and technical capacities within ANPC, PNRCC and DGE to assimilate forecasts and monitoring into existing development planning, PRSPs (SCRP, PAP, NGSPR, PDCs), the National Environmental Management Plan (PNDC-GEM) and disaster risk prevention strategies, including support for local and regional collaborations.	235,000
	2.6 Communication channels and standard procedures for issuing warnings by ANPC, DGE and NGOs/CSOs are enabled through public/private partnerships with radio, newspaper, television and mobile phone services including the development of a feedback mechanism via toll-free numbers, SMS, contact with local EWS focal points and field analysis on the utility of early warning advisories and warnings.	265,000
	2.7 Rural community capacity to adapt to climate shocks is strengthened by supporting NGOs/CSOs to promote understanding of alert signals and disaster risk prevention planning and gauge the receipt of alerts in a gender disaggregated survey	120,000

2.5 Key indicators, risks and assumptions

103. Key indicators, risks and assumptions are indicated in the Project Results Framework and Risk Log in Annex 1. Indicators have been developed to be Specific, Measurable, Achievable, Realistic and Timebound ('SMART') and are indicated in the Project Results Framework.Risksand recommended countermeasures were identified during bilateral consultations during the project preparation phase.

Key risks and assumptions underlying project development include the following:

Table 7: Risks

RISKS	RISK LEVEL	MITIGATION MEASURE
Benin does not have enough government financing to continue monitoring and to cover recurring O&M costs	Medium	By making EWS/CI more useful to various sectors, this pushes the Government to include stable, core budget lines for climate/weather services due to their cross-sectoral importance Capacity for long-term planning and costing will be built in all information production agencies.
Inadequate or inefficient political response to EWS/CI causing delays in warning dissemination and/or poor integration of hydro-meteorological information into planning	Medium	A Standard Operating Procedure (SOPs) for EWS/CI communication will be put in place, clearly identifying the roles of all actors.
Continuity breaks in National Hydro-meteorological services due to the work required with new equipment installation and other project needs	Medium	Procurement will be staggered to ensure continuity and a gradual increase for required capacity building Sufficient personnel will be hired to maintain existing and acquired equipment
Natural disasters damage infrastructure (particularly floods)	High	Robust infrastructure will be procured and training and spare parts will be provided for repair and maintenance in each technical, information production agency.
Data sharing is hindered by lack of coordination / willingness of agencies to centralize data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks)	Medium	An open-access data portal for information producers where knowledge will be shared for cross-sectoral use is an output to be developed (e.g., health, agriculture planning).
Procurement and installation of hydro-meteorological equipment, including hardware and software, is delayed because of complications with the release of funds and/or national procurement procedures.	Low	A clear Management Arrangement including a project management unit and focal points on national and local levels have been developed to facilitate fund disbursements.

Table 8: Assumptions

ASSUMPTIONS
Forecasts will be improved by local data assimilation collected from new climate/weather monitoring infrastructure
Manual equipment rehabilitated with enhanced SMS communication systems will not limit transmission of hydro-meteo data
The Ministries of Transport (DNM). Water (DG-Eau) and the Environment (CRHOB) are able to recruit enough technical personnel for project implementation. (Recruitment of technical personnel by the Government will mandate that new trained personnel must stay within their agency for 5 years to support knowledge sharing.)
The Ministry of Interior, Ministry on the Environment will have a vested interest to fully integrate climate

information into their poverty reduction strategies and disaster risk management plans due to the utility of EWS/CI for long-term planning cross-sectorally
NHMS will acquire enough capacity to tailor climate products to different socio-economic sectors (e.g., subsistence agriculture, cotton, port trade, tourism) by the end of the project.
Natural disasters (e.g., floods, strong winds) may damage infrastructure. Sufficient spare parts and tools have been procured to assist with equipment repair.
False alarms may occur but enough awareness has been provided to end-users to understand the reality of forecasting uncertainty and to inform them how they can get involved to improve early warnings and tailor CI suited to their needs

2.6 Cost-effectiveness

Outcome 1: Enhanced capacity of national hydro-meteorological services (DNM/DG-Eau) and coastal monitoring institutions (CRHOB) to monitor extreme weather and climate change (droughts, floods, sea levels and strong winds)

104. Other baseline projects were evaluated to see what relevant activities they are supporting. This project builds on the existing initiatives in terms of equipment acquisitions (building off of the LDCF1 project).To ensure cost-effectiveness for Outcome 1, it was critical to evaluate the equipment purchases. An assessment of existing equipment was made, noting the manufacturer, whether it is still working and whether the NHMS has an interest in continuing with particular makes/models. The NHMS weighed current costs against the costs of potentially cheaper solutions and the added costs of training personnel (See Annex 4). They also weighed the option on the use of manual and/or automatic stations.Training costs can be particularly high if new automatic stations are acquired and the EWS agency has had no experience using the equipment. Therefore, it was quite important for the cost estimates to include accurate training and operation and maintenance costs. Twenty-five percent (25%) of the running costs were designated for spare parts.

Outcome 2:

Efficient and effective use of hydro-meteorological and environmental information for making early and seasonal warnings which feed into long-term development plans

105. In terms of cost-effectiveness for Component 2, a key design component was to try to consolidate the training programs and workshops which are required to improve EWS/CI message dissemination. A coherent training programme was emphasized where one activity can cost effectively satisfy more than one of the needs identified, such as group training for NGO focal points. Also, other baseline programs involving capacity building for the DRM, ANPC, were evaluated in order to ensure that money has been spent wisely.

106. To facilitate decisions on cost-effectiveness, a baseline self-capacity assessment was conducted during the project preparation phase. The assessment enabled alert production and dissemination agencies to prioritize their needs (see Section 2.8). Due to project budget limitations, it was necessary to select from the long-list of equipment / capacity building needs and identify those within the scope and cost-effectiveness of this project. In response, a set of criteria to prioritize needs / requested activities was formulated. The criteria were also used to assess the relevance of the LDCF2 project to tackle these priority needs, given its overall objective. Annex 4 shows the criteria for cost-effective adaptation interventions.

107. Finally, the chosen set of Outputs was reviewed in a validation workshop involving all stakeholders and the multi-stakeholder EWS focus group committee. Based on group consensus, Outputs were revised accordingly.

108. The Outputs outlined have been chosen based on their financial feasibility. They have been chosen over alternative ways to address project barriers as shown in Table7 below.

109. A summary of the co-financing strategy, indicating sources, purposes and amounts, is shown below in Table 6.

Table **9**: Sources, Purposes and Amounts of Co-financing

Sources of Co-financing	**Name of Co-financier(s)**	**Purpose**	**Amount ($)**
PAPGFDC project	European Union	This project supports forest preservation and production of numerical maps. As a goal of this project is to mitigate flood impacts in the Ouémé watershed, it acts as a baseline initiative for the LDCF2 project.	$10.4m
PAPGFDC project	UNDP	Similar to above but with support from UNDP	$2.465m
Government budget lines supporting the PAPGFDC project	DGFRN, General Direction on Forests and Natural Resources	Similar to above but with support from DGFRN	$603,150
Millennium Villages Project	UNDP	This project is contributing to the eradication of extreme poverty in a pilot zone area of Benin where EWS/CI will be tested, a vulnerable agro-ecological zone. The LDCF2 project will exploit the established community-based networks to facilitate information dissemination.	$670,000
Donor co-financing	UNDP	Donor co-financing budget to support the LDCF2 project with a cash investment.	$300,000
Government budget line DNM-ASECNA	DNM-ASECNA	Existing SYNERGIE forecasting system and existing functional synoptic and agro-meteorological stations which serve as baseline equipment for forecasting and national climate/weather monitoring	$73,399
Total Co-financing			**$14,511,549**

Table **10**: Demonstration of Cost-effectiveness for each proposed Output indicating the project barrier addressed by each Output

OUTPUTS	Barrier Addressed	Alternatives Considered
1.1 Procurement and installation or rehabilitation of 30 water level monitoring stations with telemetry, 40 automatic rain gauges at hydrological stations and 1 automatic Doppler flow meter with data transmission capabilities and data processing and storage facilities to feed hydrological models (DG-Eau)	Lack of hydrological monitoring infrastructure required to improve forecasts, validation and monitoring Slow transmission of hydrological information from manual hydro-meteorological infrastructure	**Alternative 1:** Expand the hydrological monitoring network based on a cross-border watershed approach; however, this requires cross-border data sharing and more financial resources. This project lays a foundation for future initiatives to model hydrology in river basins by establishing good monitoring networks to build off of. **Alternative 2:** Different equipment manufacturers can be used; however, DG-Eau and DNM (see also Output 1.2) have experience with the current models which were chosen based on previous cost-effectiveness studies (Annex 4). Using different models would increase the training and maintenance costs.
1.2 Procurement / installation of 3 automatic agro-climate stations, 2 synoptic stations and 25 automatic rain gauges and rehabilitation of 6 synoptic stations and 20 agro-climate stations, all stations/gauges equipped with telemetry and improved data transmission/processing/storage facilities (DNM)	Lack of weather and climate monitoring infrastructure required to improve forecasts, validation and monitoring Slow transmission of climate information from manual hydro-meteorological infrastructure	**Alternative 1:** Only use manual stations and incorporate SMS communication services; DNM lacks any automatic stations. Some automatic stations are necessary for rapid data gathering to generate timely alerts. In order to gradually build their capacity with automatic stations, equipment procurement will be staggered and existing manual stations will be rehabilitated and continued to be used. Manual data readers are already trained on the existing equipment that is need of repair or spare parts. **Alternative 2:** Use stations with cheaper sensors to decrease the cost of spare parts; if sensors do not adhere to WMO standards, WMO will not consider the station data in regional and global models. As a result, the country's data would not be assimilated to improve the regional and international forecasting models the country will exploit and downscale. **Alternative 3:** Acquiring more equipment to improve national coverage; this option was considered as per the feasibility studies and development plans which demanded more monitoring equipment. However, this project is focusing on capacity development for service delivery (which is lacking in Africa) rather than excessive procurement. Good and targeted service delivery of EWS/CI is more likely if funds are focused on building capacity with DNM (Output 2.2). This will ensure the sustainability of continued monitoring and the use of tailored EWS/CI into long-term development plans. **Alternative 4:**Lightning detection systems: At present, there is considerable variability around the costing for lightning detection systems ranging from $50,000 to $3.5m (Sources: Astrogenic, SAMPRO, Earth Networks). Besides startup costs, which in some cases are a significant portion of the project budget, the costs of implementing new technologies, training and maintenance, as well the requirement for ground based observations (for calibration) and the untested nature of the technology in Africa were significant concerns.
1.3 Acquisition of maintenance, communication and data collection/treatment equipment (Differential Global Position System Monitoring, Acoustic	Lack of weather and climate monitoring infrastructure required to improve forecast validation	**Alternative 1:** Different equipment manufacturers can be used; however, CRHOB has experience with specific equipment to monitor coastal parameters (e.g., sea surface temperatures, sea levels) since 2010. The equipment to be procured will enhance the accuracy and detail of coastal measurements (example with Acoustic Doppler flow meters and Global Positioning System equipment).

Doppler Current and Velocity Profilers) for water level and coast erosion monitoring by CRHOB .		**Alternative 2:** Focus funds on land monitoring which is more limited spatially; however, sea level rise, storm surges and coastal erosion have had significant impacts on port trade, tourism; approximately 15,000 people are involved in the fishing industry alone (Dossou 2007)
1.4 Training for DNM (4 engineers / 4 technicians), DG-Eau (2 engineers / 3 technicians) and CRHOB (2 researchers / 2 technicians) on information collection, data treatment, operation and maintenance (O&M) and maintenance/monitoring principles including development of Standard Operating Procedures for equipment (SOPs)	Unknown sustainability of observational infrastructure and technically skilled human resources	**Alternative 1:** All operation and maintenance can be outsourced to a private company through a PPP (public private partnership) to enable the company time to train information production personnel over a longer period of time. However, DGE/DG-Eau already has experience with learning-by-doing and has received training for many of the specific monitoring instruments they have requested to be acquired/rehabilitated. **Alternative 2:** One-time training to save financial resources: This project will procure in a staggered manner a rational amount of stations considering human resource constraints so that the new stations can be well-integrated with existing NHMS and there are no continuity breaks in monitoring (i.e., problem if all resources are focused on procurement and existing stations are neglected). Budget has therefore been allotted to provide training each year as more personnel are absorbed and more equipment are procured.
2.1 DNM/ASECNA and DG-Eau technical capacity to make and use climate forecasts (on hourly, daily and seasonal timescales) is strengthened by training 4 forecasters / 4 technicians through national, regional and international knowledge sharing	Lack of weather/climate information tailored to user-needs	**Alternative 1:** DNM could rely solely on regional and international centers for training but this is not cost-effective because the option does not take advantage of internal forecasting expertise within ASECNA. ASECNA currently performs forecasting using the SYNERGIE system (MeteoFrance). DNM will build off the SYERNGIE expertise through this project. **Alternative 2:** DNM could rely on only ASECNA, however ASECNA is not specialized with forecasting multi-risk extreme weather. **Alternative 3:** Use outside forecasting products for free: this option will be considered, such as NOAA's CFS forecasting tool which is readily available and free, however, these products must be downscaled and calibrated with in situ data. Therefore, regional and international databases (e.g., NOAA's CFS tools) will be exploited to support Benin to develop national forecasting by translating open-source climate monitoring and forecasts into flooding and drought/food security information. **Alternative 4:** SADIS ($50,000) is a satellite data distribution system. The system works well, but forecasters must build enough qualifications to use the system, so capacity building costs are high and DNM has too limited capacity to consider this option. **Alternative 5:**Radiosonde: if we take the example of Kenya, they went from 4 to 1 radiosondes and the forecast accuracy still improved. The issue is that forecast accuracy is increasing rapidly and it requires less radiosonde data points for good calibration. Thus, additional radiosonde data points do not improve forecasts. Also, radiosondes are expensive to launch, costing about $100/day for a launch.
2.2 Tailored agricultural and extreme weather risk advisories that link climate, environmental and socio-economic information on short-term and seasonal timescales are developed	Lack of weather/climate information tailored to user-needs	**Alternative 1:**Rely on additional infrastructure to improve EWS/CI, however, delivery of hardware will not change the uptake of warnings and climate information by users, especially while service delivery is weak in Africa. Most importantly, by making EWS/CI more useful to various sectors in the country, this pushes the Government to include stable, core budget lines for climate/weather services due to their cross-sectoral importance.
2.3 Development of a multi-agency platform to promote synergy, CIMS, with the task of resolving	Lack of synergy between agencies and lack of coordination amongst EWS	**Alternative 1:** If nothing is done, the current EWS initiatives will continue to work independently (for localized famine and flood management) and little national capacity will be built.

the lack of coordination and collaboration amongst EWS agencies and with EWS-related initiatives, including facilitating data sharing	initiatives	**Alternative 2:** No platform to formalize synergy: this is currently the case in all other EWS and CC-related projects which has led to delays in project implementation and a lack of coordination and data sharing.
2.4 Development of an open-access EWS data portal for storing data with back-up capacity and sharing data cross-sectorally, including data transmission into the Global Telecommunication System (DGE/DNM/ASECNA/DG-Eau/CRHOB/ANPC)	Inconsistent cross-sectorial information dissemination and data sharing across and within country borders	**Alternative 1**: Have separate data portals for each agency to ensure security: however, this would prohibit the easy use of data across agencies and a potential means to share data internationally. **Alternative 2:** Do nothing, however watersheds and rivers traverse country boundaries and rain patterns upstream must be communicated to downstream Benin. Therefore, with this option models would lack appropriate boundary and initial conditions considering the case where Benin could not share data with its neighbors and vice versa. This project aims to facilitate real-time intra-national and trans-national monitoring data by developing ftp access to the central EWS data portal.
2.5 Reinforcement of operational and technical capacities within ANPC, PNRCC and DGE to assimilate forecasts and monitoring into existing development planning, PRSPs (SCRP, PAP, NGSPR, PDCs), the National Environmental Management Plan and disaster risk prevention strategies, including support for local and regional collaborations	Limited capacity to disseminate warnings on local, decentralized levels Unknown sustainability of observational infrastructure and technically skilled human resources	**Alternative 1:** Build ANPC capacity without coordination with other initiatives (World Bank and GIZ) will lead to redundant activities and a waste of financial resources.
2.6 A Standard Operating Procedure (SOP) for issuing warnings is developed including creating partnerships between ANPC, DGE and NGOs/CSOs active with alert dissemination with public/private radio, newspaper, television and mobile phone companies, including the development of a feedback mechanism.	Limited capacity to disseminate warnings on local, decentralized levels	**Alternative 1:** Enable each information dissemination agency to disseminate alerts directly: With this option, there is no central focal point for all NGOs/CSOs to report to for high level questions and to clarify disaster prevention strategies. Also, on the feedback chain there would be no clear contact for end-user comments/suggestions. Developing a Standard Operating Procedure (SOP) is therefore the best mechanism for effective communication.
2.7 Rural community capacity to adapt to climate shocks is strengthened by promoting understanding of alert signals and disaster risk prevention planning using the support of NGOs/CSOs	Limited capacity to disseminate warnings on local, decentralized levels	**Alternative 1:** Do nothing, if the locals are not informed on the utility of EWS/CI, alerts will continue to be misunderstood. Also, users will continue to lack confidence in alerts if the uncertainty of forecasts is not conveyed to the general public. Furthermore Output 2.7 includes training and a public awareness campaign for decentralized NGOs/CSOs to inform local populations about the potential of EWS/CI to assist them in building resilience to climate/weather extremes.

to conduct public awareness campaigns		

2.7 Sustainability

110. This project represents an effort to upscale the number one priority identified in Benin's NAPA (developing an early warning system) to the national scale coordinating with all existing EWS initiatives. It will also serve to develop anEWS for multi-risk forecasting (concerning floods, droughts, sea levels and strong winds)and tailored climate information so that a vast variety of stakeholders can exploit the weather/climate information produced. The project furthermore supports the MDGs in terms of aiming to reduce poverty reduction by enabling the rural populations (for which more than half are in poverty) to take preventive actions when weather or climate-induced risks are forecasted.

111. Various activities support the project's sustainability after the support of the LDCF ends including:

- The development of a multi-agencyplatform (Comité Inter institutionnel et Multi Disciplinaire pour promouvoir la Synergie, CIMS) for synergy building;
- Use of existing Multi-disciplinary Working Groups (GTPA) to support alert dissemination;
- Staggered approach to equipment procurement and training;
- Station placementbased on meetings with local representatives and the private sector;
- Development of Standard Operating Procedures (SOPs) for equipment operation and maintenance and data storage and collection;
- Knowledge sharing with international and regional training centers;
- Development of an open-access data portalto share data across country boundaries and with other ministries;
- Building capacity for local focal points and NGO/CSO representatives at the village level to better communicate and understand alerts;
- Training and capacity building strategies (Outputs 1.4 and 2.1) for civil servants who are required to remain within their ministries beyond project duration as per their contract or TORs;
- Capacity building to incorporate recurring costs into government budget lines;
- Collaboration of DNM with DG-Eau, CRHOB, NGOs (CPF, COS3C) and the Ministry on Agriculture will ensure forecast bulletin or alert information is provided in useful quantitative units (e.g., crop yield, area of flood plain, wind velocity) for the economic sectors (e.g., agricultural) and the rural populations who are most vulnerable;
- Leverage of revenue-generating tailored EWS and CI products to ensure long-term financial sustainability
- Making EWS/CI more useful to various sectors in the country, this pushes the Government to include stable, core budget lines for climate/weather services due to their cross-sectoral importance

112. Overall, the main factors affecting the financial sustainability of the project beyond the duration of the LDCF grant include the ability of the agencies to develop cost-recovery mechanisms, the potential lack of coordination with existing EWS initiatives which can delay the project and waste financial resources, and a lack of a Monitoring and Evaluation mechanism to track output progress. Project design has included Outputs/Activities to address these risks as indicated below:

113. **Output 1.4** has been developed to address the difficulty the agencies currently have in determining operation and maintenance costs. Training will be used to ensure that they can accurately

plan for costs in the future. **Output 2.2** will develop the capacity of information producers to tailor climate products based on public/private needs. Sectors such as the cotton and mining sectors have already showed interest and evidence from other African initiatives (CABI in Niger) has indicated that 'pay for weather/climate information' systems can be profitable. Funds have also been allocated to launch a pilot project to test the viability tailored weather/climate products and mobile-phone based platforms to distribute agricultural advisories to a wide, 'pay-for-service' audience.

114. **Output 2.3** stresses formalizing a synergy among several projects concerned with EWS-related initiatives through the development of a multi-agency platform (Comité Inter institutionnelet Multi Disciplinaire pour promouvoir la Synergie, CIMS). CIMS will be created to oversee any inefficiencies amongst EWS initiatives and to coordinate and consolidate the projects. Such an approach is more likely to ensure successful implementation and eliminate any risk that activities are duplicated, wasteful and in the worst case counterproductive. Also this approach tries to prevent the development of isolated projects without comprehensive, integrated, adaptation actions which will continue to hinder the social and economic development of Benin.

2.8 Replicability

115. The originality of this project is that it will be the first to attempt to build national networks for hydro-meteorological monitoring and alert dissemination and to provide support to tailor climate products in Benin. The needs for capacity building (both equipment and human resources) are too great to cover the entire country. As a result, the efficacy of EWS/CI will be tested in the most vulnerable agro-ecological zones as outlined in Benin's NAPA. Lessons learned from these pilot zones in terms of EWS/CI will be transferred in between the network of decentralized and national level focal pointstobe established through this project (associated withANPC, NGOs and CSOs). The pilot zones are therefore a means to further improve alerts nationally. Any activity or improvement to an activity can be easily replicated because the core network of national hydro-meteorological services and communication mechanisms are being developed in this project and can easily be built upon.

116. Furthermore, specific attention has been given to the limitations of local agencies to disseminate information. A national SOP for communication will be developed as a result which will include an important mechanism to share lessons learned will be the feedback mechanism developed in **Output 2.6**. The feedback mechanism canenable end-users to give direct comments and suggestions on the efficacy and utility of CI/EWS to the focal points for alert generation and dissemination (DNM/DG-Eau/DGE and ANPC).For instance, the alert generation and dissemination focal points can be contacted via SMS.

117. There are also various mechanisms of knowledge transfer so that the agencies become more self-sufficient and less reliant on outside agencies for repair. The learning-by-doing approach will be reinforced on local, regional and international levels. For example, links with international (e.g., MeteoFrance) and with regional (ACMAD, responsible for the African Early Warning and Advisory Climate Services, AEWACS or ViGIRisC project and for the ClimDevAfricaprogramme) centers will help build national forecasting expertise. Expertise can be easily transferred to new personnel because civil servants in Benin are mandated to remain in the Ministry. Also, as a security measure, Terms of Reference have been created to ensure that personnel who are hired to support this project must transfer knowledge within their respective agency after receiving specialized training. Training recipients are outlined below:

- DNM/ASECNA, DG-Eau, and CRHOB technicians/engineers for operation and maintenance
- DNM/ASECNAand DG-Eau forecasters with regional training
- ANPC disaster risk personnel, PNRCC and DGE to support communication nationally

- NGO/CSOs to supportinformation dissemination nationally
- Local ANPC focal points, mayors and NGO/CSO representatives at the village level to better communicate alerts and inform the general population how provide feedback to designated focal points for EWS/CI
- Training for information producers (DNM/ASECNA/DG-Eau/CRHOB/DGE) on how to develop public private partnerships (PPPs) and develop a suite of revenue-generating tailored climate products

118. Data will be accessible to all pertinent agencies, particularly those like the Ministry of Health who require weather data to make analyses on the spread of diseases with respect to weather variables such as temperature. Datahas the potential to be shared across borders via ftp password access. Overall, data sharing will promote the regular use of EWS/CI so that more agencies will realize its potential and utility.

119. The pilot program to test tailoring climate products for specific socio-economic sectors can be easily be up-scaled to address other private sector interests/needs. Similarly, the market research conducted under this project to support the development of a mobile-phone based platform for agricultural advisories can easily be extended as public awareness on the utility of EWS/CI is heightened.

120. Finally, UNDP's Adaptation Learning Mechanism (ALM) will be used as a dissemination and sharing tool that is accessible by all and constantly updated will the most recent information from the project. As stated in the TOR, the project management unit will be required to contribute to ALM on a regular basis noting case studies, successes and challenges.

2.9 Stakeholder involvement

2.9.1 Stakeholder baseline analysis

121. During project preparation, a series of three workshops and extensive bilateral consultations were organized.

- The inception workshop held during September 2012 was used to identify relevant EWS agencies involved with climate and hydro-meteorological information production as well as agencies that should be implicated in alert dissemination to vulnerable populations, most notably farmers and rural women. It was also used to detail the baseline of EWS-related initiatives (outlining gaps, successes and failures) and identify potential co-financing sources including institutions who are managing/developing relevant on-going/planned EWS related initiatives. Stakeholder consultations indicated that DNM/ASECNA, DG-Eau and CRHOB are the relevant information providers. The most pertinent information distributors for EWS/CI include ANPC, DGE and various NGOs/CSOs including Caritas, Care International, Plan Benin, IDID, CRS, OXFAM and the Red Cross.
- The second mission workshop in January 2013 was used to 1) to define and validate Early Warning System (EWS) costs provided by each agency in Benin 2) to perform a capacity assessment of all information production and dissemination agencies and 3) to formalize the roles of each EWS agency in information dissemination.Results from the self-assessment on capacity and prioritized needs are detailed in Annex 4.
- Subsequently, the final validation workshop was used to confirm the Management Arrangements, partnerships, project indicators, risks, assumptions, synergy mechanisms and project outputs and budgets.

122. Interventions with the Disaster Risk Management Agency, ANPC, and rural-based NGOs/CSOs who have experience with existing alert programs for famine and floods were particularly critical. These consultations have ensured the proposed project is grounded in local realities whilst being aligned to national policies. Detailed meetings were held to determine equipment needs (type, quantity, placement) and to prioritize procurements over the four-year project duration.

123. The project outcomes, outputs and activities listed in Section 2.4 are based upon the recommendations of the Stakeholders given the technical, operational and financial constraints of the project. Findings from each mission are detailed in the Key Assessment Reports (Annex 4).

124. The effective monitoring of the impacts of gender differentiated capacity for adaptation will be required for ensuring scale up actions are sufficiently sensitive to the needs of the poorest and most vulnerable. Consequently, gender-focused NGOs/CSOs (Plan Benin, CARE International, CARITAS) have been implicated in project development and will continue to be involved in project implementation. These gender-focused NGOs/CSOs will help to identify the efficiency of alert dissemination to women and the utility of climate information for women in the aforementioned target communities such as with the gender disaggregated survey planned in Output 2.7.

The following table shows the list of consultations which have taken place with providers and users of EWS information to develop a user-driven Early Warning System. The role and participation of each agency is indicated by the column headings describe in the legend.

Column Heading Legend

National Inception & Validation Workshops – involved in inception (September 2012) and validation (April 2013) workshops. The National Inception Workshop involved 28 participants in total. The Validation Workshop included 41 participants.

Role Identification and Capacity Assessment Workshop – involved in workshop (January 2013) which included participants and representation from 5 climate information producing agencies and 4 information dissemination agencies.

Involvement in Baseline Assessment – consulted during project development on existing EWS (if any)

Role Identification – Identification in institutional arrangement

Risk/Barrier Analysis – consulted on their specific institutional risks or barriers for a successful EWS

Policy/ Strategic alignment to priorities – institution has policies/strategies which are aligned with EWS

Co-financing Identification – other projects to support and be supported by EWS project financially

Gender representation – organization which is concerned with promoting the involvement of rural women in project development and the dissemination of alerts to the female rural population

Upscale / Sustainability planning – consulted on how to maintain and duplicate EWS

Document Endorsement – signatures obtained from government and UNDP CO

Table 11: Stakeholder Involvement Matrix, Benin

Stakeholder	National Inception& Validation Workshops	EWS observatory	EWS focus group	Involvement in Baseline Assessment	Role Identification	Risk/Barrier Analysis	Policy/ Strategic alignment to priorities	Co-financing Identification	Capacity Assessment	Upscale / Sustainability planning	Document Endorsement
Federal/Sector											
Direction Nationale de la Météorologie (DNM)	✓	✓		✓	✓	✓	✓	✓	✓	✓	
Direction du Conseil Agricole et de la Formation opérationnelle (DICAF)	✓			✓	✓	✓	✓	✓	✓	✓	
Direction Générale de l'Eau (DG Eau)	✓	✓		✓	✓	✓	✓		✓	✓	
Direction Générale de l'Environnement (DGE)	✓			✓		✓	✓	✓			
Agence National de la Protection Civile (ANPC)	✓	✓		✓	✓	✓	✓				
Direction of Communication and Private Media	✓			✓	✓	✓	✓				
CRHOB	✓			✓	✓	✓				✓	
Technical / Research Institutions											
Laboratoire d'Hydrologie de la FAST	✓			✓	✓	✓				✓	

Stakeholder	National Inception& Validation Workshops	EWS observatory	EWS focus group	Involvement in Baseline Assessment	Role Identification	Risk/Barrier Analysis	Policy/ Strategic alignment to priorities	Co-financing Identification	Capacity Assessment	Upscale / Sustainability planning	Document Endorsement
Laboratoire de Climatologie, FLASH UAC	✓			✓	✓	✓				✓	
Community Sector											
Comité Communal de Protection Civile	✓	✓									
Comité local de Protection Civile	✓	✓									
Comité d'Arrondissement de Gestion des Catastrophes	✓	✓									
Association villageoise des Crédits ''Avec''	✓	✓									
Point focal chargé des Urgences	✓	✓									
NGOs/CSOs											
IDID	✓			✓	✓	✓	✓			✓	
Care International	✓			✓	✓		✓	✓		✓	
CRS	✓			✓	✓		✓			✓	
Plan Bénin	✓			✓	✓		✓	✓		✓	
OXFAM	✓			✓	✓		✓				
CARITAS	✓			✓	✓		✓			✓	
Réseau des	✓			✓	✓						

Stakeholder	National Inception& Validation Workshops	EWS observatory	EWS focus group	Involvement in Baseline Assessment	Role Identification	Risk/Barrier Analysis	Policy/ Strategic alignment to priorities	Co-financing Identification	Capacity Assessment	Upscale / Sustainability planning	Document Endorsement
Journalistes											
Specific Institution											
Croix-Rouge Benin	✓										
Donor Partners											
World Bank	✓						✓	✓			✓
USAID	✓						✓				
EU	✓							✓			✓
Dutch Ministry of Foreign Affairs	✓							✓			✓
GIZ	✓							✓			✓
UNDP	✓							✓			✓
Oxfam	✓										

2.9.2 Stakeholder involvement plan

125. The Stakeholders identified during project preparation will continue to be implicated in project implementation. A Stakeholder involvement plan has been created to provide a framework to guide interaction between implementing partners and the key stakeholders, particularly end-users to validate project progress. All Stakeholders involved in the baseline self-capacity assessment will be addressed again in order to track the efficacy of Stakeholder capacity building both operationally and technically. Also, the women's interest organizations, Plan Benin, CARE International, CARITAS, will continue to be implicated and consulted in order to ensure women are properly engaged/warned.These gender-focused NGOs/CSOs will conduct the gender disaggregated survey indicating the receipt of alerts and utility of weather/climate information planned in Output 2.7. Details of the Stakeholder Involvement Plan are indicated in Annex 5.

2.9.3 Expected Benefits

126. The largest economic benefits are expected from building capacity of the climate/environmental information production agencies to tailor climate products to the needs of various socio-economic sectors (e.g., agriculture, health,cotton). By the project enabling a pilot study on tailoring climate services and market research on the potential for mobile phone-based agricultural advisories, the foundations will be set for self-sustainable NHMS. For instance, although total food production has steadily increased in Benin[17], over the past decades, per capita food production has decreased. As such, Benin farmers can take advantage of improved local forecasts of winds, rain and temperature.

127. Together with satellite imagery used for land-use planning and monitoring, tailored climate products can also provide significant local environmental benefits, such as detailing best coastal management practices which is crucial to help Benin's fight against coastal erosion (Dossou 2007). At the local level, early warnings and climate hazard mapping can provide economic benefits by reducing losses of agricultural produce, infrastructure (roads and bridges) and disruption to people's livelihoods.

128. Communities will also immediately benefit from the Standard Operating Procedure to be implemented for alert communication. The total population benefiting from these developments has the potential to grow immensely if warnings extend to a reasonable percentage of the total population e.g. through a mobile phone relay. Also, the feedback mechanism can enable the communication mechanism to be improved via end-user comments/suggestions.

129. In addition, this project will build a multi-agency platform whose sole role will be to ensure that there is synergy amongst EWS related initiatives. This will support the elimination of duplicate roles and wasted financial and human resources.Furthermore, it is expected that the open-access data portal will facilitate data sharing between ministries/agencies and potentially international institutions.

130. Many of the beneficiaries will be women, especially within the agriculture sector who do not have access to information, yet are most vulnerable to food insecurity and climate change due to their dependence on natural resources for subsistence household chores and their limited access to education and information services which prohibit participation in decision-making (Buhl 2005, O'Brien 2008). The project has and will continue to target women by implicating women-focused NGOs/CSOs (Plan Benin,

[17]WRI, 2009. Earth trends country profiles: Agriculture and Food security http://earthtrends.wri.org, accessed 06 October 2009.

CARE International, CARITAS) in order to ensure women are properly engaged/warned and are receiving useful weather/climate information.

131. The UNDP Environmental and Social Screening template has been applied to ensure environmental and social safeguards are in place. According to this checklist, the project is considered Category 2 where no further safeguards must be incorporated because no environmental or social risks are foreseen (See Annex 9).

132. Environmental safeguards being applied include the following:

- Tailoring EWS/CI to support better farming, water and coastal management practices
- Consulting local reps to find best station/equipment placement

133. Social safeguards being applied include the following:

- Mandating station placement/equipment must benefit the most vulnerable, not only the private sector
- Including women representation organizations
- Facilitating feedback from marginalized populations with the communication feedback mechanism

3 PROJECT RESULTS FRAMEWORK

This project will contribute to achieving the following Country Programme Outcome as defined in CPAP or CPD:

CPAP OUTPUT 2: In response to climate change risks, adaptation strategies and measures are developed and implemented in the most vulnerable zones

Country Programme Outcome Indicators:

Early warning system (EWS) and contingency plans.

Primary Applicable Key Environment and Sustainable Development Key Result Area (same as that on the cover page, circle one): Promote climate change adaptation

Applicable GEF Strategic Objective and Program:

Objective 2: Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level

Applicable GEF Expected Outcomes:

Outcome 2.1: Increased knowledge and understanding of climate variability and change-induced risks at country level and in targeted vulnerable areas
Outcome 2.2: Strengthened adaptive capacity to reduce risks to climate-induced economic losses

Applicable GEF Outcome Indicators:

- Relevant risk information disseminated to stakeholders
- Type and no. monitoring systems in place
- % of population covered by climate change risk measures

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Project Objective[18] To strengthen the climate monitoring capabilities, early warning systems and available information for responding to climate shocks and planning adaptation to climate change in Benin.	1.Capacity as per capacity assessment scorecard 2.Domestic finance committed to the relevant institutions to monitor extreme weather and climate change	1.Limited capacity to generate EWS and CI on a national scale for extreme hydro-meteorological phenomena Limited disaster risk prevention capacity on national and local levels within ANPC No Standard Operating Procedure (SOP) for alert communication by ANPC with the support of NGOs/CSOs Current score: 62 2.Existing budget plans do not have sufficient funds to	1. Capacity assessment TARGET score 157 for all combined EWS agencies 2. TARGET 40% increase in domestic financing for equipment operation and maintenance across all institutions	1. Capacity assessment scores 2. Ministry budget lines for recurring costs	Benin has enough government financing to continue monitoring and will consider recurring O&M costs for new infrastructure in government budget lines because of the utility of EWS/CI There is sufficient political support and capacity within the EWS agencies for successful execution and implementation of the project Inadequate or inefficient political response to EWS/CI causing delays in warning dissemination and/or poor integration of hydro-

[18] *Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR*

		maintain and operate environmental monitoring infrastructure			meteorological information into planning

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Outcome 1[19] **Enhanced capacity of national hydro-meteorological services (DNM/DG-Eau) and coastal monitoring institutions (CRHOB) to monitor extreme weather and climate change (droughts, floods, strong winds, coastal erosion, sea- level rise)**	1.% national coverage for climate/weather monitoring 2.Frequency and timeliness of climate-related data availability	1. Currently, there is approximately 30% national coverage for climate/weather monitoring with respect to the optimal arrangements defined in NHMS feasibility reports. Six manual, synoptic weather stations, 2- manual, agro-climatological stations, 55 manual rainfall gauges, 2 manual flow meters (water level), 46 automatic flow meters (water level), 1 ADCP and 1 coastal monitoring station are in place. 2. Data from manual weather and hydrological stations is collected monthly and transmitted by post.	1. 60% national coverage to take steps in achieving NHMS optimal monitoring arrangements as defined in feasibility studies with 76 automatic flow meters (water level), 2 ADCPs, 3 automatic agro-meteorological / climate stations, 2 automatic synoptic stations, 55 automatic rain gauges and rehabilitation of 6 manual synoptic stations and 20 manual agro-climatological stations 2.TARGET for data transmission frequency: daily	1.Review of budget spent on equipment procurement and rehabilitation and data held on servers to show that new equipment is operational 2.Analysis of data frequency transmission using storage servers within each information production agency	Procurement and installation of hydro-meteorological equipment, including hardware and software, is delayed because of complications with the release of funds and/or national procurement procedures. Continuity breaks in National Hydro-meteorological services due to the work required with new equipment installation and other project needs Manual equipment rehabilitated with enhanced SMS communication systems will enable transmission of data to NHMS at least daily. Natural disasters (e.g., floods, strong winds) may damage infrastructure. Sufficient spare parts and tools have been procured to assist with equipment repair.
Outcome 2 **Efficient and effective use of hydro-meteorological**	1.% of population with access to improved climate information and flood, drought, strong wind and	1. There are 4 existing EWS initiatives for regional flood warnings and famine	1. 50% increase in population who have access to improved EWS/CI 2. At least 2 of the PRSP policy	1. a) Gender disaggregated survey on receipt of alerts	Forecasts will be improved by local data assimilation collected from new climate/weather monitoring infrastructure

[19] *All outcomes monitored annually in the APR/PIR. It is highly recommended not to have more than 4 outcomes.*

and coastal information for making early warnings and seasonal forecasts which feed into long-term development plans	coastal warnings (disaggregated by gender) 2.Development frameworks (The Poverty Reduction Strategy paper, PRSP (or SCRP en Francais), the Programme d'Action Prioritaires (PAP), the Environmental Management Plan (PNDC-GEM) and the Agricultural Revival Strategy, NGSPR) that integrate climate information in their formulation of poverty reduction strategies at local levels {BASELINE: No integration; TARGET Integration into the revised SCRP (by 2015), PAP (by 2015) and NGSPR (by 2016)} 3.Sector-specific strategies and plans that integrate climate risks (agriculture, health, and cotton production sectors)	alerts, however, a national alert system concerned with extreme hydro-meteorological phenomena is lacking. There is also a limited understanding of technical alert jargon (alerts are not translated into all national languages). There is also no mechanism for end-users (most vulnerable populations) to be involved in the alert process to ensure its sustainability. 2.Development frameworks do not incorporate any EWS/CI products such as risk maps or climate change predictions into long-term planning 3. Sector specific strategies do not include EWS/CI because the quality of weather forecasts and climate predictions are poor and not tailored for specific uses, particularly seasonal forecasts.	briefs incorporate analyses of risk maps and/or climate change projections influencing long-term planning proposals 3. Development of at least two tailored climate products and presentation of market research plan on how to implement mobile phone based agricultural advisories, both supporting targeted weather/climate service delivery	b) Record of debriefings by ANPC post extreme weather events c) ANPC record of end-user feedback 2.Review of SCRP, PAP, PNDC-GEM and NGSPR documents to validate incorporation of risk, weather and/or climate information 3.Partnerships formed between information producers and the Ministries of Health and Agriculture, private sectors, NGOs and women organizations to support weather/climate service delivery	Data sharing is hindered by lack of coordination / willingness of agencies to centralize data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks) Relevant Ministries have a vested interest to fully integrate climate information into their poverty reduction strategies and disaster risk management plans NHMS will acquire enough capacity to tailor climate products to different socio-economic sectors (e.g., subsistence agriculture, cotton, port trade, tourism) by the end of the project False alarms may occur but enough awareness has been provided to end-users to understand the reality of forecasting uncertainty and to inform them how they can get involved to improve early warnings and tailor CI suited to their needs

4 TOTAL BUDGET AND WORKPLAN

Award ID:	00074268	Project ID(s):	00086748
Award Title:	Early Warning Systems Africa, Benin		
Business Unit:	BEN10		
Project Title:	Strengthening Climate Information And Early Warning Systems in Africa for Climate Resilient Development and Adaptation to Climate Change Early Warning System, Benin		
PIMS no._____	5105		
Implementing Partner (Executing Agency)	Ministry of Water		

SOF (e.g. GEF) Outcome/Atlas Activity	Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Notes:
OUTCOME 1: Enhanced capacity of national hydro-meteorological services (DNM/DG-Eau) and coastal monitoring institutions (CRHOB) to monitor extreme weather and climate change (droughts, floods, strong winds, coastal erosion, seal level rise)	**Ministry of Water**	**62160**	**LDCF**	72300	Materials & Goods	$476,000	$476,000	$476,000	$476,000	$1,904,000	a
				75700	Training, Workshops & Conferences	$59,000	$46,000	$46,000	$46,000	$197,000	b
				71600	Travel	$58,000				$58,000	c
				72400	Communication & Audio Visual Equip	$17,000	$12,000	$12,000	$12,000	$53,000	d
				72800	Information Technology Equipment	$45,500	$37,500	$12,500	$12,500	$108,000	e
				71300	NationalConsultants	$26,000	$26,000	$21,000	$21,000	$94,000	f
				71400	Contractual Services	$50,000	$50,000	$50,000	$50,000	$200,000	g
					sub-total LDCF	**$731,500**	**$647,500**	**$617,500**	**$617,500**	**$2,614,000**	
					Total Outcome 1	**$731,500**	**$647,500**	**$617,500**	**$617,500**	**$2,614,000**	
OUTCOME 2:				75700	Training, Workshops & Conferences	$141,000	$165,000	$143,000	$144,000	$593,000	h

Efficient and effective use of hydro-meteorological and coastal information for making early warnings and seasonal forecasts which feed into long-term development plans				71600	Travel	$10,000	$10,000			$20,000	i
				72400	Communication & Audio Visual Equip	$36,000	$36,000	$31,000	$31,000	$134,000	j
				72800	Information Technology Equipment	$40,000	$40,000	$45,000	$45,000	$170,000	k
				71300	NationalConsultants	$16,000	$21,000	$21,000	$21,000	$79,000	l
				71400	Contractual Services	$50,000	$50,000	$50,000	$50,000	$200,000	m
					sub-total GEF	**$293,000**	**$322,000**	**$290,000**	**$291,000**	**$1,196,000**	
					Total Outcome 2	**$293,000**	**$322,000**	**$290,000**	**$291,000**	**$1,196,000**	
PROJECT MANAGEMENT UNIT (approx. 5% of project budget)	**Ministry of Water**	**62160**	**LDCF**	71300	National consultants	$30,000	$30,000	$30,000	$30,000	$120,000	n
				71600	Travel	$20,000	$10,000	$10,000	$10,000	$50,000	o
				72500	Supplies	$5,000	$5,000	$5,000	$5,000	$20,000	p
					sub-total	**$55,000**	**$45,000**	**$45,000**	**$45,000**	**$190,000**	
					Total Management	**$55,000**	**$45,000**	**$45,000**	**$45,000**	**$190,000**	
					PROJECT TOTAL	**$1,079,500**	**$1,014,500**	**$952,500**	**$953,500**	**$4,000,000**	

Summary of Funds:[20]

	Amount Year 1	Amount Year 2	Amount Year 3	Amount Year 4	Total
PAPGFDC project (EU/UNDP)	3,865,000	3,000,000	3,000,000	3,000,000	12,865,000
Government budget lines supporting the PAPGFDC project	153,150	150,000	150,000	150,000	603,150
Millennium Villages Project (UNDP)	170,000	170,000	170,000	160,000	670,000
UNDP	75,000	75,000	75,000	75,000	300,000
Government budget line DNM-ASECNA	25,399	25,000	18,000	5,000	73,399
LDCF	1,014,500	952,500	953,500	1,014,500	4,000,000
TOTAL	**5,398,049**	**4,424,500**	**4,355,500**	**4,333,500**	**18,511,549**

[20] *Summary table should include all financing of all kinds: GEF financing, cofinancing, cash, in-kind, etc...*

Budget Notes	Description of cost item
a.	• Procurement of 30 water level monitoring stations with telemetry, 30 rain gauges at hydrological stations and 1 automatic Doppler flow meter, including costs of fencing and local security guards (DG-Eau) • Procurement of 3 automatic agro-climate stations, 2 synoptic stations and 25 rain gauges. Rehabilitation of 6 synoptic stations and 20 agro-climate stations (DNM) • Construction of secure fencing and recruitment of local security guards around weather stations to prevent theft (DNM) • Maintenance equipment for water level and coast erosion monitoring (CRHOB)
b.	• Capacity reinforcement for DNM with long-term planning and financial budgeting to procure radar in the future • Knowledge sharing between the DG-Eau and the Applied Hydrology Laboratory (LHA) on hydrological modelling • Knowledge sharing between DNM/ASECNA and the Climatology Laboratory (CL) on climate predictions • Training for DG-Eau/DNM/ASECNA/CRHOtechnicians on flow meter/weather station information collection, data treatment and O&M. O&M tasks to be documented in Standard Operating Procedures
c.	• Travel expenses to conduct field validation visits 3 to 4 weeks after choosing sites to calibrate flow (i.e., discharge) measurements based on comparing river heights with river flows (i.e., rating curves) (DG-Eau) • Travel expenses to conduct at least field consultations to verify meteorological equipment placement (DNM)
d.	• Development of improved data transmission capacity by post, mobile phone, internet/intranet and GSM including 3 field computers and 4 information computers in Cotonou (DNM) • Purchase of privileged phone systems (CB radios) and SMS communication services to enable fast transmission of coastal monitoring data (CRHOB)
e.	• Purchase of asecure data server and a back-up server to build a long-term flow database which can help in the prediction of flood probabilities and to assist with data quality control (e.g., 1 in 100 year flood) • Digitization of written hydrological data and acquisition of data downloading device to be stored in a new secure data server with back-up capabilities (DG-Eau) • Renewal and purchase of new hydrological modelling licenses (MIKE BASIN) and ArcGIS licenses • Purchase of a secure data server and back-up server to build a long-term database to assist in climate risk and climate change predictions (DNM) • IT equipment for data sharing between CRHOB, the Port Authority at Cotonou and DNM
f.	• Local consultants for organising and conducting equipment surveys/reports, identifying and liaising on procurement of equipment with line ministries and facilitating NHMS*
g.	• Cost of region-based technical assistance to the Implementing Partner for outcome 1 of this project from a pool of project-based chief technical advisors (hydrological and meteorological specialists assisting weather, climate and hydrological observation systems and forecasting) supporting this and other EWS projects in the UNDP-GEF/LDCF supported multi-country initiative on EWS/CI (320 days @ $550/day + 8 flights @ $2,000 + 40 days DSA @ $200/day). *Note: that the full cost of the Technical Support is covered by all 10 projects participating in the GEF/LDCF financed EWS multi-country initiative.* This will be managed separately. • Training on automatic synoptic and automatic agro-climate stations to assist with weather station installation, data transmission and Operation and Maintenance (O&M) training (See TORs) *** • Training on Automatic Doppler flow meter installation, data transmission and Operation and Maintenance (O&M) training (See TORs) *** • Hydrology Expert on flood forecasting modeling
h.	• Training for DNM/ASECNA/DG-Eau/CRHOB to improve national weather forecasting capabilities including capacity building for national technical experts through regional and international knowledge sharing programs • Capacity development for DNM/DG-Eau to build a formalized alert guide and thresholds for extreme weather events • Four (4) annual workshops between the technical staff of DNM/DG-Eau/CRHOB and private sector representatives to see the needs for tailored climate products

	• Capacity development for the technical staff of DNM/DG-Eau/CRHOB to generate targeted forecasts • Quarterly roundtable meetings between DNM/ASECNA, DG-Eau, CRHOB, the Ministry of Agriculture and the Ministry of Health for long-term development planning for various socio-economic sectors • Conferences to introduce mobile-phone platform development to integrate EWS/CI into agricultural advisories • Bi-annual meetings by the multi-agency platform (CIMS), composed of designated focal points, to coordinate EWS-related projects and agencies (See TORs) • Integrate the need of EWS/CI into the next phase of development policies [PRSP (SCRP), Priority Action Programme (PAP), the Agriculture Revival Strategy (NGSPR)] • Capacity building for ANPC and PNRCC to mainstream EWS/CI and adaptation measures into planning • EWS capacity development meetings between ANPC with regional disaster risk management (DRM) units • Formalized partnerships (contracts) between ANPC and local radio stations and funds to support local radio emissions • Group training for leaders of all dissemination agencies (ANPC, NGOs/CSOs) on alert signification • Capacity building between ANPC and local NGO/CSOs for implementation of a formalized feedback mechanism • Project public awareness campaign by local NGO/CSOs on the utility of EWS/CI for climate change resilience
i.	• Travel expenses for field visits undertaken to understand how users of early warning advisories and warnings use the information and to conduct gender disaggregated survey on receipt of alerts, differentiated by type (floods, droughts, strong winds) in all of the pilot zones
j.	• Communication equipment for pilot study on tailoring climate/weather products • Provision of a PCO radio for ANPC in Cotonou to be able to communicate and coordinate with 21 communities. Also provision of CB radios for focal points of relevant NGOs/CSOs • Development of a toll-free number for alert information and updates at ANPC and DNM • Communication feedback mechanism equipment • Communication equipment for the ANPC and NGOs/CSOs to inform local populations of EWS/CI • Communication equipment for public awareness campaign on the utility of EWS/CI for climate change resilience
k.	• Acquisition of IT equipment for forecasting • Development of EWS centralized server including back-up server • IT equipment for integration of satellite data from national, regional and international programs • IT equipment for ANPC
l.	• Local consultants to monitor the utility of forecasts/predictions for end-users and the efficacy of the Standard Operation Procedure for alert communication. Organise workshops, meetings and feedback sessions from users of forecasts and SOPs*
m.	• Cost of region-based technical assistance to the Implementing Partner for outcome 2 of this project from a pool of project based chief technical advisors (communication systems, knowledge sharing, SOPs and fund mobilization) supporting this and other EWS projects in the UNDP-GEF multi-country initiative on EWS/CI (320 days @ $550/day + 8 flights @ $2,000 + 40 days DSA @ $200/day). *Note that the full cost of the Technical Support is covered by all 10 projects participating in the GEF/LDCF financed EWS multi-country initiative.* This will be managed separately • Training on weather forecasting and Numerical Weather Prediction who can provide guidance on tailoring forecasts for sector-specific services (See TORs) *** • Training on climate risk and vulnerability modelling who can provide guidance on tailoring climate predictions to sector-specific services (See TORs) *** • Training on market research for mobile phone platform for agricultural advisories (See TORs) *** • Monitoring and Evaluation national expert and Monitoring, Learning, Adaptive Feedback and Evaluation (as per the results framework and M&E Plan and Budget)
n.	• Salaries for the project management unit including the Project Coordinator, a Financial and Administrative Assistant

o.	• Travel costs to conduct field validation of project progress in target zones
p.	• Supplies for project management office facilities

***** Assuming national consultant fee: $250 per day

******* Assuming international consultant fee: $4000 flight/visas, hotel $155, daily expenses $75 and salary $1000 per day

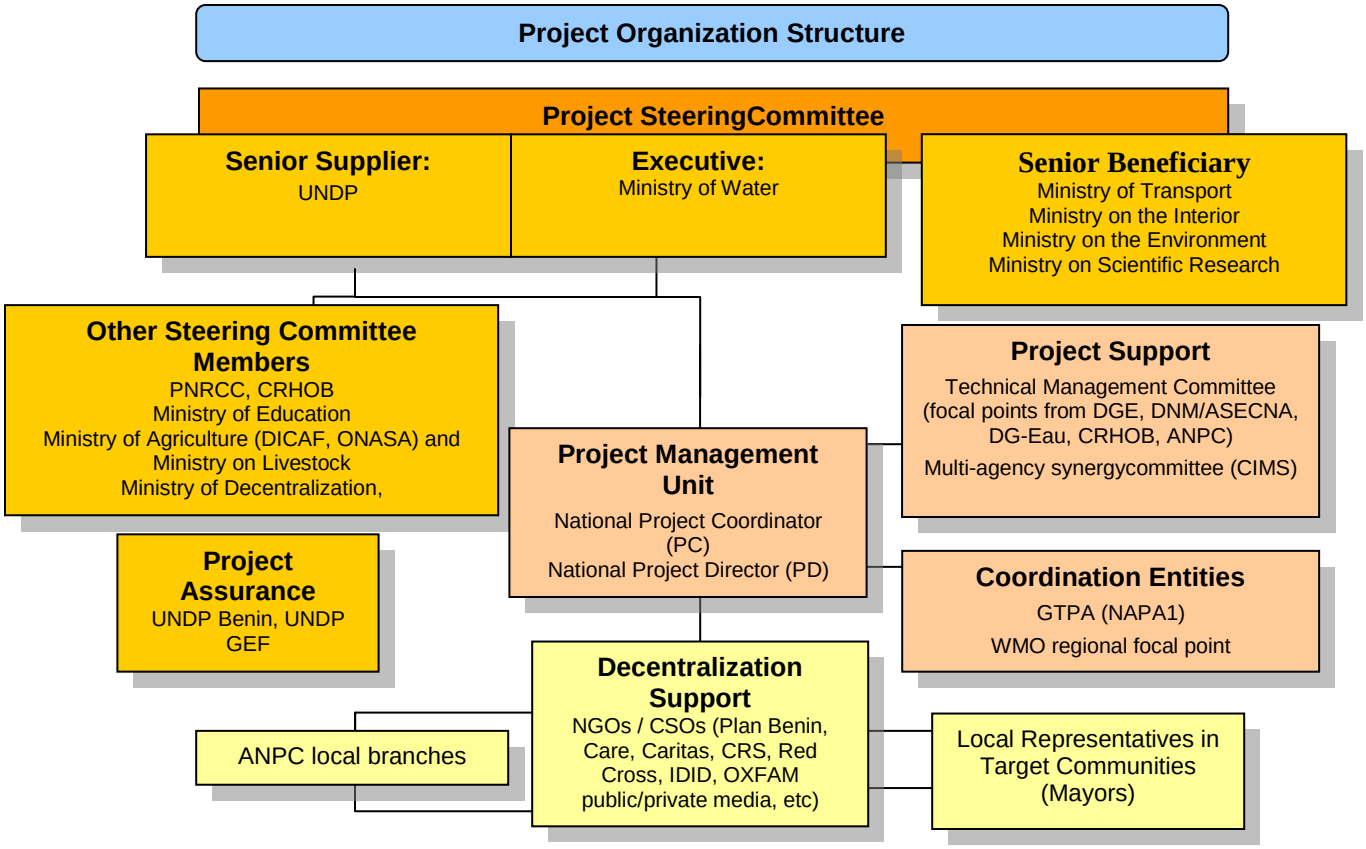
5 MANAGEMENT ARRANGEMENTS

134. The execution modality for this project will be National Implementation Modality in line with UNDP policies and procedures. The implementing partner for this project will be the Ministry of Water. As the Implementing Partner, the Ministry will have project ownership, appoint a National Project Coordinator (PC) (paid for by the project) to coordinate the different components of the project and supervise a team within the General Direction on Water (DG-Eau) to conduct project activities. The Implementing Partner will also be responsible for establishing collaboration agreements with institutions and organizations that play a major role in project implementation on local, regional and international levels and be responsible for all financial and substantive reporting to UNDP-Benin.

135. The senior beneficiaries of this project are the Ministry of Transport (MT)that oversees DNM/ASECNA, the Ministry of Interior (MI) that oversees ANPC, the Ministry of Environment (MEHU)that oversees DGE andthe Ministry of Scientific Research that oversees CRHOB, NGOs/CSOs. The Responsible Parties of the project will be these Ministries and the CSO Caritas, who will be responsible for managing capacity building activities and coordinating other CSO activities (e.g. those of Oxfam, Plan Benin, Care International, IDID, CRS, CREDEL, Red Cross).These organisationswill be represented within the Project Steering Committee (see description below) and will be held accountable for delivery of specific outputs. Draft terms of Reference (TOR) indicating the roles of each institution is attached (see Annex 6) and will be further elaborated during project implementation.The Stakeholder Involvement Table indicating the key functions of all project partners during project implementation is indicated in Table 8.

136. Prior to implementation, a review of the capacity assessment undertaken for the IP (Annex 7) will be conducted and measures put in place to ensure the project is implemented in full alignment with UNDP policies and procedures. Prior to commencement of the implementation phase, should any additional services be required of UNDP beyond its role in oversight, a Letter of Agreement between the Ministry of Water and UNDP will detail any direct project costs associated with technical or administrated services requested of UNDP.

137. The roles and responsibilities of the parties involved in managing the project are described below. A diagram is also provided to describe the composition of the Project Steering Committee and the decentralized key agencies involved in project management and support.



138. The **Project Steering Committee**(led by Ministry of Water and including UNDP, Senior officers from the Ministry of Transport (DNM and ASECNA), Ministry on the Environment (DGE), Ministry of Interior (ANPC), Ministry of Education (University of Abomey-Calavi: Laboratory of Applied Hydrology, Laboratory of Climatology and Laboratory of Bioclimatology), the National Platform on Catastrophe Risk Reduction and Adaptation to Climate Change (PNRCC), the Ministry of Agriculture (DICAF), the Benin Oceanographic and Fishing Research Center (CRHOB), donors (the European Union and GIZ) and NGOs) is responsible for making management decisions for the project in particular when guidance is required by the National Project Coordinator. The Project Steering Committee plays a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It i) ensures that required resources are committed, ii) arbitrates on any conflicts within the project and iii) negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the National Project Coordinator and any delegation of its Project Assurance responsibilities. Based on the approved Annual Work Plan, the Project Steering Committee can also consider and approve quarterly plans (if applicable) and approve any essential deviations from the original plans.

139. Potential members of the Project Steering Committee are reviewed and recommended for approval during the PAC meeting. Representatives of other stakeholders can be included in the Committee as appropriate. The Committee contains three distinct roles, including:

1) **An Executive**: individual representing the project ownership to chair the group.
   - Ministry of Water

2) **Senior Supplier**: individual or group representing the interests of the parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project. The Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project.
    - UNDP
3) **Senior Beneficiary**: individual or group of individuals representing the interests of those who will ultimately benefit from the project. The Senior Beneficiary's primary function within the Board is to ensure the realization of project results from the perspective of project beneficiaries.
    - Ministry of Transport, Ministry on the Interior, Ministry on the Environment, Ministry on Scientific Research
4) The **Project Assurance** role supports the Project Board Executive by carrying out objective and independent project oversight and monitoring functions. The National Project Coordinator and Project Assurance roles should never be held by the same individual for the same project.
    - UNDP Benin and UNDP-GEF

140. **National Project Coordinator (PC)**: The National Project Coordinator has the authority to run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Project Steering Committee. The National Project Coordinator's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. He/she will be appointed nationally and his salary will be paid by the project (See TOR in Annex 6).

141. **National Project Director (PD):** A representative from the Ministry of Water who will support the PC with overall administration and maintaining a liaison with UNDP. (See TOR in Annex 6).

142. **Project Support**: Regular technical project support will be provided by focal points from the National Directorate on Meteorology (DNM), the General Directorate on Water (DG-Eau) the National Advisory for Civil Protection (ANPC), the Benin Oceanographic and Fishing Research Center (CRHOB), and the General Directorate on the Environment (DGE) who will meet monthly with the National Project Coordinator. They will provide project administration, management and technical support to the PC as required by the needs of the individual project or National Project Coordinator. The PC and the technical support group will also coordinate with the NAPA1 EWS technical committee for food security (GTPA) and the regional WMO focal point.

143. **Decentralization Support**: The Decentralization Support role provides a mechanism to assure the project results are effectively decentralized and that end-users have an input into project implementation. Representatives from the decentralized branches of ANPC and key NGOs/CSOs (Plan Benin, Care, Caritas, CRS, IDID, Red Cross, Oxfam) along with public/private media and local representatives in the target regions will work as a team to assure EWS/CI is being disseminated to the local populations in a comprehensible and stream-lined manner. This support team will also be responsible for ensuring that the feedback mechanism, which enables end-users to take an active role in the project, is effective and that end-user comments/concerns/suggestions are integrated into the project design.Similarly, coordination will be promoted with the Multi-agency Committee for Synergy (*Comité Inter institutionnelet Multi-disciplinaire de promouvoir la Synergie*, CIMS) to be established through this project to ensure EWS-related initiatives are well-coordinated.

144. This project in Benin is part of a multi-country programme on Climate Information and EWS supported by UNDP-GEF. In response to LDCF/SCCF Council requirement that a regional component would be included to enhance coordination, increase cost effectiveness and, most importantly, benefit from a regional network of technologies, a cohort of technical advisors and a

project manager will be recruited to support each of the national level project teams. In particular they will support countries to develop robust adaptation plans and provide technical assistance and deliver training for accessing, processing and disseminating data for early warning and national/sectoral planning related purposes on a systematic basis. The cost of these project staff has been prorated across the project budgets in all countries that are part of this multi-country programme including Benin, Burkina, Ethiopia, Liberia, Sao Tome, Sierra Leone, Tanzania, Uganda and Zambia. To ensure cost-savings and maximize on efficiencies in procurement for each project, recruitment of these posts will be done centrally on behalf of EWS projects that are part of this multi-country programme.

6 MONITORING FRAMEWORK AND EVALUATION

The project will be monitored through the following M&E activities. The M&E budget is provided in the table below. The M&E framework set out in the Project Results Framework in Part III of this project document is aligned with the AMAT and UNDP M&E frameworks.

Project start: A Project Inception Workshop will be held within the first 2 months of project start with those with assigned roles in the project organization structure, UNDP country office and where appropriate/feasible regional technical policy and program advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan.

The **Inception Workshop** should address a number of key issues including:

- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and Regional Coordinating Unit (RCU) staff vis-à-vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
- Based on the project results framework and the LDCF related AMAT set out in the Project Results Framework in Section III of this project document, and finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
- Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- Plan and schedule Steering Committee meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first Steering Committee meeting should be held within the first 12 months following the inception workshop.

An **Inception Workshop report** is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

Quarterly:

- Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform.
- Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS. Risks become critical when the impact and probability are high. Note that for UNDP/GEF projects, all financial risks associated with financial instruments such as revolving funds, microfinance schemes, or capitalization of ESCOs are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical).
- Based on the information recorded in Atlas, a Project Progress Reports (PPR) can be generated in the Executive Snapshot.
- Other ATLAS logs will be used to monitor issues, lessons learned. The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

Annually: Annual Project Review/Project Implementation Reports (APR/PIR): This key report is prepared to monitor progress made since project start and in particular for the previous reporting period (30 June to 1 July). The APR/PIR combines both UNDP and GEF reporting requirements.

The APR/PIR includes, but is not limited to, reporting on the following:

- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative)
- Project outputs delivered per project outcome (annual).
- Lesson learned/good practice.
- AWP and other expenditure reports
- Risk and adaptive management
- ATLAS QPR

Periodic Monitoring through site visits: UNDP CO and the UNDP-GEF region-based staff will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and Project Board members.

Mid-term of project cycle: The project will undergo an independent Mid-Term Review at the mid-point of project implementation (expected to be in October 2015). The Mid-Term Review will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term review will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term review will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit (RCU) and UNDP-GEF. The LDFC/SCCF AMAT as set out in the Project Results Framework in Section III of this project document) will also be completed during the mid-term evaluation cycle.

End of Project: An independent Terminal Evaluation will take place three months prior to the final PSC meeting and will be undertaken in accordance with UNDP-GEF guidance. The terminal evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term review, if any such correction took place). The terminal evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-GEF.The LDFC/SCCF AMAT as set out in the Project Results Framework in Section III of this project document) will also be completed during the terminal evaluation cycle. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response, which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC).

Learning and knowledge sharing: Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums.

The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects.There will be a two-way flow of information between this project and other projects of a similar focus.

Audit: Project will be audited in accordance with UNDP Financial Regulations and Rules and applicable audit policies.

Table **12**:M& E workplan and budget

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team staff time*	Time frame
Inception Workshop and Report	▪ Project Manager ▪ PIU (Project Implementation Unit) ▪ UNDP CO, UNDP GEF	Indicative cost: 10,000	Within first two months of project start up
Measurement of Means of Verification of project results.	▪ UNDP GEF RTA/Project Manager will oversee the hiring of specific studies and institutions, and delegate responsibilities to relevant team members. ▪ PIU, esp. M&E expert	To be finalized in Inception Phase and Workshop.	Start, mid and end of project (during evaluation cycle) and annually when required.
Measurement of Means of Verification for Project Progress on output and implementation	▪ Oversight by Project Manager ▪ PIU, esp. M&E expert ▪ Implementation teams	To be determined as part of the Annual Work Plan's preparation. Indicative cost is 20,000	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	▪ Project manager ▪ PIU ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG	None	Annually
Periodic status/ progress reports	▪ Project manager and team	None	Quarterly
Mid-term Review	▪ Project manager ▪ PIU ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	Indicative cost: 30,000	At the mid-point of project implementation.
Terminal Evaluation	▪ Project manager ▪ PIU ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team)	Indicative cost : 45,000	At least three months before the end of project implementation
Audit	▪ UNDP CO ▪ Project manager ▪ PIU	Indicative cost per year: 3,000 (12,000 total)	Yearly
Visits to field sites	▪ UNDP CO ▪ UNDP RCU (as appropriate) ▪ Government representatives	For GEF supported projects, paid from IA fees and operational budget	Yearly for UNDP CO, as required by UNDP RCU
TOTAL indicative COST Excluding project team staff time and UNDP staff and travel expenses		US$ 117,000 (+/- 5% of total GEF budget)	

7 LEGAL CONTEXT

This document together with the CPAP signed by the Government and UNDP which is incorporated by reference constitute together a Project Document as referred to in the SBAA [or other appropriate governing agreement] and all CPAP provisions apply to this document.

Consistent with the Article III of the Standard Basic Assistance Agreement, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner.

The implementing partner shall:

a) put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;

b) assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

8 ANNEXES

Annex 1: Risk Analysis

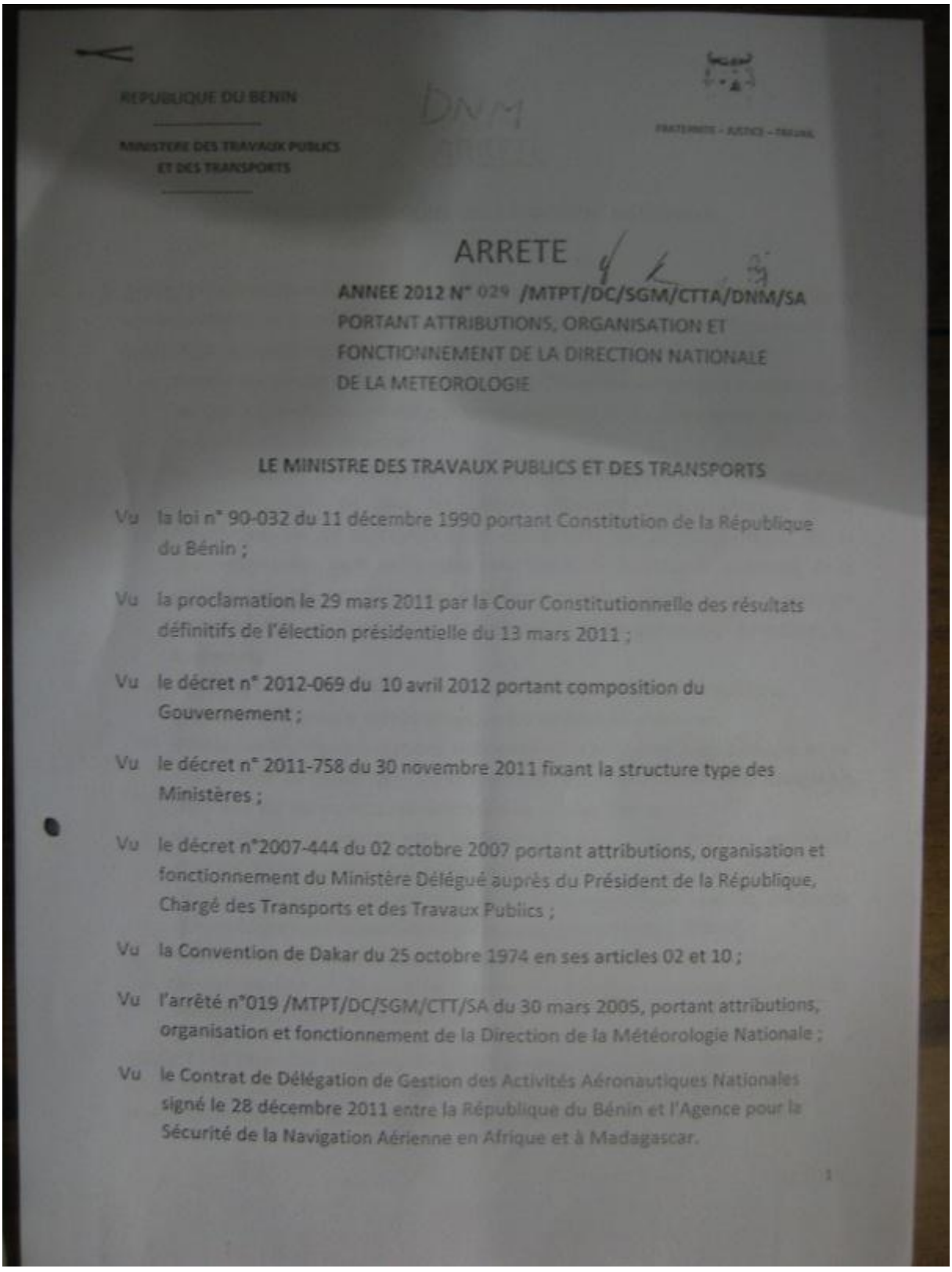
#	Description of the risk	Potential consequence	Countermeasures / Mngt response	Type (Risk category) Environmental Financial Operational Organizational Political Regulatory Strategic Other	Probability & Impact (1-5, low to high)	Owner	Submitted updated by	Last Update	Status
1	Benin does not have enough government financing to continue monitoring and to cover recurring O&M costs	Warnings become less accurate and useful on a national level	By making EWS/CI more useful to various sectors, this pushes the Government to include stable, core budget lines for climate/weather services due to their cross-sectoral importance Capacity for long-term planning and costing will be built in all information production agencies.	Organizational, Strategic, Financial	P=3 I=4				
2	Complications with the release of funds and/or national procurement procedures	Procurement and installation of hydro-meteorological equipment, including hardware and software, is delayed	A clear Management Arrangement including a project management unit and focal points on national and local levels have been developed to facilitate fund disbursements.	Political, Operational, Financial	P=2 I=2				
3	Inadequate or inefficient political response to EWS/CI	Delays in warning dissemination and/or poor integration of hydro-meteorological information into	A Standard Operating Procedure (SOPs) for EWS/CI communication will be put in place, clearly identifying the roles of all actors.	Political, Operational	P=2 I=2				

#	Description of the risk	Potential consequence	Countermeasures / Mngt response	Type (Risk category) Environmental Financial Operational Organizational Political Regulatory Strategic Other	Probability & Impact (1-5, low to high)	Owner	Submitted updated by	Last Update	Status
		planning							
4	Continuity breaks in National Hydro-meteorological services due to the work required with new equipment installation and other project needs	Existing manual stations may become neglected because efforts are focused on project development	Procurement will be staggered to ensure continuity and a gradual increase for required capacity building Sufficient personnel will be hired to maintain existing and acquired equipment	Operational	P=3 I=3				
5	Lack of qualified personnel within the NHMS to operate and maintain new equipment, data transmission/treatment/storage processes and forecasting models	May limit/delay project implementation	A major part of the project is to strengthen institutional and technical capacity for planning, designing and implementing EWS/CI Recruitment of technical personnel by the Government will mandate that new trained personnel must stay within their agency for 5 years to support knowledge sharing. Personnel will be supported through knowledge sharing opportunities to gain expertise (e.g., ACMAD, Météo France). Collaborations with international EWS initiatives (Benin, Mali, Niger) will also be developed	Operational, Strategic	P=4 I=4				
6	Natural disasters damage infrastructure (particularly floods and coastal erosion)	Threat to operational sustainability of project Weather network becomes less extensive	Robust infrastructure will be procured and training and spare parts will be provided for repair and maintenance in each technical, information	Operational	P = 2 I = 2				

#	Description of the risk	Potential consequence	Countermeasures / Mngt response	Type (Risk category) Environmental Financial Operational Organizational Political Regulatory Strategic Other	Probability & Impact (1-5, low to high)	Owner	Submitted updated by	Last Update	Status
		and representative for forecasting	production agency.						
7	Data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks)	Threat to sustainability of weather/climate information collection. Threat to vulnerable population's ability to adapt to climate change (particularly for subsistence agricultural production)	An open-access data portal for information producers where knowledge will be shared for cross-sectoral use is an output to be developed (e.g., health, agriculture planning).	Strategic	P = 3 I = 3				
8	False alarms	Decreased confidence in alerts	Enough awareness will be provided to end-users through project activities so that they can understand the reality of forecasting uncertainty Feedback mechanisms engage end-users and enable lessons learned to be relayed to the alert generation team so that alerts can be improved and continually updated.	Strategic, Operational	P = 3 I = 3				

Annex 2: Agreements (including co-financing letters)

Agreement between DNM and its operational arm, ASECNA (see scans below)



REPUBLIQUE DU BENIN

MINISTERE DES TRAVAUX PUBLICS
ET DES TRANSPORTS

DNM

FRATERNITE – JUSTICE – TRAVAIL

ARRETE

ANNEE 2012 N° 029 /MTPT/DC/SGM/CTTA/DNM/SA
PORTANT ATTRIBUTIONS, ORGANISATION ET
FONCTIONNEMENT DE LA DIRECTION NATIONALE
DE LA METEOROLOGIE

LE MINISTRE DES TRAVAUX PUBLICS ET DES TRANSPORTS

Vu la loi n° 90-032 du 11 décembre 1990 portant Constitution de la République du Bénin ;

Vu la proclamation le 29 mars 2011 par la Cour Constitutionnelle des résultats définitifs de l'élection présidentielle du 13 mars 2011 ;

Vu le décret n° 2012-069 du 10 avril 2012 portant composition du Gouvernement ;

Vu le décret n° 2011-758 du 30 novembre 2011 fixant la structure type des Ministères ;

Vu le décret n°2007-444 du 02 octobre 2007 portant attributions, organisation et fonctionnement du Ministère Délégué auprès du Président de la République, Chargé des Transports et des Travaux Publics ;

Vu la Convention de Dakar du 25 octobre 1974 en ses articles 02 et 10 ;

Vu l'arrêté n°019 /MTPT/DC/SGM/CTT/SA du 30 mars 2005, portant attributions, organisation et fonctionnement de la Direction de la Météorologie Nationale ;

Vu le Contrat de Délégation de Gestion des Activités Aéronautiques Nationales signé le 28 décembre 2011 entre la République du Bénin et l'Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar.

1

ARRETE

TITRE I : MISSIONS ET ATTRIBUTIONS DE LA DIRECTION NATIONALE DE LA METEOROLOGIE

Article 1 : La Direction Nationale de la Météorologie (DNM) a pour mission d'assurer la promotion et le développement des activités météorologiques en République du Bénin. A ce titre, elle est chargée :

- d'observer le temps et le climat sur toute l'étendue du territoire national, en prévoir les évolutions et diffuser les informations correspondantes sous forme de prévisions, avis et autres ;
- de satisfaire les besoins en données, informations et produits météorologiques de tous les usagers notamment ceux chargés de la conception ou de la planification des projets de développement, de la protection civile, de la prévention des risques, de la défense nationale, de la gestion des infrastructures, des établissements humains et d'autres secteurs essentiels tels que l'agriculture, les ressources en eau, la santé, l'énergie et les transports;
- de suivre et de contrôler les activités de la météorologie aéronautique;
- d'assurer l'assistance météorologique à la navigation maritime ;
- d'élaborer les règlementations nationales en matière de météorologie et de coordonner au besoin avec les autorités de l'aviation civile et de la navigation maritime sur les aspects opérationnels liés à leurs domaines ;
- de mettre en œuvre au plan national les Conventions, Accords et Traités internationaux conclus dans le domaine de la météorologie et du climat ;
- de veiller à l'application des résolutions et au respect des normes, pratiques et procédures de l'Organisation Météorologique Mondiale (OMM) ;
- d'assurer ou de contribuer à la formation du Personnel météorologique ;
- de coordonner et de contrôler toutes les structures exerçant les activités météorologiques au plan national.

Article 2 : La Direction Nationale de la Météorologie représente le Bénin auprès de l'Organisation Météorologique Mondiale (OMM) et de toutes autres organisations régionales et internationales chargées de la météorologie.

TITRE II : ORGANISATION ET FONCTIONNEMENT DE LA DIRECTION NATIONALE DE LA METEOROLOGIE

Article 3 : La Direction Nationale de la Météorologie comprend :

- le Service de l'Administration, des Finances et des Ressources Humaines (SAFRH);
- le Service de la Météorologie Opérationnelle(SMO) ;
- le Service de la Climatologie (SC);
- le Service de l'Agro météorologie (SAM).

CHAPITRE I : DU SERVICE DE L'ADMINISTRATION, DES FINANCES ET DES RESSOURCES HUMAINES

Article 4 : Le Service de l'Administration, des Finances et des Ressources Humaines est chargé :

- de l'élaboration du budget ;
- du suivi de l'exécution du budget ;
- de la tenue de la comptabilité ;
- de la gestion et du suivi de la carrière du personnel ;
- de la préparation des commandes de matériels et de fournitures ;
- de la gestion du stock de matériels ;
- de la facturation des prestations fournies.

Article 5 : Le Service de l'Administration, des Finances et des Ressources Humaines comprend :

- la Division de l'Administration et des Finances ;
- la Division des Ressources Humaines ;
- la Division Gestion du Matériel et des Affaires Générales.

CHAPITRE II : DU SERVICE DE LA METEOROLOGIE OPERATIONNELLE

Article 6 : Le Service de la Météorologie Opérationnelle est chargé :

- de la gestion et du suivi du réseau des stations d'observations pluviométriques, climatologiques et agro météorologiques ;
- de la prévision météorologique au plan national ;
- de l'assistance météorologique à la navigation maritime ;
- du suivi et du contrôle de la météorologie aéronautique ;
- du contrôle et de l'inspection du réseau d'observations synoptiques ;

- de l'installation, de la maintenance et de l'étalonnage des instruments et autres équipements en service dans les stations d'observations météorologiques.

Article 7 : Le Service de la Météorologie Opérationnelle comprend :
- la Division Prévision Météorologique ;
- la Division Maintenance et Etalonnage des Equipements ;

CHAPITRE III : DU SERVICE DE LA CLIMATOLOGIE

Article 8 : Le Service de la Climatologie est chargé :
- de la gestion et du traitement des données observées dans les différentes stations du réseau d'observation météorologique national ;
- de l'élaboration et de la diffusion de bulletins pluviométriques, climatologiques et d'autres produits climatologiques ;
- de la fourniture de données et informations météorologiques et climatologiques aux divers usagers ;
- de la réalisation et de la publication d'études sur des sujets relatifs au temps et au climat ;
- de la participation aux activités scientifiques nationales et internationales dans le domaine du climat et de l'environnement ;
- de l'inspection périodique des stations et postes du réseau d'observation météorologique national ;
- de la mise en œuvre du Cadre Mondial pour les Services Climatologiques ;

Article 9 : Le Service de la Climatologie comprend :
- la Division Collecte, Contrôle et Saisie des données ;
- la Division Traitement des Données climatologiques et publications ;
- la Division Relations Publiques.

CHAPITRE IV : DU SERVICE DE L'AGRO METEOROLOGIE

Article 10 : Le Service de l'Agro météorologie est chargé :

- de la collecte, du contrôle et du traitement des données météorologiques et phénologiques observées au niveau du réseau agro météorologique national ;
- de l'élaboration et de la diffusion de bulletins agro météorologiques ;
- du suivi agro météorologique de la campagne agricole ;
- de la fourniture de renseignements agro météorologiques sous forme de données, d'alertes ou d'avis aux divers usagers ;
- de la réalisation d'études d'impact du climat sur les cultures ;
- de l'inspection du réseau agro météorologique durant les campagnes agricoles ;

Article 11 : Le Service de l'Agro météorologie comprend :

- la Division traitement des données Agro météorologiques et publications ;
- la Division Système d'Alerte Rapide et Assistance à la Sécurité Alimentaire.

TITRE III : DISPOSITIONS DIVERSES

Article 12 : Sont rattachés au Directeur National de la Météorologie :

- un **Secrétariat Administratif** chargé de l'enregistrement, du traitement et de la conservation des courriers à l'arrivée et au départ et de l'exécution de toutes autres tâches à lui confiées par le Directeur ;
- une **Cellule d'Informatique et de gestion de base de données** chargée de la gestion centralisée du réseau informatique de tous les services techniques de la Direction, de l'Administration de la base de données météorologiques, des Archives et de la Documentation.

Article 13 : Les responsables du Secrétariat Administratif et de la Cellule d'Informatique et de gestion de base de données ont rang de Chef de Division.

Article 14 : La structure organisationnelle de la Direction Nationale de la Météorologie est représentée par l'organigramme ci-joint.

Article 15 : Le Directeur National de la Météorologie est nommé par Décret pris en Conseil des Ministres sur proposition du Ministre des Travaux publics et des Transports.

Article 16: Les Chefs de Service sont nommés par arrêté du Ministre des Travaux Publics et des Transports sur proposition du Directeur National de la Météorologie.

Article 17 : Le Directeur National de la Météorologie est chargé de l'application du présent arrêté qui prend effet à compter de la date de sa signature.

Article 18 : Le présent arrêté qui abroge toutes dispositions antérieures contraires, notamment celles de l'arrêté N° 019/MTPT/DC/SGM/CTT/SA du 30 mars 2005, sera publié et communiqué partout où besoin sera.

Cotonou, le 28 JUIN 2012

Lambert KOTY

AMPLIATIONS :

PR	04
PM	01
TOUS MINISTERES	25
CAB/MTPT	01
SG/MTPT	01
ANAC	01
ASECNA	01
DNM	01
CHRONO	01

6

28 MARS 2013

REPUBLIQUE DU BENIN

MINISTERE DE L'ENVIRONNEMENT, DE L'HABITAT ET DE L'URBANISME

DIRECTION GENERALE DES FORETS ET DES RESSOURCES NATURELLES

TEL : (229) 21-33-06-62 FAX : 21-33-21-92/21-33-04-21 BP. 393 COTONOU (R. BENIN)
E-mail : «forêtsbenin@yahoo.fr»

LE DIRECTEUR GENERAL

N°252/2013/DGFRN/DPCEP/DSI/SA

Cotonou, le 27/03/13

Très bien!

Isidore Adjahou

A

Madame Nardos BEKELE,
Coordinatrice du Système des Nations Unies,
Représentante Résidente du PNUD au Bénin

COTONOU

Objet : **Confirmation de cofinancement**

Madame la Représentante Résidente,

Par la présente lettre, je viens confirmer l'engagement du Projet Appui à la Préservation et au Développement des Forêts Galeries et Production de Cartographie de base numérique (PAPDFGC) à contribuer au cofinancement du Projet « Renforcement de l'information climatique et des systèmes de prévision en Afrique de l'Ouest et du Centre pour un développement résilient au climat et l'adaptation au changement climatique-Bénin » à l'atteinte des résultats des composantes 1 et 2. En effet, un certain nombre d'activités du Projet PAPDFGC est relatif à la réalisation d'une cartographie de base.

Le cofinancement de notre institution dans cette composante est évalué à Huit Millions Quatre Cent Soixante Cinq Mille (**8465000**) euros pour la période allant de 2013 à 2017, dont Huit Millions (**8000000**) euros en provenance de l'Union

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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Votre référence
Notre référence N° 063 /2013/PEP/AM

03.04.2013

A

L'équipe Nationale de formulation du Projet SAP-Bénin

Att : Consultants PNUD/FEM

Cotonou

<u>Objet</u> : Réalisation de l'Etude Technique Détaillée du Système d'Alerte Précoce SAP-Mono aux inondations

Mesdames et Messieurs,

Suite à l'intérêt que vous avez manifesté pour prendre en compte l'étude citée en objet dans le cadre du projet SAP-Bénin en cours de formulation, j'ai le plaisir de vous confirmer le soutient du Programme Eau Potable et Assainissement (PEP) de la GIZ.

Dans le passé, le PEP a donné un appui technique à la Direction Générale de l'Eau pour la réalisation de l'étude de faisabilité du SAP-Mono aux inondations ainsi qu'à la formulation des Termes de Références pour une Etude Technique Détaillée.

Nous vous confirmons notre intérêt d'accompagner aussi dans le futur, les activités de la DG-Eau dans son engagement de contribuer à une meilleure gestion des inondations pour l'amélioration des conditions de vie des populations riveraines vulnérables exposées aux inondations du fleuve Mono.

Veuillez recevoir l'expression de mes salutations distinguées.

Dr Norbert Hagen
Le Chargé du Programme

PROGRAMME EAU POTABLE ET ASSAINISSEMENT • P.E.P. • Le Chargé de Programme giz

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

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N° d'identification fiscale : 040 250 56073

Président du conseil de surveillance
Hans-Jürgen Beerfeltz, Secrétaire d'État

Présidente du directoire
Tanja Gönner

Membres du directoire
Dr Christoph Beier
(Vice-président du directoire)
Tom Pätz
Dr Hans-Joachim Preuß
Cornelia Richter

Programme des Nations Unies pour le développement

Au service des peuples et des nations

REFERENCE :2013/PROG-PRO/28/ENVIR Cotonou, le 20 Mars 2013

CONFIRMATION DE COFINANCEMENT

Je viens par le présent document confirmer l'engagement du Programme des Nations Unies pour le Développement (PNUD) à contribuer au cofinancement du projet PNUD/ FEM « Renforcer l'information climatique et les systèmes de prévision en Afrique de l'Ouest et du Centre pour un développement résilient au climat et l'adaptation au changement climatique – Bénin ».

Le cofinancement de mon institution est évaluée à **Trois millions quatre cent trente cinq mille (3 435 000)** USD, réparti comme suit pour la période allant de Mi 2013 à Mi 2017.

-Projet Villages du Millénaire : 670 000 USD
-Projet Appui à la préservation et au développement des forêts galeries et production de cartographie de base numérique – PAPDFGC : 2 465 000 USD
-Contribution spécifique en espèce : 300 000 USD

Ce montant représente les dépenses et investissements en nature et en espèce prévus dans le cadre des activités du PNUD déjà identifiés, lesquels contribueront à l'atteinte des résultats attendus du projet.

Nardos BEKELE-THOMAS
Représentant Résident
Coordonnateur Résident du SNU

Au service des peuples et des nations

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REPUBLIQUE DU BENIN

MINISTERE DES TRAVAUX PUBLICS
ET DES TRANSPORTS

DIRECTION NATIONALE DE LA METEOROLOGIE

N° 00000132 /MTPT/DC/SGM/DNM/SA

Cotonou, le 17 MAI 2013

Projet SAP (Système d'Alerte Précoce)

OBJET : Contribution de la DNM au Projet SAP

La Direction Nationale de la Météorologie (DNM) pourra contribuer au Projet SAP (Système d'Alerte Précoce) pendant la durée du Projet (3 ans) pour un montant d'environ 73 399,2 Dollars.

Le Directeur National de la Météorologie

MTPT DIRECTION NATIONALE DE LA METEOROLOGIE LE DIRECTEUR

Denis TOHIO

Annex 3: References

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Annex 4: Key assessment reports

Strengthening climate information and early warning systems in Africa for climate resilient development and adaptation to climate change – Benin

INCEPTION REPORT
FOR THE DESIGN PHASE OF THE UNDP-GEF PROJECT DOCUMENT FOR SUBMISSION FOR CEO ENDORSEMENT

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October 2012

Executive summary

A mission was undertaken to support the Benin UNDP Country Office with the design of an Early Warning System (EWS) and climate information project to be financed by the LDCF. An interactive workshop and bilateral consultations involving the producers, operators and end-users of EWS as well as other key stakeholders were held between the 14th and 20th of September. The primary tasks of the workshop and consultations were 1) to detail the baseline of Early Warning Systems in Benin, 2) to develop a work plan to develop the UNDP project document for the LDCF financed project on climate information and EWS for climate resilient development, and 3) to identify potential co-financing sources including institutions which are managing/developing relevant on-going/planned EWS related initiatives in order to ensure the UNDP-GEF/LDCF EWS project can leverage and mutually support (and be supported by) other projects.

Key findings from the mission include:

- A lack of synergy and coordination amongst institutions has led to a duplication of roles within EWS agencies. In response, three new groups have been (and will be) formed to facilitate the project: 1) an EWS focus group to assist with project development, 2) focal points assigned in relevant institutions for project implementation and 3) an EWS observatory for project implementation (more details Section 2.1.2).
- A lack of project monitoring and evaluation by the national institutions or agencies in charge of project implementation will be resolved by assigning focal points within each relevant EWS institution with this task.
- A lack of automatic weather and hydrological monitoring equipment and the existence of old equipment requiring repair will be resolved by procuring and rehabilitating hydro-meteorological infrastructure.
- Information producers in the National Directorate on Meteorology (DNM) and the General Directorate on Water (DG-Eau) require training on information collection, data treatment and operation and maintenance of equipment. Similarly, DNM personnel must be trained to provide more useful forecasts for the agricultural sector detailing drought and rainy periods to enable long-term development planning.
- There is a need to build capacity within the newly formed National Agency of Civil Protection (ANPC) which has a lack of personnel, technical and financial resources. Since its development at the end of 2011, it has been capable of focusing only on disaster management rather than risk prevention.
- No formal communication mechanism and coordination with the Direction of Communication to officially disseminate alerts exists. In response, a standardized, formal information chain involving all EWS agencies will be developed.

Initial activities, workshop and consultations

An interactive national workshop on Early Warning Systems (EWS) was held on the 18th September 2012 at the Palais des Congrès in Cotonou, Benin. The purpose of the workshop was to bring together the producers of hydro-meteorological information, those in charge of disseminating alerts and parties concerned with the management of catastrophes and natural disasters to present the intended scope of the project (as cleared by LDCF/Council) to facilitate the exchange of ideas on how to best elaborate, implement and develop a sustainable EWS in Benin.

Following the workshop, bilateral consultations took place with technical institutions (e.g., the General Directorate on Water), Government departments (e.g., the Direction of Communication and the Chamber of Agriculture), and bilateral/multilateral donors (e.g., USAID).The purpose of these meetings was to inform the relevant institutions and departments of the scope of the proposed LDCF project, to understand the role of key EWS actors, elicit ideas on details that could be factored into the LDCF project during the design phase so as to ensure that the LDCF financed project coordinates and complements other ongoing and planned initiatives. The needs and estimated costs for developing and facilitating EWS capacity and efficiency were also discussed.

Inception workshop

The workshop involved 28 participants from organizations ranging from technical institutions such as the Laboratory of Applied Hydrology and the National Meteorological Service (DNM), governmental institutions concerned with disaster and risk management (ANPC) as well as the NGO CCDARE (Annex II contains the workshop agenda). After several presentations from key invited speakers integral to EWS and an introduction to this project, two working groups were formed. The first working group included institutional representatives involved in managing EWS. They were asked to better define the roles of EWS agencies as an initial step to defining the institutional arrangement of the project. Roles were defined according to previous EWS or climate change project experience (See Annex IV, Table 2). The second working group included the technical parties experienced with the operations aspects of EWS. Their discussions detailed existing EWS services/equipment and training/capacity-building needs for an efficient EWS system (See Annex IV, Table 1). Annex IV shows the minutes for the workshop.

Key sectors / users of climate information

Through the workshop and consultations, key sectors/users of climate information and EWS were identified. These institutions or organizations are detailed below.

- The National Directorate on Meteorology (DNM) produces forecasts and elaborates all warnings. Since 2010, they serve as a hydro-meteorological phenomena observatory which specializes in the field of applied meteorology to assist in generating weather forecasts for agriculture, water resources planning, and socio-economic needs. DNM is currently collaborating with the WMO, the FIDA Project, AGRHYMET and the ACMAD project.
- The General Directorate for Water (DG-Eau) is involved in the hydrological aspects of the project including the acquisition and operation/maintenance of flow meters, determination of flood risk through hydrological modeling and diffusion of flood warnings.
- The National Agency for Civil Protection (ANPC), formed in late December 2011, is responsible for defining preventive actions, rehabilitation policy and directives as well as implementing rehabilitation activities in disasters areas. This agency will have two roles for this project: (i) the transmission of warnings to vulnerable communities and (ii) the preparation of rehabilitation plans and post-disaster actions.

- The National Platform for Catastrophe Risk Reduction (PNRRC) is the Secretariat of ANPC. It was formed in late December 2011 to provide information about disaster risk to the general public. Members gather in the case of disaster for decision-making. The President of the Committee is a representative of DNM while the Vice-President is a representative from DG-Eau.
- The Directorate of Agricultural Council and Professional Training (DICAF) will serve to advise and disseminate warnings to farming communities. Its core role is to implement policy, directives, and training to transfer best farming practices to rural communities in the climate change context. Their involvement is integral in terms of end-user driven project design.
- The Laboratory of Applied Hydrology (LHA) and the Laboratory of Climatology (LACEEDE) will assist in generating EWS products and assessing disaster risk through hydro-meteorological modeling. Their role in terms of this project is to collaborate with the National Meteorology and Hydrology Services (NMHS) and to confirm hydrological modeling results.

Two key groups of stakeholders were defined at the workshop. The first is concerned with information production and climate and environmental monitoring infrastructure. This group includes the DNM, DG-Eau, the General Directorate on the Environment (DGE), the Ministry of Health (DNSP), farming, livestock and fishing Directorates and the Ministry of Decentralization (DAT) among others listed in Annex IV Table 1. Parallel discussions with these parties will be conducted by the national consultants in order to prioritize fund distributions for the procurement or rehabilitation of hydro-meteorological infrastructure.

The second group outlined at the workshop involves all agencies concerned with integrating climate information into development plans or early warning systems. The key information users targeted with the role of planning and information diffusion include DNM, DG-Eau, the NGOs (IDID, PNE, CREDEL), ANPC, and DICAF among others listed in Annex IV Table 2.

Development of working groups

A key finding from the workshop was to formalize three working groups to facilitate elaboration and implementation of the project. The participants and recommended roles of each group are described below.

(1) A National Platform for Catastrophe Risk Reduction (PNRRC) currently exists. A virtual EWS observatory composed of key EWS actors, representing national and local levels, should be created and led by the National Agency for Civil Protection (ANPC). The role of the EWS observatory would be to oversee the development of EWS and resolve any institutional conflicts.
(2) A focal point should be assigned in all institutions implicated in this project to focus on developing, maintaining and operating the EWS.
(3) During the project preparation (PPG) phase, a smaller focus group should be created containing key focal points from the institutions involved in EWS. The focal points named in the workshop include the General Directorate on the Environment (DGE), the General Directorate on Habitat and Urbanism (DGUD), DG-Eau, DNM, the Ministry of Health (DNSP), the Directorate of Agricultural Council and Professional Training (DICAF), ONASA, the Ministry of Decentralization (DAT), private sector representatives, the NGO, CCDARE, and public/private media. The role of the focus group will be to contribute in the elaboration of the project by developing concrete plans, costs and cost-recovery mechanisms.

Vulnerable regions to be targeted

Although workshop consensus was to build capacity nationally and within regional and local branches for Disaster Risk and Recovery (DRR), participants from the workshop also identified four key regions which require improved forecasting of floods, strong, warm winds and droughts during the rainy season (see Annex V). These regions have been chosen due to their need for risk forecasting and rapid warning for food security in accordance with Benin's National Adaptation Programme of Action (NAPA).The project will build Early Warning services based on the needs of the principal end-users: the rural populations including farmers and producers in these regions/zones.

- Zone I: Soudano-sahelian zone of the extreme north Benin (6000 km²)
- Zone IV: Soudanosahelian zone of northwest Benin (31200 km²)
- Zone V: Soudanoguinean zone of transition in central Benin (16900 km²)
- Zone VIII: Sandy littoral and River-Lake zone of Benin (3600 km²)

Zones I, IV and V are predominantly rural. Zone VIII is also victim to sea level rise and suffers significant health risks during storm or flood periods due to the presence of densely populated regions.

Initial consultations

Meetings were conducted with the UNDP Country Office and key representatives of bilateral/multilateral organizations represented in Benin in order to facilitate the design of the EWS. Details of these consultations are indicated in Table 1.

Table 1: Mission Program and Findings: Preparation of EWS project in Benin (14 Sep 2012 – 20 Sep 2012)

Day/Date	Time	Meetings/Activities	Key Discussion Topics
Fri 14 Sep 2012	12:00–14:00	Internal meeting between M. Houinato, UNDP and International Consultant, Cara Tobin concerning organization of meetings and inception workshop	- Finalization of Inception workshop agenda, key invited speakers - Discussion on agenda for mission meetings
Sat 15 Sep 2012	14:00-17:00	Introduction between National and International consultants, briefing on work tasks and project	- Introduction to EWS project, required tasks and goals - Discussion on agenda for mission meetings and workshop
Mon 17 Sep 2012	09:00-10:15	Direction du Conseil Agricole et de la Formation opérationnelle (DICAF)	- Their role is to support farmers and try to adapt them to climate change such as with adaptive planting - They have a committee to take measures for adaptation - A database of 30-40 years is necessary to be able to predict climate trends and Benin has only 10 yrs data - Better seasonal forecasts are needed for agricultural /livestock planning
	10:30-10:45	Meeting with the UNDP Resident Coordinator	- EWS inception workshop briefing
	11:00-12:30	Direction Générale de l'Eau (DG Eau)	- They do hydrological modeling for 4 watersheds, only one of which has EWS - Problem with coordination with other EWS agencies - Use MIKESHE for hydrological modeling - Must coordinate with neighboring countries such as Togo for modeling - Need training on hydrological modeling software - A four-stage alert process is planned
	14:00-15:15	Laboratoire d'Hydrologie de la FAST	- They use hydrological and climatological data to do hydrological modeling with in-house software - Data is discontinuous

			- They perform qualitative and quantitative evaluations on water resources - Rating curves for river flows exist but they are not up to WMO standards - Validation of models is their primary challenge
	15:30-16:30	Direction Générale de l'Environnement	- They are supportive of the project and will act on any boards - Planning of the workshop was discussed
	17:45-19:00	Direction Nationale de la Météorologie (DNM)	- Existing meteorological network must be extended through station repair/maintenance and acquisition - Purchase of automatic stations and training technical personnel is critical (many technicians are retiring soon) - 3 day forecasts show general weather but do not quantify rainfall or wind intensity - DNM wants to sell their climate products to the private sector
Tues 18 Sep 2012	09:00-18:00	Inception Meeting and Workshop	- See meeting minutes, Annex IV
Wed 19 Sep 2012	8:30-10:30	UNDP meeting with M. Houinato	- De-briefing of inception workshop - Formalization of meeting minutes
	11:00-12:30	Meeting with US AID	- Introduction to project and request for project synergy - US Aid is beginning new Climate Change group - They have 1 M USD grass-roots project involving preparing rural populations for the threat of inundations (particularly women). The project will take place at approximately the same time as the EWS initiative. - It was agreed to share project documents to enhance collaboration as the projects unfold
	12:30-13:00	Meeting with International Development Research Center	- Introduction to project and request for project synergy
	13:00-13:30	Web correspondence with Union European contact, Benin (M. Hoa-Binh)	- Introduction to project and request for project synergy
	13:30-14:00	Web correspondence with World Bank contacts, Benin (M. A. Olojoba and M. Issa)	- Introduction to project and request for project synergy

	14:15-14:45	Meeting with UNFCC Focal Point	- Discussion on other relevant CC initiatives with which this project can support and be supported by - UNDP project leaders must be contacted for co-financing opportunities
Thurs 20 Sep 2012	9:00-10:00	Meeting with the Direction of Communication and Private Media	- GSM network reaches 8 M Beninois - Channels of communication to use include rural radio, sms, social media outlets and television announcements
	10:00-11:00	Meeting with the head of IDID NGO, 'Initiatives for an Integrated, Sustainable Development'	- From IDID's experience, they recommend DNM to implement the project because they are already linked with ANPC, MAEP and other institutions involved with EWS - Local radio and sms are the most efficient means to communicate with locals - Facilitating communication from local to national levels is critical
	11:00-12:30	Meeting with the Representative of the Chamber of Agriculture	- Actors at the local level who can directly benefit from EWS include farmers and producers. Craftsmen, local industries and small businesses can also benefit indirectly. - To ensure project sustainability, existing institutions which are already decentralized must be exploited - It is important to assign roles to the local level actors - Monitoring and evaluation is critical and lacking in Benin

Project development

Current and past EWS-related activities

Until the NAPA was formalized in 2007, no discussion had taken place on elaborating an Early Warning System. Currently, flood alert systems are in place in the Niger River Basin in Benin and maintained by the Authority of the Niger Basin (ABN). DG-Eau has a flood alert system in the Ouémé River basin and the National Office for Food Security (ONASA) maintains alerts at times of famine. However, the existing systems are focused predominantly on regions within the country and none act in coordination with one another.

Furthermore, alerts up until the present have been either lacking or false. One of the most destructive floods in Benin occurred in 2010. No alert was disseminated to the population. Similarly, an alert was provided 2 weeks before a recent flood event in September 2012. However, the forecasted timing of the recent 2012 flood was inaccurate.

In response to false alerts, it is planned that the DNM/DG-Eau will start to utilize 4 alert categories. The alerts will range from 1) flood monitoring to 2) flood watch to 3) flood alert and ultimately to 4) expected flood crisis. More research has to be conducted on how to accurately set the thresholds for these alert levels.

Disaster risk and reduction has been handled by the National Agency for Civil Protection since its creation in late December 2011. The role of ANPC is to plan anticipatory and reactive actions for natural catastrophes. However, due to its limited experience, ANPC is in the process of building its personnel and capacity. During the 2012 flood, ANPC demonstrated good recovery planning; however, it was not able to plan effective anticipatory actions. Furthermore, it was unable to implicate many actors and end-users in decision-making during the 2012 flood disaster.

Due to the devastation caused by the floods of 2010, the World Bank is funding the PUGEMU project implemented by the Directorate of Urbanism of the Ministry of Environment, Habitat and Urbanism in the Ouémé River basin. The goal of this project is to strengthen disaster risk advisory capacities in the region. Consultations with DG-Eau, who is the technical institution implementing the PUGEMU project, indicated that lessons learned from the PUGEMU project must be applied to this LDCF EWS project in order to build upon the existing disaster risk developments.

Similarly, it is essential that this project develop collaboration with the UNDP project "Millennium villages project, Banikoara". A formal collaboration could enable this project to use the established community-based network in the selected regions to facilitate information dissemination to the local regions.

This project must also collaborate with regional EWS-related efforts. Formalizing a solid collaboration with ACMAD's ViGIRisC (African Early Warning and Advisory Climate Services (AEWACS)) project is crucial for the success of the project. ACMAD provides seasonal forecasts called PRESAO to the DNM. The aims of the ViGIRisC project are: (i) to provide a needs assessment for climate risk identification in terms of Early Warning Systems and (2) to identify opportunities for EWS improvement in Africa for climate risk reduction. This project must coordinate with ViGIRisC to gain knowledge on EWS in the region. In addition, the second phase of ViGIRisC will include the installation of pilot EWSs in selected countries and regions. This project must exploit the ViGIRisC project at the regional level by using ACMAD facilities, ACMADs observation network and taking part in ACMAD's forecast training courses for West Africa.

A formalized mechanism for EWS and transmitting alerts is therefore required and it must take into account lessons learned from the existing EWS-related initiatives and coordinate with regional initiatives. The project will emphasize the implementation of EWS in regions of Benin where no alert is currently provided in zones considered vulnerable according to Benin's NAPA. The EWS observatory to be implemented in this project will include the actors of existing EWS-related projects in order to reinforce collaboration and facilitate discussion and knowledge sharing.

Other interventions and their successes/failures

Consultations have indicated that an in-house focal point specific to this project is necessary to ensure the sustainability of an EWS; the PUMA project succeeded with a focal point while the AMESD project failed without one. DNM would like to reinstate the AMESD project in the context of this project; however, further discussions with the national and sub-regional managers of this program are necessary to clarify how AMESD and its extended phase MESA can support EWS. The lack of project focal points is also the possible cause for a lack of project monitoring and evaluation by the national institutions or agencies in charge of project implementation.

There is also a lack of synergy and coordination amongst institutions which has led to a duplication of roles for EWS agencies. This shortcoming is evident in government departments responsible for poverty reduction and disaster risk reduction which have no means to coordinate and have developed parallel efforts for certain projects. To resolve this problem the Government put in place the National Platform of Disaster Risk Reduction (PNRRC) within ANPC in late December 2011. Conclusions from the workshop proposed to resolve the lack of coordination through the creation of an EWS observatory which will be lead by PNRRC to remove redundancies amongst all responsible EWS agencies.

There are also no organized debriefings with the National Meteorology and Hydrology Services (e.g., DNM, DG-Eau, scientists (modeling laboratories), decisions makers (Directorate of Civil Protection (DPC), Ministry of Public Health, Ministry of Planning) and donors (UNDP, World Bank, USAID) or NGOs before or after flood events to integrate lessons learned. Consultations showed support for the idea of having the EWS observatory organize the debriefings post natural catastrophes.

Moreover, currently, there is no formal communication mechanism to officially disseminate alerts. A formal communication mechanism must include a standardized flow for information for issuing warnings from national to local levels and vice versa. Warnings must be issued in all local languages (through both governmental and non-governmental agencies). Consultations indicated that appropriate local institutions must be assigned responsibilities for warning transmission in order to ensure the EWS is decentralized and efficient. Discussions with the Direction of Communication highlighted feasible existing channels of early warning transmission including SMS, social media outlets (Facebook), local radio, vocal messages by mobile phone and television announcements.

Limitations of current capacity and existing systems

Weaknesses and limitations of current EWS systems and their capacity include the following:

- Poor crisis management in the field by the National Agency of Civil Protection (ANPC) (as demonstrated during the 2012 flood in the towns of Malanville and Karimama on the Niger River Basin);
- A need to assimilate forecasts and monitoring into existing development planning, Poverty Reduction Strategy Papers (PRSPs) and disaster management systems;

- No formal communication mechanism and coordination with the Direction of Communication to officially disseminate alerts through multiple sources of media;
- Poor collaboration among the DNM, the DG-Eau, the disaster management agencies (PNRRC and ANPC) and the media;
- Poorly utilized ANPC local focal points which must be more heavily involved to effectively decentralize the EWS project;
- Poor coordination between hydrological and meteorological information providers (e.g., rain gauge information is not incorporated into the MIKE BASIN hydrological model used by DG-Eau);
- Lack of clear collaboration between the technical and governmental institutions, namely the DNM, the DG-Eau, the Laboratory of Applied Hydrology (LHA), and the Laboratory of Climatology (LACEEDE);
- Weather forecasting data is weak and not quantitative in terms of rain intensity and wind velocities per various regions of Benin;
- Lack of useful forecasts for the agricultural sector detailing drought and rainy periods to enable long-term development plans;

EWS components, existing and proposed

The existing EWS components and their insufficiencies (if any) include:

- 6 manual, synoptic weather stations, 16 manual, agro-climatological stations, 55 rainfall gauges, and multiple manual flow meters (See Annex VI for weather station locations.):
    - The quantity of monitoring equipment is not to norm with the WMO standards (1 synoptic station every 100 km, 1 rain gauge every 8 km). Automatic stations are needed to enable real-time data collection at a higher frequency in order to have sufficient information for reliable, short-term weather forecasts and long-term seasonal forecasts.
- Exploitation of regional and international satellites through the projects: MSG, Eumestat, Météosat. (Existing satellite coverage is viewed as sufficient.)
- 1 sounding to take atmospheric profile information (Number of launches per day is thought to be sufficient by DNM.)
- Multiple manual flow meter measurements
    - No automatic, real-time flow measurements prevent decision-making for alerts because collection time takes days to weeks. This hinders the ability to provide sudden warnings for threats such as floodplain inundation.
- Technical personnel including 6 engineers-meteorologists, 9 superior meteorology technicians, 20 observation technicians, 1 engineer-hydrologist and 1 superior hydrology technician
    - Training is essential for technical personnel involved in information production because many technicians will retire soon and skills need to be transferred and reinforced. Also, more trained forecasters are needed to generate forecasts for both short-term flood events and longer-term for agricultural and livestock planning.
- Weather bulletins and reports at daily, decadal and monthly scales and an annual hydrological atlas. The daily bulletin provides 72 hour forecasts.

- Decadal, monthly and annual manuals contain climate/weather/hydrology summaries of the past. Theses bulletins are unable to provide future weather predictions. The daily bulletin shows current morning and evening temperatures as well as daily rainfall accumulation.

Needs for the EWS components include:

The operational working group at the workshop unanimously agreed that a flood forecasting system that automatically models and predicts the impacts of natural disasters, using a formalized alert guide which provides risk maps and forecast probabilities must be developed. In Benin, there are currently 6 weather stations (synoptic) recording climate data at all times. However, the treatment of manual climate data is time-consuming, limiting its exploitation for decision making in the case of EWS and disaster risk management. By investing in automatic hydro-meterological infrastructure, this project can focus on reporting real-time local data to offshore forecast centers. Effectively, the quality and frequency of regional forecasts can be improved (e.g., 5 month, 72 hour, 6 hour forecasts).

Networks for hydro-meteorological data collection must therefore be extended. Consultations with the DNM have shown that 10 automatic agro-climatologic stations and 25 rain gauges should be procured in order to provide an effective representation of climate variables. In addition, 16 manual agro-climatologic stations should be rehabilitated.

This project will continue parallel discussions with all governmental and technical institutions as well as the donor agencies (UNDP, IRDC, EU, USAID) listed in Table 2 to identify specific areas of support required (thematically, geographically and financially). Further dialogues to ensure prioritization of needs amongst stakeholders and end-users of EWS will take place over the next month by the national consultants with the assistance of the UNDP CO. These meetings will involve prioritizing budget distributions and developing a formalized structure for climate-risk data collection and dissemination. Two outstanding tasks for consultations are 1) to deliberate with local NGOs to find the best way to engage the local populations in EWS design, implementation, and continual monitoring and evaluation and 2) to meet with private sector representatives to gauge their interest and potential willingness-to-pay for EWS products.

Conclusions from the workshop and consultations demonstrated that ministries are well aware that they must properly inform rural populations so that they can act in advance to evacuate, cultivate in advance and protect livestock. They understand that the project must be decentralized in order to get alerts to the regions more effectively. To accomplish this, the established vertical chain of government from a national level (Government, Ministry) to the local level (Municipality, Village) will be exploited and appropriate local institutions will be informed, consulted and included in warning transmission.

Furthermore, the project will build Early Warning services based on the needs of the principal end-users: the rural populations including farmers and producers. The coordinating unit for NGOs, CCDARE, was involved in the workshop and will be continuously consulted to ensure the final end-users are consulted. They will be represented in the EWS observatory and will be included in the focus group for project elaboration. CCDARE is integral in the upcoming meetings involving the national consultants and the locals; the meetings will include discussion on the local's present experience and needs with EWS.

Capacity of forecasts and needs for improvement

The DNM currently provides a 3 day weather forecast showing a general characterization of the expected morning and afternoon weather (e.g., partially sunny). No forecasts are provided per region and none provide quantifications of rainfall or wind intensity. Both aspects are necessary for local planning during periods of extreme weather.

The DNM therefore requires significant weather forecasting training. If a collaboration is formalized between this project and the ViGIRisC project, it is feasible that the DNM can partake in the weather forecast training organized at the regional level by ACMAD or at an international level by MeteoFrance.

Operation and maintenance gaps

DNM annually detail maintenance needs in terms of equipment needed or in need of repair. However, the DNM currently has a tight budget and is only able to perform operation and maintenance through the financial support of ASECNA and WMO. It expects that with this project after infrastructure has been procured or rehabilitated and its personnel have been trained, it can recover the costs of operation and maintenance by selling climate information products, in particular to the private sector.

In order to respond to end-user needs for short-term alerts and seasonal forecasts, DNM has proposed that investment must be foremost made in acquiring automatic weather stations and in training technical personnel. Investment must also be made in procuring manual agro-climatological stations to avoid any technological constraints in the event of automatic instrument failure and to have some control with the station function and weather data collection. Currently, it takes between one week to one month to collect data from manual weather stations (both synoptic and agro-climatological). Only approximately 30% of the country is covered by manual weather stations. Data servers and the development of a website displaying weather forecasts have been requested.

Preliminary costs from DNM for procuring/rehabilitating and maintaining/operating infrastructure are listed below:

Table 3: Preliminary costs from the National Directorate on Meteorology in Benin

No	Item	Quantity	Cost/Item (FCFA)	Subtotal (FCFA)	Subtotal (USD)
1	Automatic agro-climatologic station	10	10000000	100000000	$200'000
2	Rehabilitation of manual agro-climatologic statio	16	30000000	480000000	$960'000
3	Rain gauges	25	185000	4625000	$9'250
4	Annual operation manual weather station	16	2000000	32000000	$64'000
5	Annual operation automatic weather station	not yet known			
6	Cost of surveying manual weather station	16	180000	2880000	$5'760
7	Cost of surveying rain gauges	25	120000	3000000	$6'000
	Total				$1'245'000

In terms of existing capacity, DNM currently have 5 meteorological engineers and 2 advanced technicians. They also have three meteorological engineers in training at professional schools in China and Russia who will finish their training throughout the next 3 years. In 2013, a Master's student focusing on climate change issues, and 3 technicians receiving training through AGRHYMET Niamey (and specializing in agro-meteorology, computer and weather station maintenance) will join the DNM crew.

Due to the approaching retirement of DNM technical personnel and the need to reinforce the existing crew, DNM require 20 new positions including: 6 meteorological engineers and 7 advanced technicians specialized in meteorology from 2017, an electronic computer maintenance and weather station equipment engineer, a telecommunications engineer, 3 advanced maintenance technicians and 2 telecommunications technicians.

Information access and dissemination

There is a lack of data centralization due to various institutions acting as information producers. Consultations indicated that much of the existing environmental data is not archived securely and awareness of data located at different departments, institutions, NGOs and other stakeholders is limited. There is limited and often nonexistent data sharing horizontally and vertically within and between institutions. An open access portal to store data and secure data servers was therefore deemed necessary to ensure transparent databases for all EWS information production actors.

There are also limited means to transfer data efficiently between EWS agencies. Data from meteorological and hydrological stations or instruments are primarily collected on a daily basis, recorded on paper, and sent once a month by mail to regional offices and to the central data production office of DNM or DG-Eau in Cotonou. An open access portal is necessary for all EWS information producers to be able to efficiently provide rapid inter-departmental alerts and responses.

Databases are also limited in length, rarely quality-checked for inconsistencies and contain gaps due to the difficulties in collecting manual data, particularly during catastrophic events. Limited databases prevent the prediction of natural catastrophes based on past event behaviour. As indicated by consultation with the Laboratory of Applied Hydrology (LHA), at least 30-40 years of data are required whereas 10 years of data exist. Sparse datasets and data points prevent validation of hydro-meteorological modelling results.

Furthermore, there is a need to collaborate with countries in the region in terms of hydro-meteorological data sharing. The majority of West African countries depend on regional climatic zones which have the same weather patterns progressively. Regional forecasts track weather patterns on international-and regional scales such as with PRESAO forecasts (ACMAD). The hydrologic network is also linked between countries because of transboundary basins including the Mono, Volta, Niger and Ouémé watersheds (e.g., Togo, Burkina, Niger and Nigeria). Rain patterns upstream must be communicated to downstream Benin. However, models are lacking appropriate boundary and initial conditions because Benin has not been able to utilize trans-national data.

Conclusions from the workshop also indicated that information must be easily accessed so that institutions can make correlations of weather and hydrology data with other environmental variables. Often, interdisciplinary data analysis can have broader relevance and application for local intervention planning and monitoring in the case of hydro-meteorological disaster risk.

Locations for hydro-meteorological infrastructure

A table of the locations of the proposed rain gauges is provided in Annex VI. Locations of the proposed weather stations have not yet been determined. They will be constructed to complement the existing network shown in Annex VII. Further bilateral consultations between the national consultants and the key institutions are necessary to clarify the exact location of new equipment or equipment to be rehabilitated and the associated costs (with the exception of rain gauges).

Potential private sector clients

A key aspect of workshop and consultation discussions revolved around leveraging project funds so that the resulting EWS system is sustainable in the long-term. Regular revenues from the purchase of

EWS products by the private sector could help the project to develop cost-recovery mechanisms such as to cover the costs of operation and maintenance. However, it is essential to obtain more detail about the existing and potential of private sector interest in climate information. Consultations to see if any formalized partnerships with the private sector can be created are planned. At this point of the project, a list of potential private sector clients who may be willing to pay for climate products has been outlined. They include:

i. Agro-businesses (e.g., Fludor, the mineral water industry, the shea industry and the pineapple transformation industry) - Value-added climate risk information such as the location of specific seasonal rainfall/temperature forecasts, heavy winds, droughts, and floods can be of value to these private entities in adjusting their sowing/harvesting production behaviors.
ii. Hotel industry and tourism - The hotel and tourism industries are the two leading private sectors interested by climate information. Real-time rainfall, temperature and flood warning information are requested by hotel and tourism operators.
iii. Building (BTP) companies - For BTP companies, climate risk information can be of value in planning construction activities.
iv. Civil aviation - There has been discussion about opening domestic flights to a few new destinations (e.g., Parakou and Natitingou) in the northern part of Benin. Real-time weather information can potentially be useful for flight operation and planning.
v. Insurance companies - Further discussions will be engaged with insurance companies (e.g., Africain des Assurances, NSIA, FEDAS, GAB) to identify their interests in climatic risk and weather information. Potentially, risk hazard forecast maps can be purchased by insurance companies to enable them to set more accurate premiums and payout calculations.

Outcomes and outputs

The outcomes identified in the Project Identification Framework have remained virtually the same with some details added to Outcome 2 on the type of forecasts required. The general concept of most of the outputs has remained the same while the quantities of infrastructure/personnel to procure/rehabilitate/train have changed based on departmental-specific needs. Due to the lack of radar in Benin, the high costs to launch a sounding, and the sufficient capacity of the existing satellites, Outputs 1.3-1.5 from the original PIF have been deleted. Table 4 below details the revised Outcomes and Outputs.

Table 4: Revised Project Outcomes and Outputs

OUTCOMES	OUTPUTS
1. Enhanced capacity of national hydro-meteorological services (NHMS) and environmental institutions to monitor extreme weather and climate change	1.1 Procurement and installation or rehabilitation (in case of existing) of approximately 50 hydrological monitoring stations with telemetry and 5 automatic Doppler flow meters with archiving and data processing facilities.
	1.2 Procurement and installation of 10 automatic agro-climatologic stations, 25 rain gauges and rehabilitation of 16 manual agro-climatologic stations. All stations/gauges will be equipped with telemetry, archiving and data processing facilities.
	1.3 (DELETED) Rationale: Procurement of radar is considered too expensive and beyond the financial capacity of this project.
	1.4 (DELETED) Rationale: This output has been deleted because running

	costs to provide an additional daily sounding are too high; radiosonde equipment is expensive and a reliable source of gas (hydrogen, helium) is difficult to maintain. 1.5 (DELETED) Rationale: Benin exploits regional and international satellites through the projects: MSG, Eumestat, Météosat. Their existing satellite coverage is viewed as sufficient, so this output has been deleted. 1.6 Training of at least 20 engineers / technical officers to operate, maintain and repair equipment, computer infrastructure and telecommunications, including cost-effective technologies to interface with existing equipment/software.
2. Efficient and effective use of hydro-meteorological and environmental information for making early and seasonal warnings and long-term development plans	2.1 NHMS capacity to make and use climate forecasts (on hourly, daily and seasonal timescales) is strengthened by training at least 4 forecasters. 2.2 Tailored sector-specific early warning products that link climate, environmental and socio-economic information on short-term and seasonal timescales are developed, based on identified user needs from NGO and NC consultations. 2.3 National capacity for ANPC and PNRCC to assimilate forecasts and monitoring into existing development planning, PRSPs and disaster management systems is built, including coordination with systems and warnings developed by other initiatives. 2.4 Communication channels and procedures for issuing warnings (through both governmental and non-governmental agencies) are enabled through radio, newspapers, mobile phones, television and social media outlets with warnings disseminated in local languages. 2.5 Plans for sustainable financing for the operation and maintenance of the installed EWS are developed and implemented, including public and private financing options to assist cost-recovery mechanisms.

Implications for the project budget and co-financing

Current budget allocation

At this stage of the project, it seems that the budget allocation is appropriate because two-thirds of the 4 Million USD will be allotted to the procurement or rehabilitation of environmental monitoring infrastructure and relevant training. Along these lines, the investments seen as most critical include the procurement and installation of automatic stations and the training of technical personnel from the DNM and DG-Eau.

From the limited budget information the consultants have obtained from consultations, only the DNM has supplied an idea of operation and maintenance costs. It will be necessary to obtain more cost information from DG-Eau on required infrastructure and training, ANPC on their capacity building costs, the Direction of Communication on their needs for standardizing and formalizing an information dissemination chain and the local NGOs on their needs for engaging the local populations in EWS design, implementation and monitoring and evaluation.

Capacity assessment

The second mission will be used to conduct a capacity assessment of all EWS actors. The assessment will be used to score the ministries/departments ability to budget and plan for the human and technical costs of operationally maintaining current and additional observation networks and systems.

Identified risks

The understanding of climate change, its manifestation and its impacts and adaptation / mitigation strategies is still limited to a few experts and decision-makers. At an institutional level the lack of awareness among policy-makers and development practitioners about the risks associated to climate change and extreme events, and how these relate to development priorities is a barrier to the necessary mainstreaming of adaptation in planning. Within decentralized branches of national institutions on local and regional levels, their financial and operational capacity to promote and reinforce adaptation principles is also relatively limited.

There is also a poor availability and use of information on hydrometeorology risks on a local level to facilitate actions in support of adaptation. A sufficient understanding of climate change, climate extreme events, adaptation / mitigation is lacking on a local level which prevents reactive responses. As a result, there is a need early on in the project to facilitate community-based decisions makers to make realistic plans in response to climate change and extreme events. Traditional means of coping with climate extreme events, climate stress and shock are often no longer appropriate (e.g., pastoralist lifestyles). This project will therefore not succeed unless the local populations are able to make use of weather forecasts for adaptation purposes such as rainwater harvesting, the development of short cycle crops and sustainable management of water resources.

Furthermore, information production, diffusion and use between the local level (agro-ecological zones) and the national level (decision making, policy development) are poor. As a result, there are no feedback mechanisms to engage the ideas and needs of local populations in the development of EWS. Also, the local private sectors are not engaged to create tailored climate products which can promote the sustainability of climate monitoring and reporting and the scaling up of EWS. Furthermore, appropriate information such as region-specific seasonal forecasts is lacking and prevents advanced planning of farming practices and the ability to elaborate localized risk warnings. To reduce the risk of poor information dissemination, the decentralized offices of the municipalities will act as climatic risk information providers or diffusers. The project will also target its actions in selected vulnerable municipalities and assign focal points for EWS. NGOs will be used to engage the local population in project development.

Local level risk management is limited by the availability of reliable local meteorological data to use as ground truth for high resolution predictive models. In the case of weather and crop related risk management, more reliable seasonal and short-term early warning information is required by farmers to assess risk and preventive planning. The network of hydro-meteorological infrastructure must be expanded throughout Benin and in particular the vulnerable regions

indicated in Section 2.1.3 specified by Benin's NAPA. According to the DNM, to keep the risk as low as possible, it is important that farmers are located near weather stations—no farther than 20 kilometers, depending on terrain in the area. However, current weather forecasts are based on 6 synoptic weather stations located throughout the country and there can be more than 400 km without any hydro-meteorological measurement. In response to this barrier, the project will prioritize the establishment of local hydro-meteorological services in the four vulnerable zones indicated in the workshop.

Annex II – Inception Workshop Agenda

Inception workshop for EWS project, PPG phase
18th September 2012, Palais du Congres, Cotonou, Benin.

Time	Agenda item	
09H 00-09H 15	Enregistrement	
09H 15- 09H 40	Allocutions d'ouverture	- PNUD - Ministère de l'environnement
09H 40 – 09H 45	Cocktail et retrait des officiels et photo de groupe	
09H 45 – 10H 00	Mise en place du présidium et présentation des objectifs et agenda de l'atelier	
Session 1	**Le contexte du projet et activités préparatoires**	
10H 00- 10H 15	Présentation sur l'état actuel de l'infrastructure d'observation, la prévision des inondations et des sécheresses et SAP	Martin KASSIN de la DNM
10H 15 – 10H 30	Présentation sur l'état actuel des ressources en eau, surveillance hydrologique et prévision des crues	Dr- Ing Arnaud ZANNOU de la DGE
10H 30 – 10H 45	Présentation sur les services de vulgarisation et les réponses aux aléas climatiques	M. Comlan HOUNGNIBO
10H 45 – 11H 00	Présentation sur la gestion des catastrophes et les réponses, insérer si possible les initiatives régionales, etc.	M. AKAMBI de la DICAF
11H 00 – 12H 00	Discussion	
12H 00 – 12H 15	Présentation d'autres initiatives pertinentes pour le projet	Consultant national : - Dr Henri S. TOTIN VODOUNON - Mme Jeanne J. ACACHA AKOHA
12H 15 -12H 30	Introduction au SAP dans le contexte africain, les lacunes, les besoins et les grandes lignes des objectifs et résultats du projet	Consultant international : Dr Cara TOBIN
12H 30 – 13H 00	Discussion	Tous les participants
13H 00 – 14H 00	Déjeuner	
Session 2	**Examen de la conception du projet et la planification des activités clés**	
14H 00 – 15H 00	Les composantes du projet, l'échéancier – description des approches et discussion	Consultant international : Dr Cara TOBIN et participants
15H00 – 16H 30	Travaux de groupe: spécialistes en hydrologie- météorologie ; spécialistes en SAP, prévision et gestion des catastrophes / Att : Préciser les thèmes par groupe et donner les orientations de travail (revue des composantes, développement des activités clés pour atteindre les résultats, détermination de la démarche opérationnelle)	UNDP Consultants (IC, NC)
	(Analyse des projets SAP existants, définition des intervenants et partenaires de mise en œuvre, définition des responsabilités)	

16H 30- 17H 30	Présentation et discussion sur les travaux de groupe	
17H 30- 17H 45	Pause café /thé	
Session 3	**Synthèse et perspectives**	
17H45 – 18H 00	Synthèse et perspectives	
18H 00- 18H 15	Clôture	

Annex III: List of participants at the Inception workshop for EWS project, PPG phase 18th September 2012, Palais du Congres, Cotonou, Benin

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Annex IV: Workshop Minutes

ATELIER DE LANCEMENT DE LA FORMULATION DU PROJET SYSTEME D'ALERTE PRECOCE (SAP)

Sur invitation du Ministre de l'Environnement, de l'Habitat et de l'Urbanisme avec l'appui technique du PNUD, les experts issus des institutions impliquées dans la gestion du système d'alerte précoce, ainsi que la consultante internationale et les deux consultants nationaux se sont réunis en atelier au palais des Congrès de Cotonou, le 18 septembre 2012, pour lancer la formulation du projet « Système d'Alerte Précoce (SAP) : Promouvoir la résilience aux extrêmes climatiques et le changement à l'adaptation au changement climatique ».

Ce projet a pour but de : Renforcer la capacité des unités pour le suivi du changement de climat, fournir des informations hydrométéorologiques fiables (incluant les prévisions) et combiner ces données avec celles existantes pour améliorer les décisions concernant les alertes précoces et les réponses d'adaptation ainsi que la gestion des zones de risques.

L'objectif général du projet de « Renforcer les capacités de surveillance climatique, les systèmes de prévision et les informations disponibles pour répondre aux chocs climatiques et planifier l'adaptation au changement climatique au Bénin.

Description des participants

L'atelier a connu la participation de 26 experts venus des structures internes du MEHU (DGE, DPP, PEGEMU,…) du Ministère en charge de l'eau (DG/Eau…) du Ministère de l'agriculture (ONASA) du Ministère des transport (DNM,…) du Ministère de l'Enseignement Supérieur (UAC, Université de Parakou, Laboratoire de l'Hydrologie, CBRST…), des ONG, du PNUD et des experts indépendants, etc

La liste de présence des participants est jointe en annexe.

L'objectif de cet atelier est de faire l'état des lieux et de procéder à l'analyse diagnostique de la situation pour la formulation dudit projet.

L'atelier s'est déroulé en quatre sessions qui se présentent comme suit :

- La cérémonied'ouverture ;
- Le contexte du projet et les activités préparatoires ;
- L'Examen de la conception du projet et la planification des activités clés
- Synthèseet perspectives.

I - Ouverture

Deux discours ont marqué l'ouverture de l'atelier. Il s'agit de celui de Madame le Représentant Résident du PNUD et celui du Ministre de l'Environnement, de l'Habitat et de l'Urbanisme.

Dans son discours, Madame le Représentant Résident du PNUD, a souhaité la bienvenue à tous les participants. Elle s'est particulièrement réjouie de la présence du Ministre de l'Environnement, de l'Habitat et de l'Urbanisme, malgré son agenda très chargé. Il a ensuite situé le contexte de l'atelier en rappelant la genèse des systèmes d'alerte précoce (SAP) en Afrique. Enfin, il a invité les participants à examiner de manière les produits existants ainsi que ceux escomptés afin de permettre aux consultants de continuer l'élaboration du document de projet.

Dans son allocution d'ouverture, le Ministre de l'Environnement, de l'Habitat et de l'Urbanisme a mis l'accent sur les changements climatiques contemporains qui sont devenus une préoccupation pour le Bénin comme pour la communauté internationale. L'ensemble du territoire national est assujetti à des risques écologiques importants tels que les inondations, la sécheresse, la désertification, la déforestation, l'élévation du niveau de la mer, la dégradation des zones côtières et l'érosion a t-il poursuit.

Il a ensuite précisé le caractère intégré du projet qui prend en compte tous les secteurs à savoir, l'environnement, la sécurité alimentaire, la météorologie, l'urbanisme, la santé et qui a pour objectifs :

- D'assurer la disponibilité suffisante du personnel qualifié pour le pilotage et le suivi du SAP ;
- De gérer les bases de données connectées et les systèmes d'information ;
- D'intégrer la météorologie et les systèmes hydrologiques, les données radars et satellitaires ;
- De développer l'infrastructure requise et la communication, y compris la bande passante.

II - Contexte du projet et les activités préparatoires

Cette partie a été marquée par différentes communication qui ont porté sur :

1 - Etat actuel de l'infrastructure d'observation, prévision des inondations et des sécheresses et SAP.

2 - Présentation sur l'état actuel des ressources en eau, surveillance hydrologique et prévision des crues

3 - Présentation sur les services de vulgarisation et les réponses aux aléas climatiques

4 - Présentation sur la gestion des catastrophes et les réponses, insérer si possible les initiatives régionales etc

5 – Quelques initiatives pertinentes pour le projet Système d'Alerte Précoce (SAP) : Promouvoir la Résilience aux extrêmes climatiques et l'adaptation aux changements climatiques : Projet ViGIRisC et Programme AMESD/MESA

6 - Introduction au SAP dans le contexte africain, les lacunes, les besoins et les grandes lignes des objectifs et résultats du projet

A l'issue de ces présentation des échanges ont permis aux participants d'avoir une meilleure compréhension de l'existant et des contraintes/faiblesses du système actuel.

III - Examen de la conception du projet et la planification des activités clés

Composantes du projet, l'échéancier – description des approches présentée par la consultante internationale a permis de mettre l'accent sur les résultats de cet atelier qui sont :

- Développer les activités clés pour obtenir des résultats,
- Déterminer les étapesimportantes,
- Identifier les partenaires et les utilisateurs.

Les travaux se sont poursuivis en groupe et ont permis de définir les points suivants :

1 – Plan institutionnel

Composante du Projet	**Résultatsescomptés**	**Produitsexistants**	**Produitsescomptés**	**Montant indicatif du financement par produit escompté (USD)**	**Leçons apprises**
Transfert des technologies pour l'infrastructure de surveillance environnementale et climatique.	1. Capacités renforcées des institutions hydrométéorologiques nationales (IHMN) et environnementales pour surveiller les phénomènes météorologiques extrêmes et le changement climatique.	- 6 Stations synoptiques (standard) - 21 stations agroclimatologiques (seuls les pluviomètres sont fonctionnels) - 45 postes pluviométriques - 6 ingénieurs (3 en retraite d'ici 2014) - 9 techniciens supérieurs - 20 techniciens - observateurs - 55 stations hydrologiques - 55 lecteurs d'échelles - 11 structures déconcentrées - 1 ingénieur hydrologue - 1 Technicien supérieur - 1 Technicien	Renforcement des stations météorologiques Renforcement des capacités des ressources humaines en météorologie (Formation, perfectionnement) Radar - satellite Moyens de communications Equipement des 4 zones agro-écologiques les plus vulnérables (Zone I : zone soudano-sahélienne de l'extrême Nord Bénin (6000km²), Zone IV : zone soudano sahélienne du Nord-Ouest 31200km², Zone V : zone soudano guinéenne de transition du Centre Bénin 16900km², Zone VIII : zone sableuse, littorale et fluvio lacustre 3600 km²) Recrutement des ingénieurs, techniciens supérieurs et de techniciens en hydrologie Installation d'une vingtaine de stations hydrologiques sur l'ensemble du territoire national Renforcement des réseaux par des stations de mesure de qualité et de turbidité de l'eau,		Nécessité d'évaluer les moyens de pérenniser les acquis

Informations climatiques intégrées dans les plans de développement et les systèmes de prévision	. Utilisation efficiente et efficace des nformations hydrométéorologiques et nvironnementales pour faire des prévisions t élaborer des plans de développement à ong terme.	Diffusion des bulletins météorologiques Bulletin agrométéorologique décadaire Bulletin météo média Rapport pluviométrique Bulletin climatologique mensuel Annales hydrologiques	Annuaire hydrologique Prévision des dates de début et de fin de saison Prévision des séquences sèches à l'intérieur des saisons Prévision des risques, des impacts, de la vulnérabilité, des catastrophes Mise en application de la plate-forme de gestion des risques et catastrophes Atlas des risques et catastrophes naturelles		
Total partiel					
Coût de gestion du projet					
Coût total du projet					

2 - Définition des acteurs

Composane du Projet	**Résultatsescomptés**	**Définition des acteurs institutionnels et parties prenantes**	**Rôles des acteurs institutionnels et des parties prenantes/ Arrangement institutionnel**	**Leçons apprises**
Transfert des technologies pour l'infrastructure de surveillance environnementale et climatique.	1. Capacités renforcées des institutions hydrométéorologiques nationales (IHMN) et environnementales pour surveiller les phénomènes météorologiques extrêmes et le changement climatique.	<u>Acteurs institutionnels</u> DNM, DG-Eau, ONASA, DGE/MEHU,CRHOB, ABE, INRAB, CeRPA, CecPA, Direction des pêche, DGDU /MEHU, ANCB(commune), ANPC, DNSP, CSE/ZS CENATEL, DAT, PENOPA, UCP, CBRST, UAC, Université de Parakou, DICAF, DPLC/MEHU Direction de l'agriculture, Direction de l'élevage, INSAE, DPP/MAEP <u>Parties prenantes</u> ONGs(IDID, PNE, CREDEL), secteurs privés,	<u>Acquisition des données</u> DNM, DG-Eau, DGE, ONASA, DGDU, CeRPA/CecPA, CRHOB, DNSP, CENATEL, Direction des pêches, Direction de l'agriculture, Direction de l'élevage, <u>Production de l'information</u> DNM, DGE, ONASA DG-Eau INRAB CRHOB DNSP CENATEL D/pêche, D/agriculture, D/élevage, INSAE <u>Diffusion de l'information</u> DNM, ONG, DG-Eau, Doter le secrétariat de la plateforme d'un observatoire, Désignation d'un point focal dans toutes les structures, <u>Formation des producteurs</u>	-Manque de synergie Manque de coordination Manque de suivi-évaluation pérennisation des projets Inexistence, vétusté et non entretien des équipements
Informations climatiques intégrées dans les plans de développement et les systèmes de prévision	2. Utilisation efficiente et efficace des informations hydrométéorologiques et environnementales pour faire des prévisions et élaborer des plans de développement à long terme.	MDAEP, DGE, DAT, Commune,		
Total partiel				
Coût de gestion du projet				
Coût total du projet				

9. Brief Summary of the Second Mission

The mission was undertaken to support the UNDP Country Office to engage with climate information and Early Warning System stakeholders to finalize design aspects of the UNDP-GEF/LDCF financed project. The primary tasks of this mission were 1) to request and validate Early Warning System (EWS) costs provided by the agencies in Benin 2) to perform a capacity assessment of each EWS agency and 3) to formalize the selection criteria for the Implementing Partner. All three tasks were facilitated by holding two meetings with Stakeholders, one involving information producers and the second with information dissemination agencies. The consultants also conducted individual meetings with key EWS agencies to obtain missing information and key reports. This mission was also used to target sources of co-financing to ensure the project can leverage and mutually support (and be supported by) other projects.

i) Two discussion meetings on the use of climate information and Early Warning Systems (CI-EWS) were held on the 17th and 18th of January 2013 at the Ministry on the Environment in Cotonou, Benin, in order to contribute towards the final design phase of the EWS project. The first meeting on the 17th brought together the producers of hydro-meteorological information. Nine different agencies were represented including the General Directorate on the Environment (DGE), the National Agency for Civil Protection (ANPC), the National Meteorological Service (DNM), the Benin Oceanographic and Fishing Research Center (CRHOB), representatives from the first National Adaptation Programme of Action project (NAPA1) project team, the Emergency Urban Environment Program (PUGEMU) project, a National Office for Food Security (ONASA) EWS programme representative, UNDP and the UNFCCC focal point. The second meeting on the 18th involved those in charge of disseminating alerts and parties concerned with the management of catastrophes and natural disasters. Eight information dissemination agencies were represented including the NGOs Care International and IDID, the Ministry of Health, DGE, DGDU, the NAPA1 project representative, UNDP and the UNFCCC focal point. The meetings were used to present the detailed scope of the project, which has been formulated during 4 months of individual consultations with relevant agencies following the inception workshop in September. The capacity of all agencies involved in CI-EWS information production and dissemination was also assessed during the meetings with participants answering one of two questionnaires, a questionnaire for i) climate, hydro-meteorological information producers and ii) information and alert dissemination agencies, particularly the NGOs and civil society organizations (CSOs) at the ground level. The goal of the questionnaires was to identify the capacity of their respective agency with respect to CI-EWS tasks and to prioritize their needs. The meetings were also used for informal discussions on who is preferred to be the lead implementation agency for the project and which agencies would be capable and efficient in generating and disseminating alerts. Criteria for choosing the implementing partner have been formulated based on the discussion meetings and individual consultations.

I. The information production meeting included the National Directorate on Meteorology (DNM), the National Agency on Civil Protection (ANPC) as well as the NGO, IDID, which had been active in implementing a small EWS project under financing from the CC Dare project. Representatives from two key on-going projects having smaller EWS initiatives for flood prevention, PUGEMU and the first NAPA project financed by the LDCF, were also quite active in the discussion to ensure that this project will have synergy with the existing projects and not duplicate any current or planned efforts.

II. Bilateral consultations also took place with key CI-EWS agencies, including the National Directorate on Meteorology (DNM), the Meteorological Forecast Center (ASECNA), the General Directorate on Water (DG-Eau) and the primary disaster risk management agency, ANPC. These consultations were used to validate and prioritize the financial needs of these agencies for developing and facilitating EWS capacity and efficiency and ensuring the cost-effectiveness of their budget items. Meetings were also conducted with the head UNDP disaster management risk specialist, Professor Constant Houndenou, the UNDP focal point, IsidoreAgbokou, a climatologist, Professor Aho, from the University of Benin and the UNFCCC focal point, IbilaDjibril in order to ensure that all EWS design steps have been considered and that the criteria to select the responsible EWS

agencies have solid rationale. Finally, the multilateral donor (the European Union) was consulted to see if the LDCF financed project coordinates and complements their ongoing and planned initiatives.

Key findings

The meetings were effective in providing a discussion forum to formalize the roles of CI-EWS agencies in the information dissemination chain. Agreement was reached to use the National Directorate on Meteorology (DNM), partnered with ASENCA and the General Directorate on Water (DG-Eau) to generate alerts. Alerts will be based on data from DNM/ASECNA and DG-Eau in addition to data provided by the Benin Oceanographic and Fishing Research Center (CRHOB). Alerts will be distributed to the National Agency on Civil Protection, ANPC, before dissemination. ANPC will be responsible for alert dissemination, alert training to NGOs and will provide alert information to relevant NGOs including Caritas, Care International, Plan Benin, CRS, IDID, the Red Cross and Oxfam. For a schematic of the proposed information chain with a feedback mechanism for end-users to ANPC and DNM via toll-free numbers to be developed with LDCF financing, see Annex III.

1. Other findings in terms of project development as highlighted in the workshops include:
   - Must improve synergy and exchanges with the NAPA LDCF and PUGEMU projects as well as with NGOs (e.g., IDID and the CC Learn program)
   - Need to include CRHOB, PNRRC and GTZE in institutional arrangement and distinguish between central, intermediary and local levels
   - Need to provide CRHOB with equipment training
   - Need to include strong winds as risk
   - Must integrate EWS into PDCs (Communal Development Plans) and sectoral strategies
   - Must integrate the communes in the EWS/CI dissemination protocol
   - Must take into account that DG-Eau needs to build watershed modeling capacity outside of the Ouémé and Mono watersheds
   - Must try to integrate monitoring and evaluation as an output or activity
   - Need to have a mechanism to include the private sector, such as the National Fund on the Environment
   - Must take into account the existing equipment and their locations in other neighboring countries and consider communication strategies with neighboring countries

2. Findings from individual consultations with information producers include the following:

There is a need for a national EWS to generate alerts for the entire populations. The initial idea for EWS in Benin was to develop warnings for floods. Currently, there are localized EWS activities (see GIZ project discussion) to elaborate contingency plans for specific risks in target areas (primarily floods) based on the National Contingency Plan (NCP). However, the NCP requires more timely and accurate information generated by DNM/ASECNA which can be adapted to vulnerable regions throughout the country for a multitude of risks (e.g., floods, droughts, strong winds, coastal storm surges). A strategy must be developed to ensure the continuity of technical forecasting services by transferring knowledge from ASECNA to DNM. DNM is presently limited with 3 personnel and does not have enough applied meteorology competency. DNM can presently forecast up to 24 hours in advance, but the forecasts are based on PRESAO regional forecasts which are not downscaled to suit the different climate zones in Benin.

DNM proposes to rehabilitate existing stations and have a mix of manual and automatic climatological and synoptic stations. They will provide the NC with a clarified cost estimate indicating how many manual and automatic synoptic and climatological stations they require. DNM does not feel that they can be completely reliant on automatic stations yet because of the difficulty in training personnel. Maps of existing and proposed stations are depicted in Annexes VI and VII.

In order for ASECNA to support DNM, they require 3 to 6 months training for 10 forecasters in Nairobi or France. Also, they need 3 to 6 months training on better analyzing satellite images. According to consultation with

ASECNA, DNM/ASECNA must develop EWS in accordance to the Global Framework for Climate Services (GFCS) and must adhere the EWS/CI to SMOC (SystèmeMondiald'Observation du Climat) (Global Climate Observing System, GCOS).

In terms of hydrological modeling and forecasting, DG-Eau needs to develop watershed models for all 4 of Benin's watersheds (Niger, Volta, Mono, Ouémé). The models should be combined or integrated in the end to provide an operational flood forecasting model which can be used to trigger alerts.The LDCF project must consider synergy with the PPEA2 project where they are constructing reservoirs and dams in Ouémé watershed to regulate flows based on flood/drought risks. DG-Eau recommends to integrate water management with the other information producers. Currently, both DNM and DG-Eau generate and share data (meteorological, climate and hydrological data). DG-Eau does not have a great internal method for monitoring and evaluation presently. They believe that the private sector could be implicated to assist with hydrological equipment upkeep. DG-Eau suggests to sign contracts with private manufacturers to ensure hydrological equipment maintenance.

3. Findings from individual consultations with information distributors include the following:

The first steps for ensuring good communication with the local population are to have a good public awareness campaign and ensure efficient communication channels. Local knowledge on risks must be integrated into the prevention plans. Sirens could be used to alert the population.

Consultation with the National Agency on Civil Protection (ANPC) indicated that they have focal points in each commune for effective alert communication. However, the focal points do not have the technical means to communicate alerts in real-time (e.g., CB radios). ANPC indicated that they need working sessions with prefects to elaborate tests identifying risk zones. They are in the process of creating a cartography of risk zones and thus far, they have identified 21 communes at risk. ANPC needs to judge the current state of communes at risk and run EWS simulations to know if an alert system is functional. Also, ANPC would like monthly meetings with DNM/ASECNA/DG-Eau to get advice on how to elaborate pro-active planning when communes are faced with catastrophes. ANPC already collaborates with NGOs on elaborating contingency plans and works with national TV channels, however, they need to develop partnerships with local radio and TV which is costly. ANPC wants to have a toll-free number and work with the Direction of Communication. They can translate alerts in national languages and can inform them on site. Based on the consultation, they have indicated that they do not have M&E mechanisms and require a better collaboration with ASECNA.

4. During the meetings, a capacity assessment questionnaire was used to ask a representative from each organization the following questions. The primary goals of the assessment were to detect potential weaknesses within each CI-EWS organization and to find any overall consensus as to which capacity building issues are most pressing for the group as a whole. Two separate questionnaires were provided to i) information dissemination agencies and ii) information production agencies.

Information dissemination agencies

1.1 To what extent is your agency capable of disseminating alerts?
1.2 To what extent are you able to understand the hydro-meteorological alerts currently, in order to be able to simplify them for local populations?
1.3 What is your level of technical resources to disseminate alerts (e.g., privileged Flotte telephone communication systems)? If capacity is lacking, please specify enumerated, prioritized needs (1 being most needed) in the Comments column.
1.4 What is your level of human resource capacity? If capacity is lacking, please specify enumerated, prioritized needs (1 being most needed) in the Comments column.
1.5 To what extent are you capable of providing alerts in local languages?
1.6 To what extent are you able to provide messages through different sources of media? Please note in Comments which media works best for rural populations where you have experience (e.g., radio, sms) with 1 being the media source that is most effective?
1.7 What is your technical capacity to inform local population organizations of Early Warning System (EWS) to make them more involved in this project? If capacity is lacking, please specify

enumerated, prioritized needs to perform training (1 being most needed) in the Comments column.
1.8 Excluding your own organization, what is your level of capacity to coordinate with either the local CONASUR focal points, the Rural Confederation of Benin or the Civil Society Organization on Climate Change (COS3C)? Please indicate in Comments if collaboration would be useful and why.
1.10 What is your existing capacity to hold joint training workshops for your decentralized offices with other environmental-related organizations? (This question is asked to try to streamline alert dissemination to local regions.)
1.11 Based on your experience, to what extent are local populations currently provided alerts? Please note in comments what alerts are provided, when have alerts been provided or lacking, and who has provided the alerts.
1.12 Based on your experience, to what extent are local populations aware of climate change?
1.13 To what extent are local populations aware of ADAPTATION to climate change and how a weather warning can help them become more resilient to the impacts of climate change?

Information production agencies

2.1 To what extent do you have necessary human resource capacity for an Early Warning System (EWS)(e.g., weather forecasters)? If capacity is lacking, please specify enumerated, prioritized needs (1 being most needed) in the Comments column.
2.2 To what extent do you know the costs of operation and maintenance for existing equipment?
2.3 To what extent are you familiar with cost-recovery mechanisms to pay for the costs of operation and maintenance? In Comments column, provide examples of current cost recovery mechanisms you utilize.
2.4 To what extent are you willing to sell your climate products to the private sector for revenue to support operation and maintenance costs given that the products must be tailored to private sector needs?
2.5 To what extent are you familiar with the roles of other information producers?
2.6 To what extent do you share data with other climate information producers? In Comments column, please indicate who you collaborate with and with whom you are lacking collaboration.
2.7 To what extent do you think it is necessary to collaborate with other climate information producers?
2.8 To what extent do you currently collaborate with the private sector? In Comments column, provide examples of how you work with the private sector.
2.9 What is your level of capacity for managing donor funds? If you have existing capacity, in Comments column, provide examples of how you work with donor funds currently.

5. Findings from the capacity assessment will be presented as an Annex to the PPG final report after all organizations have responded to the questionnaires and the information has been analyzed.

6. Selection criteria for the roles of agencies in the Implementation Arrangement
   Based on bilateral meetings with the head UNDP disaster management risk specialist, Professor Constant Houndenou, the UNDP focal point, IsidoreAgbokou, a climatologist, Professor Aho, from the University of Benin and the UNFCCC focal point, IbilaDjibril, it was decided to use the following criteria to choose the Implementing Partner (IP):

   - Structure of the EWS information producer;
   - Nature of information in relation to vulnerability to Climate Change;
   - Level of the budget reserved for prevention;

- Capacity for risk detection, measurement and assessment;
- Ability to mobilize resources (financial, human resource, technical, etc.) for early warnings;
- Existence of human resources (technical and operational);
- Technical capacity to manage the risks and early warning;
- Readiness, high transmission communication capacity;
- Partnership with the Global Framework for Climate Services;
- Signing authority

Overall, it was noted that the IP should be open to people (sensitive to beneficiaries and their needs), neutral, and have a federal framework and solid technical capacities.

7. Necessary components for a preventive EWS

A report by the Government of Benin, the World Bank and the United Nations System entitled Inundations in Benin, Evaluation Report on Post-Catastrophic Needs (a Post-Disaster Needs Assessment), April 2011 was written to address post catastrophe needs after the devastating flood event in 2010. Although the report was primarily post-event focused, the technical team of experts recommended preventive measures in an Annex with a list of steps to establish a flood Early Warning System in Benin. Innovative and progressive suggestions which have been integrated into LDCF2 project activities include:

- Organize and codify the information exchange between the main actors involved in the processing and usage of data;
- Conscientiously develop alerts to gain credibility and especially avoid unjustified panic reactions;
- Reinforce ANPC's human, material and financial capacity;
- Promote a changed behavior and people's participation in reducing their vulnerability because infrastructure solutions are very expensive and will be operational only medium term;
- Assess the appropriateness and the relevance of a system of insurance against floods in the context of Benin

8. Projects which this project must build a synergy

The NAPA initiative funded through the GEF-LDCF (LDCF1), Integrated Adaptation Programme to Combat the Effects of Climate Change on Agricultural Production and Food Security in Benin" ($3.18 LDCF; 2010-2014) highly complements the current project. The LDCF1 project will strengthen the capacity of agricultural production in selected communities to adapt to extreme events and climate change in four vulnerable agro-ecological zones in Benin. It involves developing agricultural strategies, improving the delivery and relevance of agro-meteorological information for project pilot areas and strengthening the capacity of DICAF on adaptation measures in the agricultural and food security context. Relative to this project, 9 rain gauges (1 in each pilot village) are being installed throughout the 4 pilot zones to improve agro-meteorological monitoring (originally, the installation of agro-meteorological stations was planned but the project is waiting for continued financing). Also, the project includes the development of risk maps and calendars of seasonal climate trends to tell farmers what to plant and when. Most significantly, commune technical committees known as Zonal Agro-meteorological Technical Groups (GTZA) have been created in each of the 4 zones to i) transfer data from the commune level to the national level, ii) receive information from the national level to help with commune level decision-making, and iii) aide in zone-specific information dissemination (i.e., via community radio) (See Figure 1). The LDCF2 project will use the GTZA groups to help with EWS/CI information dissemination and to facilitate the local feedback mechanism in the communication chain. The LDCF2 project will also place additional weather stations in complementary locations to the rain gauges installed under the LDCF1 initiative in order to establish national monitoring coverage. Finally, EWS/CI will be tailored using the lessons learned from DICAF on how to best develop localized, crop-specific forecasts adapted to agricultural needs.

Following the floods of 2010, the World Bank is funding the Emergency Urban Environment Program (Projetd'Urgence de GestionEnvironnementale en Milieu Urbain, PUGEMU) project implemented by the Directorate of Urbanism of MEHU in the Ouémé River basin. The project, to be implemented over the 2011-2015 period, invests over $5m to increase Benin's level of preparedness to flooding events in five cities including Cotonou. This financing covers i) the rehabilitation and improvement of three drainage networks and wastewater treatment works in Cotonou, ii) the management of drainage-blocking solid waste in all cities, and iii) the implementation of an EWS for floods in the Ouémé watershed. Components of the PUGEMU EWS focus on reinforcing the capacity of DG-Eau in terms of hydrological modeling, integrating satellite data and developing forecast models and a GIS (Geographic Information System).21 Capacity building delivered through the PUGEMU project will enable DG-Eau to run various flood scenarios, have a Digital Terrain Model (DTM) to account for the complexities of the Benin terrain and to effectively map flood risk zones. There is also a small capacity building component for ANPC in terms of being able to interpret risk maps and elaborate management plans.

A flood-specific EWS is also being developed in the GIZ funded project, Implementation of a Flood EWS for the Mono River, $XXm (2012-xxxx). The project concept was developed by DG-Eau after the 2010 major flood event in order to conduct a feasibility study to establish an EWS for floods in the Mono watershed. The project involves conducting an inventory of data, defining risks, and elaborating flood forecasting tools. Its primary goal is to develop a rainfall-runoff forecasting model (with 3 to 5 day forecasts) to aid in the management of dam releases and the regulation of reservoir levels to mitigate flood impacts upstream and downstream of the Nangbeto dam. Through this project, real-time monitoring equipment (GSM data transmission) will be acquired and placed on 5 existing rain gauges near the dam. Also, a water level (limnimetric scale) will be acquired to place on an existing hydrological station and computer/software will be purchased to generate flood risk maps. Training for DG-Eau and the Power Community of Benin (CEB) on flood forecasting and equipment maintenance is included. Capacity will be built for ANPC at the communal levels in the Mono region.

9. Need to take lessons learned from previous EWS project by the NGO, IDID

The GFDRR project providing "Lessons from an Agro-meteorological Early Warning System using Local Climate and Cultivation Knowledge" (financing $XX), 2007-2010, was a project managed by the NGO, Initiatives for Integrated Sustainable Development (IDID). The goal of the project was to establish an EWS providing targeted agro-meteorological information for six departments (35 communes). The project focused on using end-user feedback to define useful forecasts which enabled the agricultural population to adapt to new climate conditions. Bulletins were created monthly using data from 20 ASECNA climate stations, forecast information from DNM and ACMAD and regional forecasts from WMO. Two groups were formed to generate and disseminate weather/climate information, i) a National Committee on Early Warning and Agro-meteorology interpretation (CNAP) formed to generate information included technical representatives from DNM/ASECNA, MAEP (DICAF), ANPC, national and rural radio, universities and NGOs and ii) a Communal Committee on Early Warning and Agro-meteorology interpretation (CCPA) which was given the role to understand and disseminate the information to local populations. Lessons learned from this project include that more localized and crop-specific forecasts are required for agricultural needs. Also, a major issue hindering communication channels was that local radios stations required payment and were only 30% effective in distributing information. The LDCF2 project will integrate the lessons learned from this project such as when and how often to distribute alerts and weather bulletins to local populations. Compared with this localized EWS initiative, the LDCF2 project builds NHMS capacity to improve forecasts for multi-risk extreme weather.

10. Project zones

The project will build Early Warning services throughout the country based on the needs of the principal end-users, including rural populations, farmers and producers of agricultural products. Targeted areas, which have suffered significant flood damage in the past, have been additionally identified in the second workshop. These areas can be used to provide project indicators by comparing the effectiveness of the improved alerts proposed

[21] http://web.worldbank.org/external/projects/main?Projectid=P113145&theSitePK=40941&piPK=73230&pagePK=64283627&menuPK=228424

by this project over present day alerts. Agencies familiar with the local regions including the NGOs/CSOs suggested the following areas to be used for project indicators during the second mission workshop:

- Zone I: Soudano-sahelian zone of the extreme north Benin (6000 km²)
  Communities in Malanville: Association of rice-growing farmers
- Zone IV: Soudanosahelian zone of northwest Benin (31200 km²)
  Communities in Tanguieta: Union of Villages Associations of Fauna Reserves Management (U-AVIGREF) which is the federation of farmers, fishermen, pastoralists and food transformer committees around the National Park of Pendjari
- Zone V: Soudanoguinean zone of transition in central Benin (16900 km²)
  Communities in Savalou: Tuber Farmer's Association
- Zone VIII: Sandy littoral and River-Lake zone of Benin (3600 km²)
  Communities in Grand-Popo, Adjohoun and Aguegues: Association of Market Garden, Committee of Fishermen (sea fishing in Grand Popo and River fisherman in Adjohoun and Aguégués)

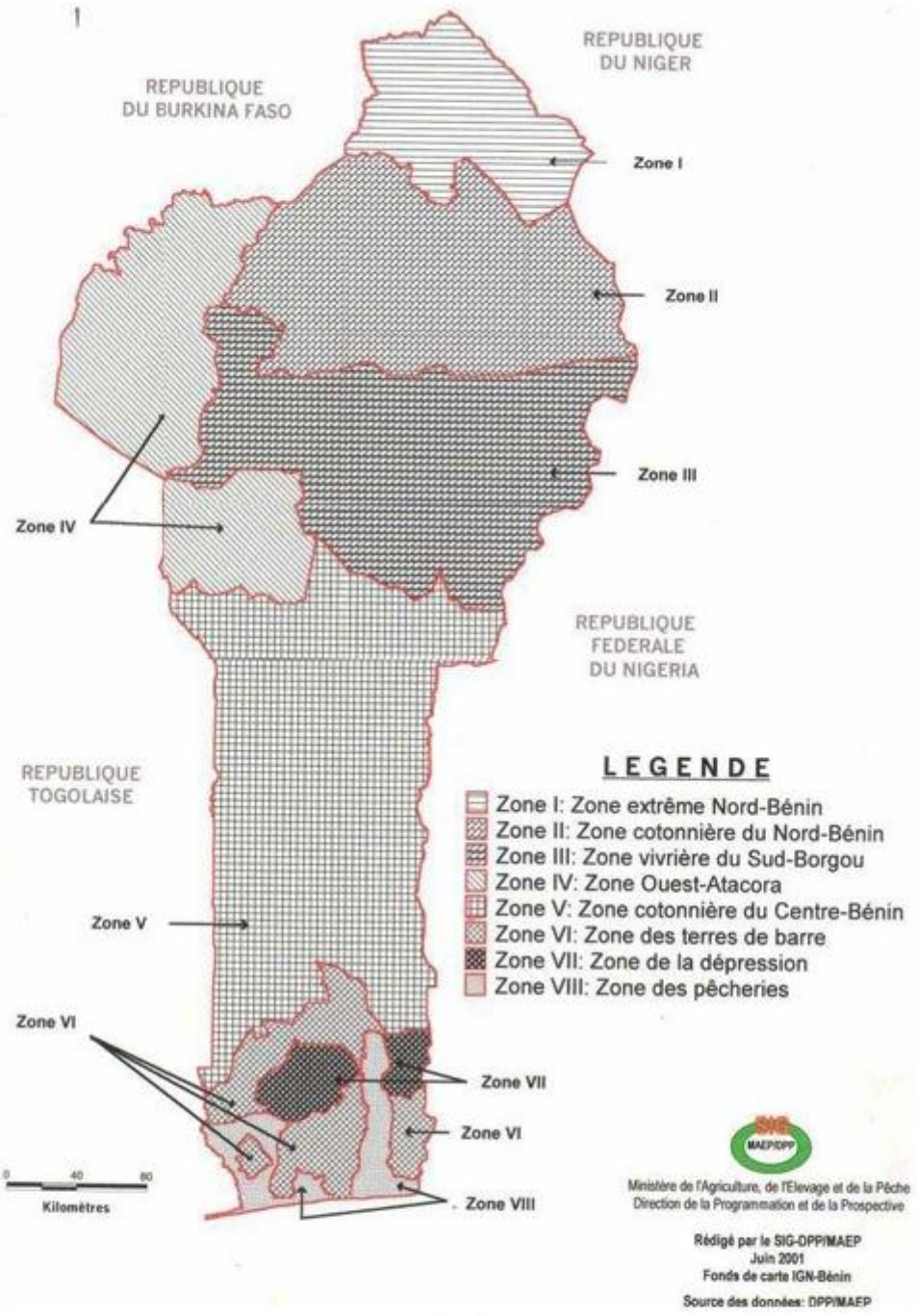
11. Detailed costs
    Final detailed cost estimations are in the process of being collected from all EWS/CI actors. Consultations during the second mission were used to validate that all operation and maintenance costs have been included. Also, agencies were asked to prioritize their needs in the Comments column of the questionnaires to facilitate annual budget planning. The final cost estimate will distribute the costs over the course of the four year project, prioritizing the tasks most necessary. The final PPG report will provide a detailed financial breakdown for the components, outputs and activities of this project.

12. Discussion on EarthNetworks technology
    EarthNetworks presented their total lightning technology to the UNDP CO and the project consultants during this mission. The lightning sensor network, known as the Earth Networks Total Lightning Network (ENTLN), is the world's largest lightning detection network detecting both in-cloud (IC) and cloud-to-ground (CG) lightning. Because phase changes within clouds are indicative of storm development, the IC detection technology can provide forecasts for rain events. According to EarthNetworks, their technology is quite comparable with radar at a fraction of the cost. In addition to their technology, EarthNetworks can provide hardware, data processing and nowcasting and/or forecasting with the assistance of regional control centers. In developing countries such as Brazil, EarthNetworks provides their forecasting products using a web-based interface.

    Discussion with EarthNetworks revolved around the power required for the stations. EarthNetworks potential plan would be to install their sensors on existing cell phone towers. Some complications in implementing an EarthNetworks system in the context of this project might include obtaining cell phone tower space. EarthNetworks could either rent cell phone tower space and data transfer capabilities or the government could mandate that the cell phone companies provide the data transfer service free of charge since warnings are a public good. In addition, installation on cell towers is not generally compliant with WMO standards for installation. Furthermore, a need for observers and technicians and provision for site clearance and security might be costs additional to standard equipment.

13. Co-financing
    Discussion with the European Union representative, Mr. Nestor Nouhouayi indicated that another relevant baseline development project in the context of the proposed outcome 1 is the PAPDFGC project, Support for Forest Preservation and Production of Numerical Maps funded by the European Union, for the amount of $10.8m, 2011-2015. This project has two broad components, i) to support employment and income-generating activities to have better food security by using forests sustainably and ii) to mitigate flood impacts in the Ouémé watershed. The second component includes the provision of a small EWS in the single watershed. Synergy will be necessary with this project.

Annex V: Vulnerable Zones from NAPA vulnerability map. Sites I, IV, V and VIII are target zones



Carte N°3 : Zones agro climatiques du Bénin
Source : SIG – DPP/MAEP (2001)

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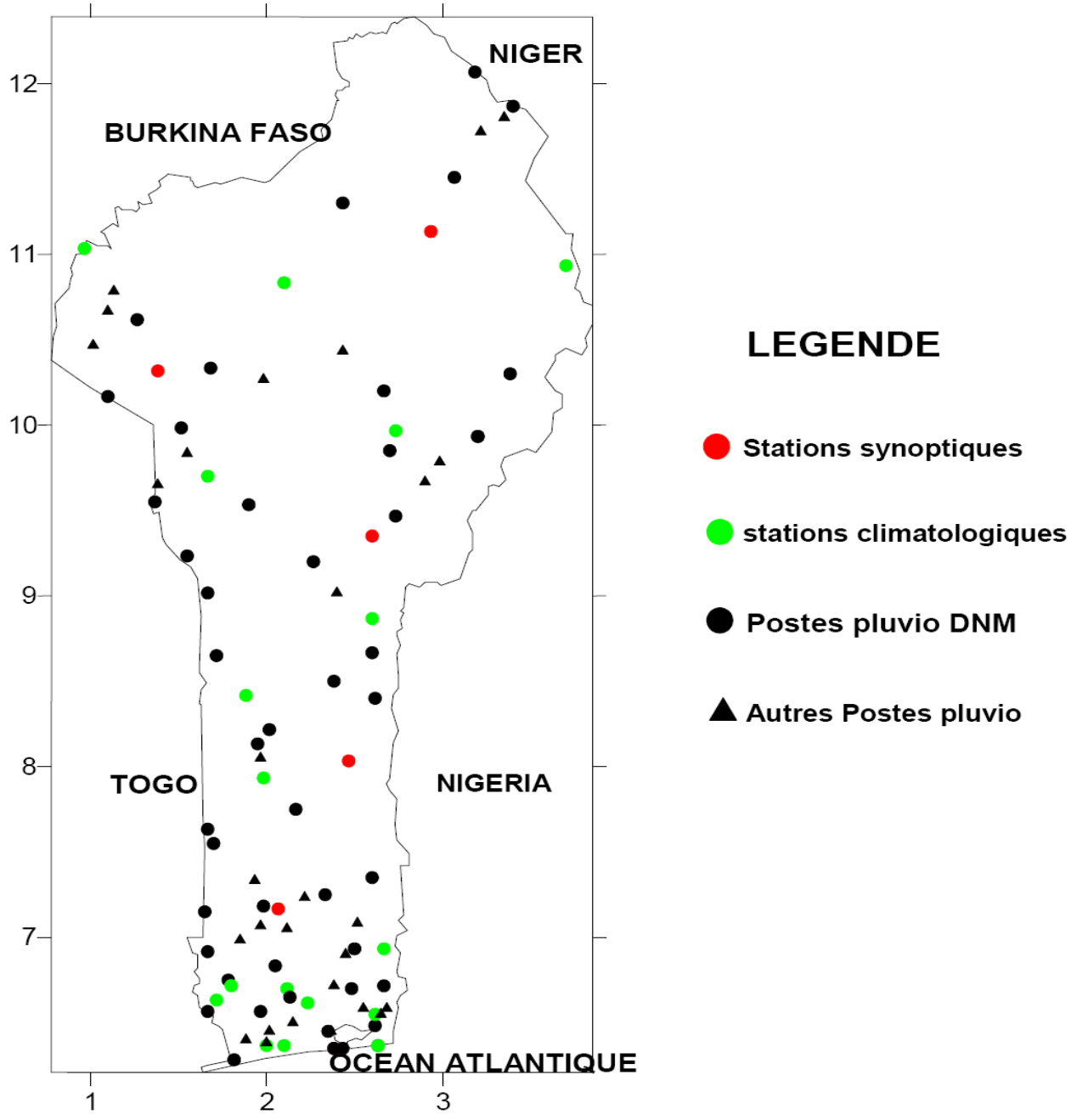
Annex VI: Proposed network of rain gauges

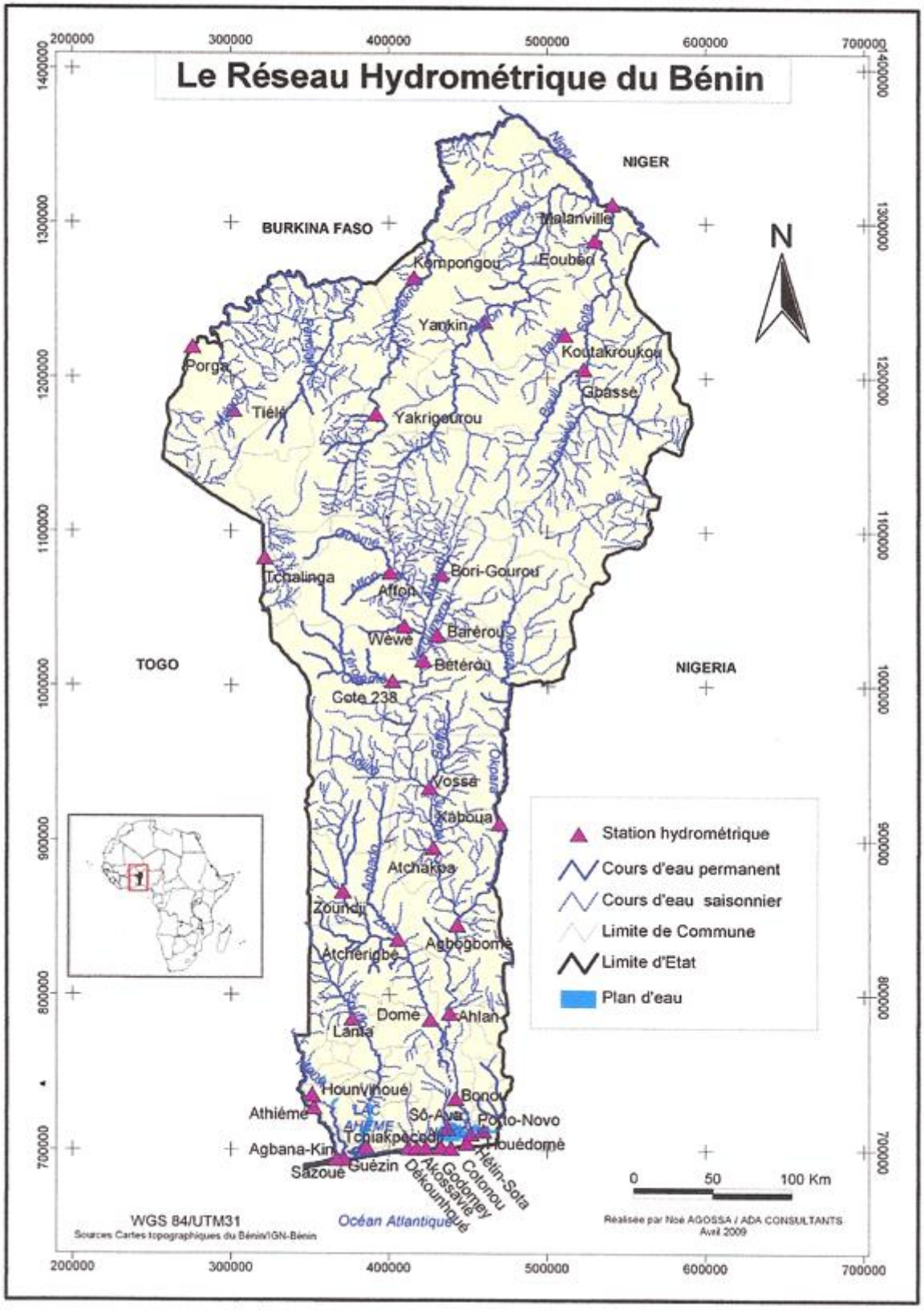
LOCALITES RETENUES POUR RECEVOIR LES 25 NOUVEAUX PLUVIOMETRES

Départements	**Nombre total de pluviomètres**	**LOCALITES devant recevoir les pluviomètres**
Atlantique -Littoral	2	Tori-Bossito
		Kpomassè
Atacora - Donga	6	Prèkètè
		Pélébina
		Gbassa
		Koungarou
		Kobli
		Touncountouna
Borgou - Alibori	11	Kompa
		Madékali
		Angaradébou
		Gogounou
		Bérouboué
		Gbessé
		Dounkassa
		Dérassi
		Guinagourou
		Sinendé
		Tchatchou
Mono – Couffo	1	Djakotomey
Ouémé –Plateau	0	
Zou - Collines	5	Alafia
		Glazoué
		Doumè
		Djidja
		Setto

Annex VII: Existing weather station network (Source: National Directorate on Meteorology (DNM) 2012)



Annex VII: Existing hydrological equipment network (Source: General Directorate on Water (DG-Eau) 201?)



Prioritisation Process

To facilitate decisions on cost-effectiveness, a baseline capacity assessment was conducted during the PPG Phase. The assessment enabled alert production and dissemination agencies to prioritize their needs (see Section 2.8). Due to project budget limitations, it was necessary to select from the long-list of equipment / capacity building needs and identify those within the scope and cost-effectiveness of this project. In response, a set of criteria to prioritize needs / requested activities was formulated. The criteria were also used to assess the relevance of this LDCF project to tackle these priority needs, given its overall objective. Table 1 shows the criteria for cost-effective adaptation interventions.

Tables 1a and 1b: Criteria for inclusion of activity in LDCF-GEF project

1a) Criteria for Selection of Information Production Activities	
✓	The activity needed is within the scope (scale, cost and timeframe) of this project including the time it takes for procurement, installation and training;
✓	Requested acquisition / rehabilitation of hydro-meteorological infrastructure includes a mix of manual and automatic stations to ensure that data collection is not hindered by training needs associated with automatic stations;
✓	At least two supplier costs (where applicable) have been compared for new hydro-meteorological infrastructure;
✓	The placement of hydro-meteorological infrastructure represents the best network representation based on user-needs (public and private) and providing national coverage;
✓	Requirements for operation and maintenance (O&M) are not complex. The need for outsourcing O&M is limited;
✓	Capacity can be built in the relevant sectors to participate fully in the intervention;
✓	The activity has a high likelihood to achieve replication and sustainability;
✓	There is a strong alignment of the activity to national and sub-national adaptation priorities;
✓	The agency involved in alert production has Monitoring and Evaluation mechanisms (M&E) in place;

1b) Criteria for Selection of Information Dissemination Activities	
✓	Capacity can be built in the relevant agency to assist with dissemination;
✓	Agency has the capability to disseminate information to a broad range of people, including the most vulnerable and women;
✓	The agency has mechanisms in place to transfer knowledge to decentralized branches;
✓	The agency is already trained in adaptation to climate change principles;
✓	Any equipment demanded for communication is necessary for improved alert dissemination;
✓	The activity has a high likelihood to achieve replication and sustainability;
✓	There is a strong alignment of the activity to national and sub-national adaptation priorities;
✓	If applicable, the activity enables EWS/CI to be integrated into national policies and planning;

1b) Criteria for Selection of Information Dissemination Activities
✓ Alert communication mechanism is able to reach women and other vulnerable populations

Baseline Capacity Assessment Results (Workshop, Mission 2, January 2013)

Table 1: Results for each Information Production agency

Matrix with color and number coded capacity indicating scores of 1 (red, poor capacity/knowledge/experience) to 5 (green, good capacity/knowledge/experience) for each Information Production agency

Question	Indicateur de capacités	Situation de référence: Niveau réel des capacités/connaissances					
		1	2	3	4	5	
		Nul	**Faible**	**Moyen**	**Fort**	**Très Fort**	
	Structure	**DNM**	**DGEau**	**CRHOB**	**PANA1**	**DGE**	**DICAF**
2.1	Quel est le niveau de vos capacités en ressources humaines (ingénieurs, techniciens…) ? Si les capacités font défaut, veuillez spécifier les besoins selon leur priorité (1 étant le besoin le plus urgent) dans la colonne réservée aux commentaires.			3	4	1	
2.2	Avec quelle précision connaissez-vous les coûts de fonctionnement et de maintenance des équipements existants ?			4	2	1	
2.3	Dans quelle mesure connaissez-vous les mécanismes de recouvrement de coûts pour le paiement des coûts de fonctionnement et de maintenance ? Dans la colonne réservée aux commentaires, veuillez donner des exemples de mécanismes de recouvrement de coûts que vous employez actuellement ?			3	2		
2.4	Dans quelle mesure êtes-vous disposé à vendre vos produits climatologiques au secteur privé en vue d'obtenir des revenus pouvant alléger les coûts de fonctionnement et de maintenance étant donné que les produits doivent être adaptés aux besoins du secteur privé ?			4	2		
2.5	Dans quelle mesure connaissez-vous les rôles des autres fournisseurs/producteurs d'informations ?			3	2	1	
2.6	Dans quelle mesure partagez-vous des données avec les autres fournisseurs/producteurs d'informations climatiques ? Dans la colonne réservée aux commentaires, veuillez indiquer avec qui vous collaborez et avec qui la collaboration fait défaut.			3	3	2	
2.7	Dans quelle mesure jugez-vous la collaboration avec les autres fournisseurs/producteurs d'informations climatiques nécessaire ?			5	4	1	
2.8	Dans quelle mesure collaborez-vous actuellement avec le secteur privé ? Dans la colonne réservée aux commentaires, veuillez donner des exemples de la manière dont vous travaillez avec le secteur privé. Citez ces secteurs privés.			2	4	2	
2.9	Quel est le niveau de vos capacités en matière de gestion de fonds émanant des bailleurs ? Si vous disposez de capacités, veuillez donner des exemples de la manière dont vous employez actuellement les fonds des bailleurs dans la colonne des commentaires.			3	4	1	

Table 2: Average Results for Information Production agencies

Bar chart indicates average capacity for all information producers collectively based on the questions presented in Table 1 above.

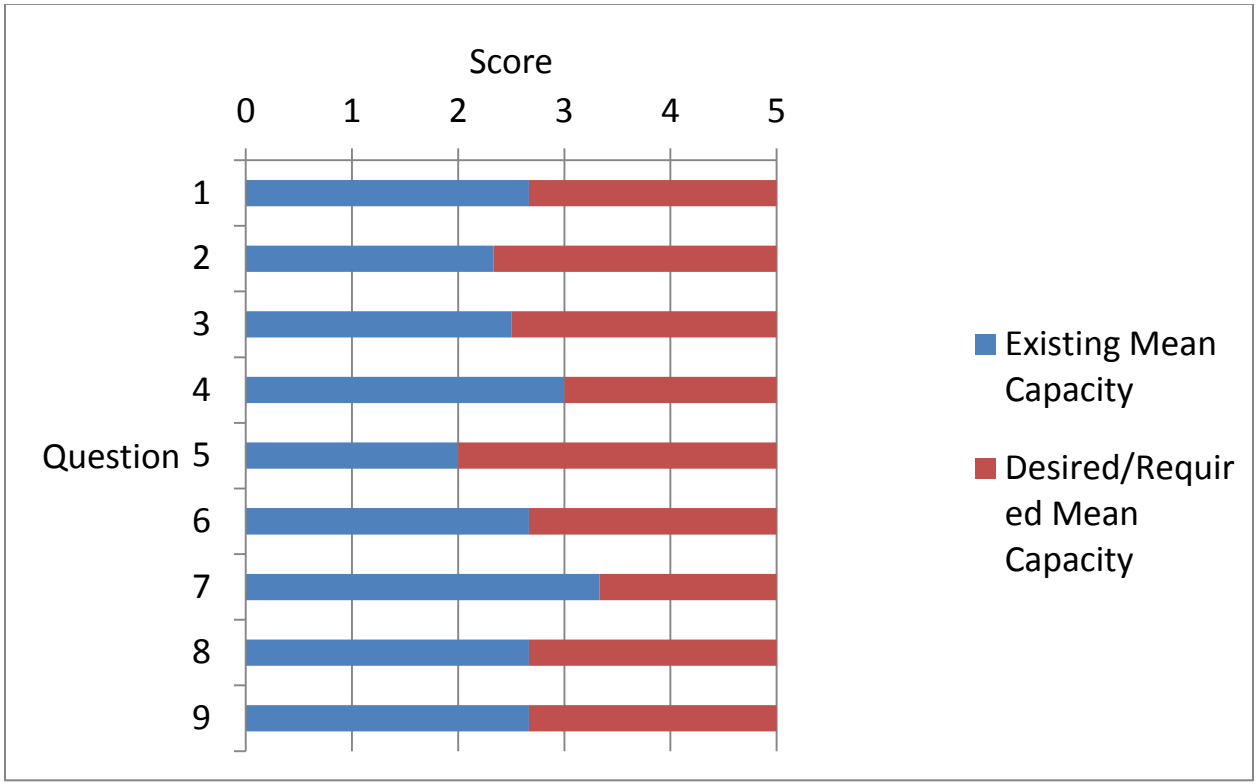


Table 3: Results for each Information Dissemination agency

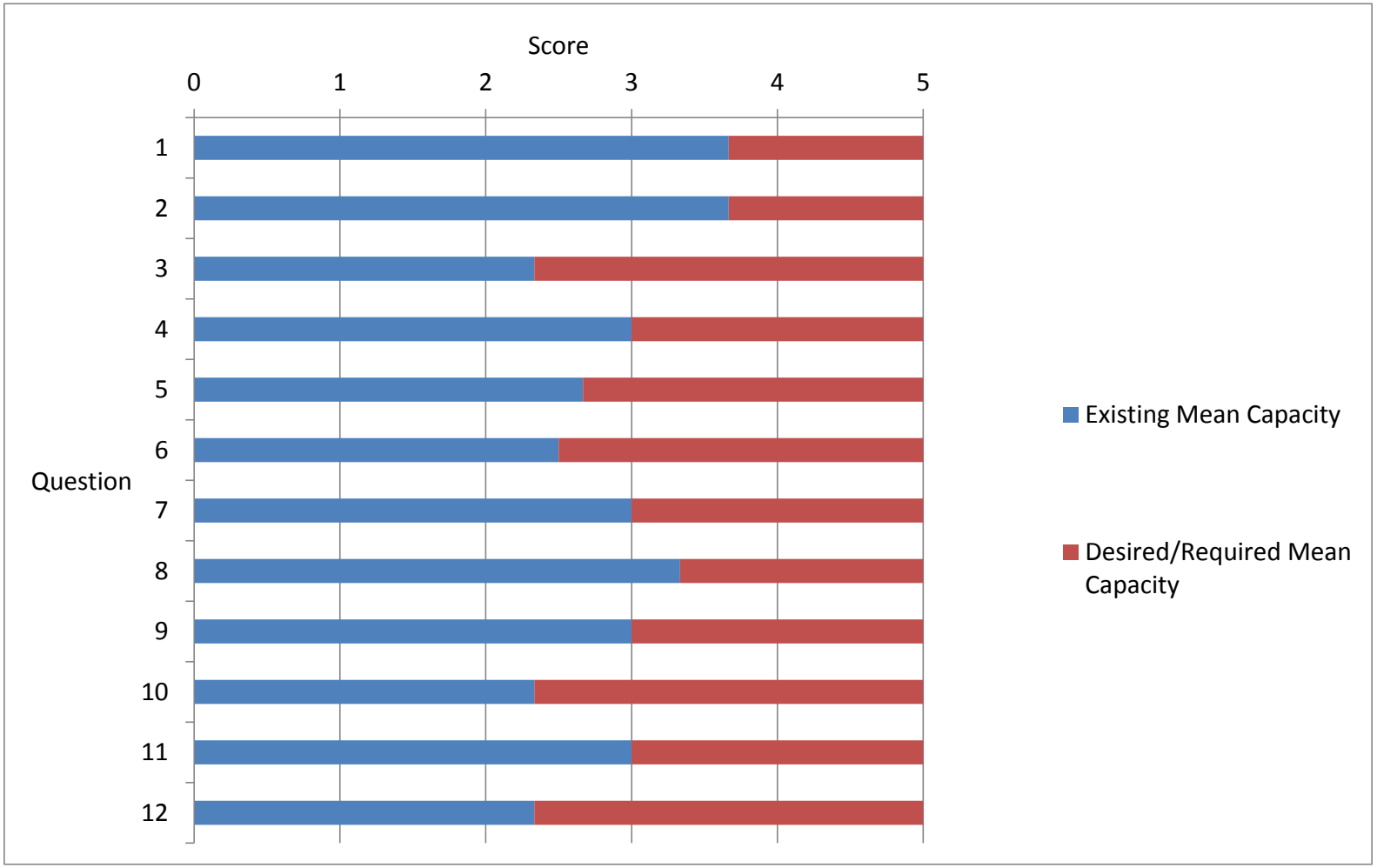
Matrix with color and number coded capacity indicating scores of 1 (red, poor capacity/knowledge/experience) to 5 (green, good capacity/knowledge/experience) for each Information Dissemination agency

Question	Indicateur de capacités	Situation de référence: Niveau réel des capacités/connaissances				
		1	2	3	4	5
		Nul	**Faible**	**Moyen**	**Fort**	**Très Fort**
	Structure	**ANPC**	**IDID**	**Ministry of Health (DNSP)**	**CARE International**	**Plan Benin**
1.1	Quel est le niveau des capacités de votre organisme dans la diffusion des alertes ?		4	3	4	
1.2	Dans quelle mesure êtes-vous actuellement capable de comprendre les alertes hydrométéorologiques afin de les simplifier pour les populations locales ?		4	3	4	
1.3	Quel est le niveau de vos capacités en ressources techniques pour diffuser des alertes (ex., les systèmes téléphoniques privilégiés Flotte) ? Si les capacités font défaut, veuillez spécifier les besoins selon leur priorité (1 étant le plus besoin le plus urgent) dans la colonne réservée aux Commentaires.		2	3	2	
1.4	Quel est le niveau de vos capacités en ressources humaines ? Si les capacités font défaut, veuillez spécifier les besoins selon leur priorité (1 étant le plus besoin le plus urgent) dans la colonne réservée aux Commentaires.		3	4	2	
1.5	Quel est le niveau de vos capacités dans la fourniture d'alertes en langues locales?		3	2	3	
1.6	Quel est le niveau de vos capacités dans la diffusion de messages à travers différents médias ? Veuillez noter dans la colonne réservé aux Commentaires lequel des médias que vous maîtrisez est le plus adapté aux populations rurales (ex., la radio, les textes) 1 représentant le média le plus efficace?			2	3	
1.7	Quel est le niveau de vos capacités techniques dans l'organisation de fomation visant à mieux impliquer les populations locales dans ce projet de Système d'Alerte Précoce? Si les capacités font défaut, veuillez spécifier les besoins selon leur priorité pour la tenue de formation (1 étant le plus besoin le plus urgent) dans la colonne réservée aux Commentaires.		4	3	2	

Question	Indicateur de capacités	Situation de référence: Niveau réel des capacités/connaissances				
		1	2	3	4	5
		Nul	**Faible**	**Moyen**	**Fort**	**Très Fort**
	Structure	**CONASUR**	**SIG**	**CPF**	**SOS Sahel**	**INADES Formation**
1.8	En dehors de votre propre organisation, quel est le niveau de vos capacités dans la coordination soit avec les points focaux locaux de la CONASUR, la Confédération rurale du Burkina Faso soit les organisations de la société civile sur les changements climatiques (COS3C) ? Veuillez indiquer dans la colonne réservée aux Commentaires si une collaboration serait utile et pourquoi.		4	3	3	
1.9	Quel est le niveau réel de vos capacités dans l'organisation d'ateliers conjoints avec d'autres organisations du secteur environnemental (cette question est posée en vue de rationaliser la diffusion d'alertes) ?		4	1	4	
1.10	Selon votre expérience, quel est le niveau actuel des capacités des populations locales dans la réaction aux alertes? Veuillez noter dans la colonne réservée aux commentaires la date à laquelle les alertes ont été émises ou absentes et indiquez le fournisseur d'alertes.		3	2	2	
1.11	Selon votre expérience, quel est le niveau de conscience des populations des changements climatiques ?		4	2	3	
1.12	Quel est le niveau de connaissance des populations des mesures d'ADAPTATION aux changements climatiques et de quelle façon un avertissement météorologique peut-il les aider à devenir plus résilientes aux impacts des changements climatiques ?		3	2	2	

Table 4: Average Results for Information Dissemination agencies

Bar chart indicates average capacity for all information distributors collectively based on the questions presented in Table 3 above.



Title: **REALISATION D'UNE ETUDE DE FAISABILITE D'UNSYSTEME DE PREVISION ET D'ALERTE AUX CRUES DANS LE BASSIN DU FLEUVE MONO, Mars 2011**

Translation : Feasibility study on implementing a flood EWS in the Mono River watershed, March 2011

From: "Chapter 8: Suggestions of facilities for a better forecasting and alert system".

Goals (Chapter 8.1)

- Risk mapping system
- Realisation of an operational forecasting Software
- The hydro-meteorological equipment

Equipment

- Five Rainfall stations have to be "fully equipped" (p.115) + another one in the Mono (p.115) and provided with all "means of communication" (they mention modems but also suggest satellite systems, GSM transmission system or a radio network on page 116) and power alimentation (battery). In the Athiémé station they also suggest to add a "ThalimèdesLimnigraphe".

This leads them to need (p.119):

- Rain gauges (they do not indicate precisely how many but they indicate that they would need them in five stations as well as in Athiémée).
- Some automatic sensors and recorders.
- Some satellite teletransmission modules.
- Autonomous communication tools (GSM telephones)

Human Resources

- Hydrological prevision has to be dealt with by two specific units: the CEB (dam management group), which should create a "rain-flow model" (p.117) and the service dedicated to hydrology in the DG-Water, which should take care of the real-time transmission of the information.

The information chain would be: CEB → DG-Eau (or, DG-Water) → DDPC → Mono-Couffo Prefecture → Municipalities (pp. 117-118).

This leads them to need (p.119):

- One experienced hydrologist
- One technician (hydrologist or meteorologist)
- One computer specialist
- Some agents for the Hydrology Service
- They also need to raise the population's awareness
- They need the people working in the radio to be trained to get and inform about the risks.
- They need trained observers to keep track of the flooding markers

Title: **Observation systematique et changement climatique au Benin**
Translation : Systematic Observation and Climate Change, Benin, December 2010

Tableau 3.1 : Paramètres mesurés, heures d'observation et qualification du personnel par type de réseau météorologique

	TYPES DE RESEAU		
	SYNOPTIQUE	CLIMATOLOGIQUE et AGRO-METEOROLOGIQUE	PLUVIOMETRIQUE
TACHES	observation en surface et en altitude	observation en surface	observation en surface
PARAMETRES MESURES OU ESTIMES	température, humidité, vent à 10m, rayonnement solaire, température au sol et dans le sol, évaporation , pression atmosphérique, mesure de précipitation, couverture nuageuse et type de nuage, durée d'insolation, mesure de vent en altitude(sondage pilot), visibilité,	température, humidité, vent à 2m, évaporation, mesure de précipitation, température au sol et dans le sol	précipitation
FREQUENCE D'OBSERVATION	Horaire (Temps universel)	Trois fois par jour (08h, 12h, 18h locales)	Deux fois par jour (08h, 18h locales)
NOMBRE DE STATIONS	6	17	44
PERSONNEL TECHNIQUE	Professionnel	non professionnel (formé sur le tas)	non professionnel (formé sur le tas)

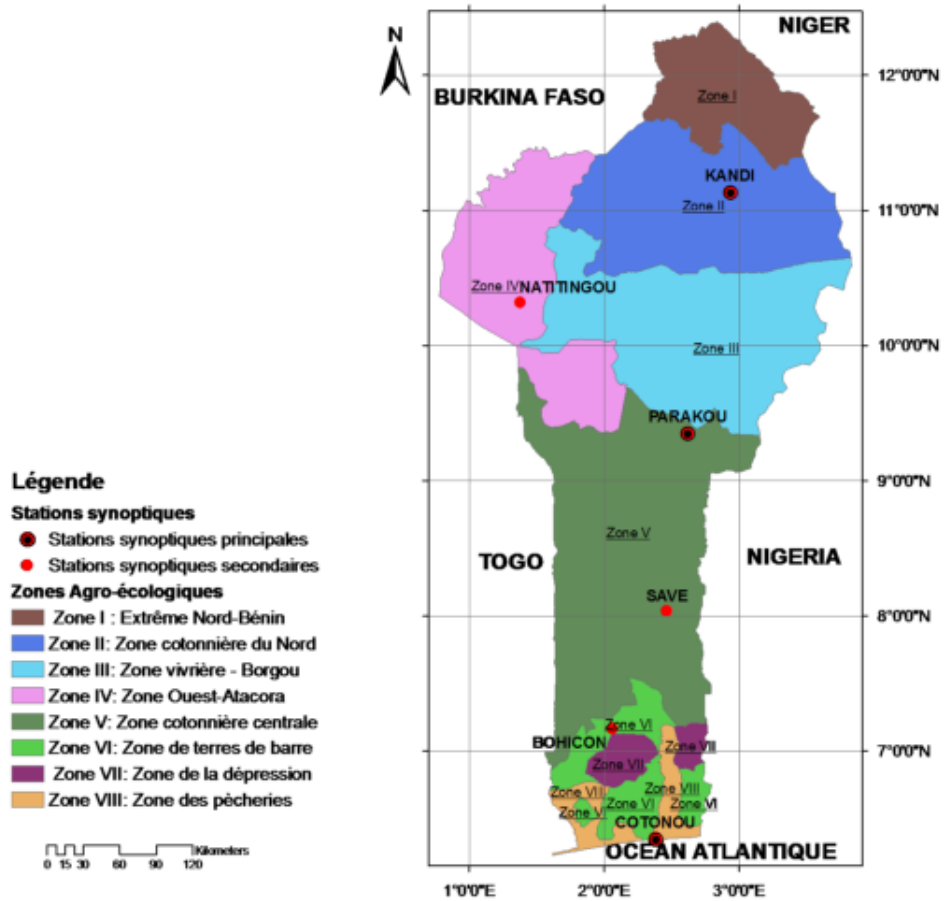


Figure 3.1: Réseau synoptique géré par le SMN/ASECNA

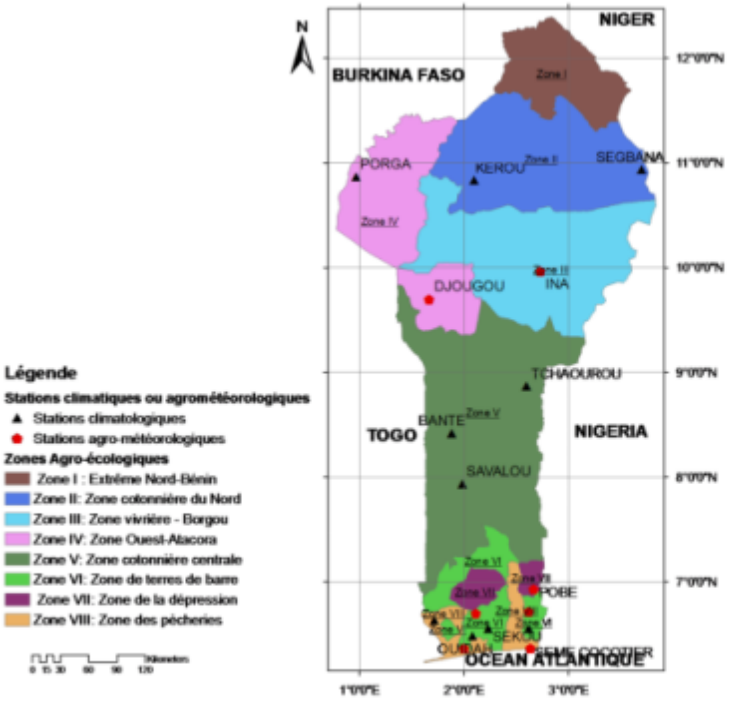


Figure 3.2: Réseaux climatologique et agrométéorologique gérés par le SMN/ASECNA

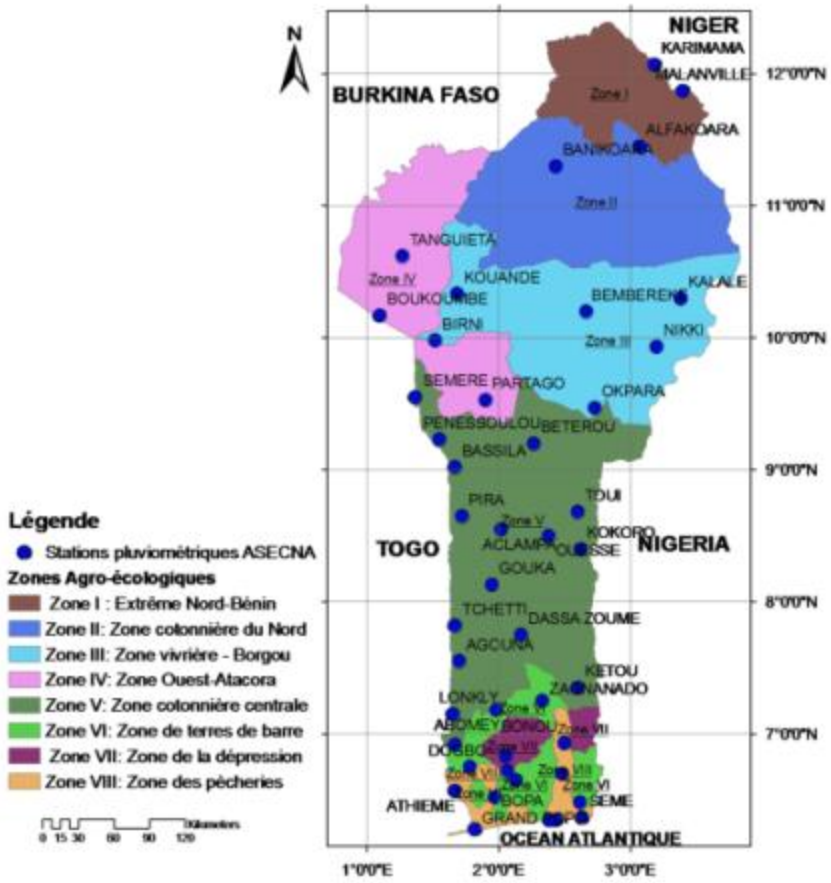


Figure 3.3: Réseau pluviométrique géré par le SMN/ASECNA)

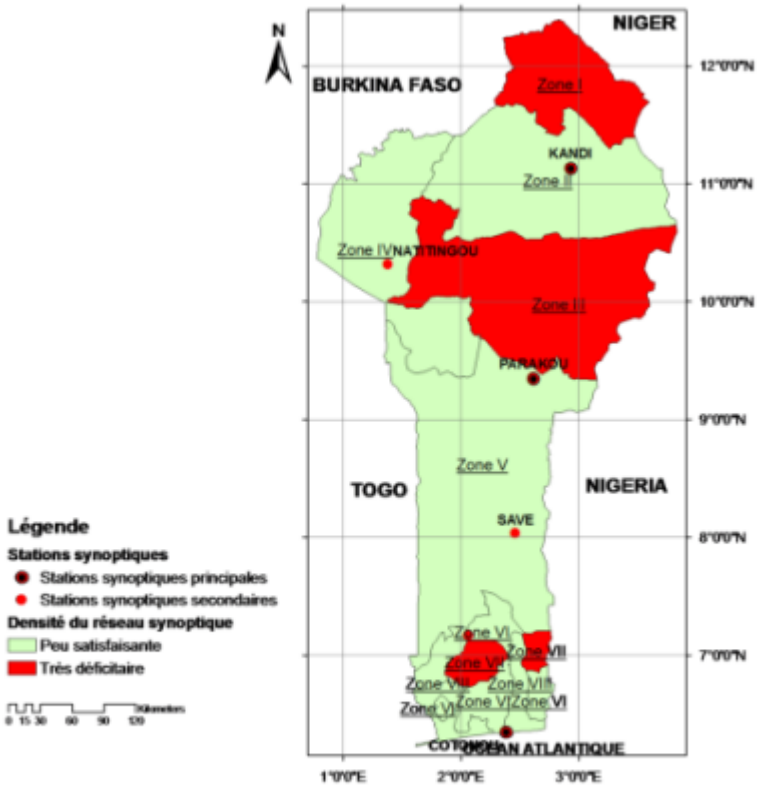


Figure 3.6: Densité actuelle du réseau synoptique géré par le SMN/ASECNA

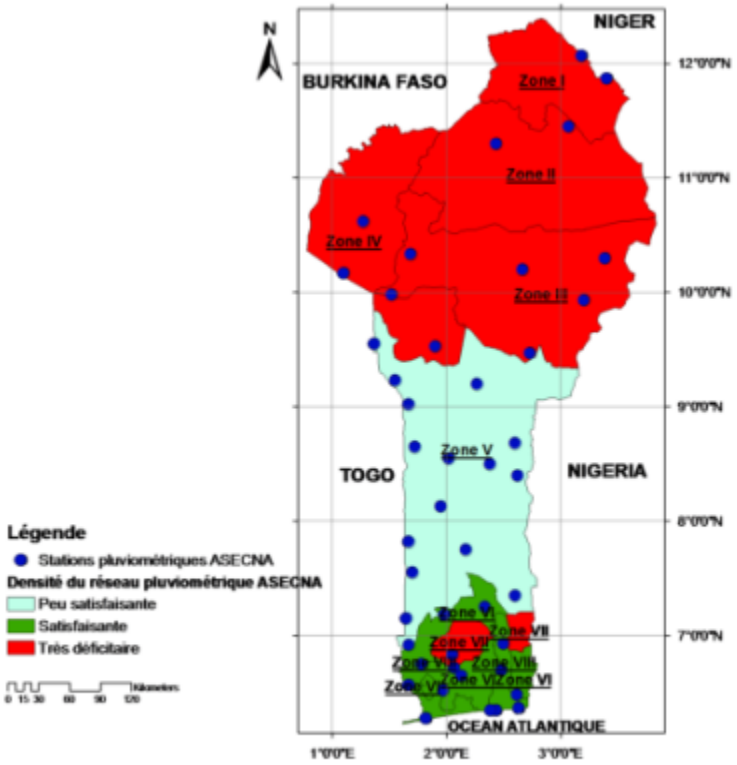


Figure 3.7: Densité actuelle du réseau pluviométrique géré par le SMN/ASECNA

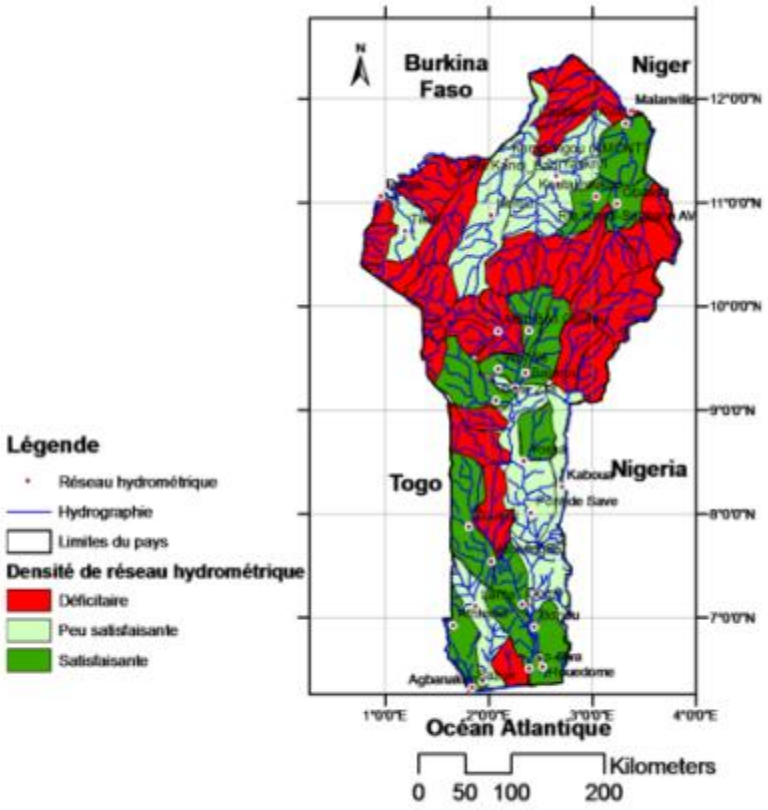


Figure 3.9: Densité actuelle du réseau hydrométrique par sous-bassin

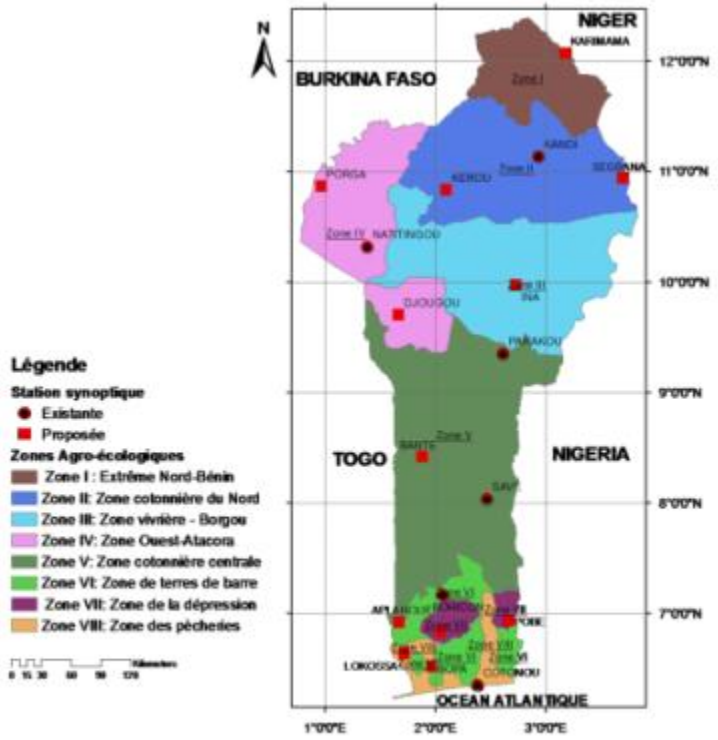


Figure 4.1: Répartition spatale du réseau synoptique proposé

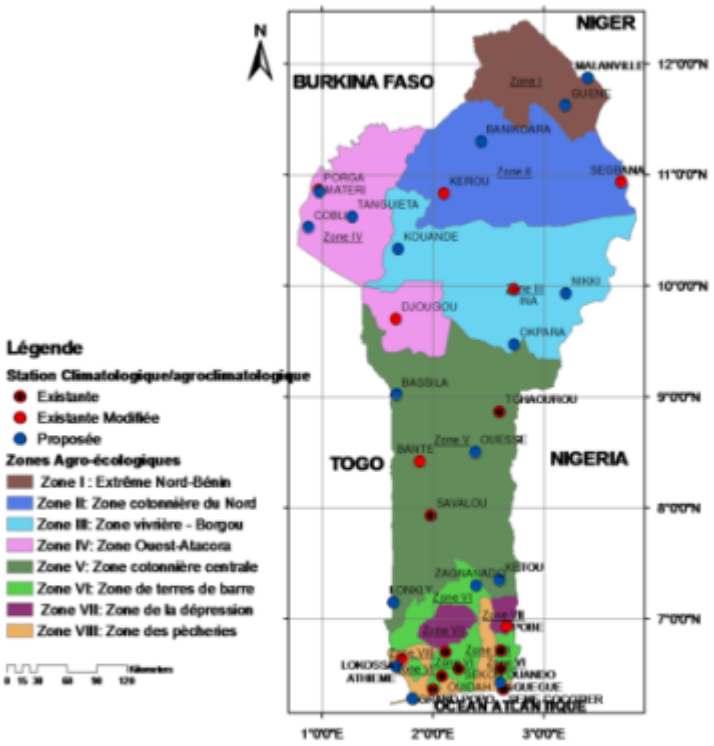


Figure 4.2: Répartition spatale du réseau climatologique/agrométéorologique proposé

Annex 5. Stakeholder involvement plan

Background

Stakeholder consultation has been a key feature in the design of this LDCF Proposal, and stakeholders have been involved in identifying and prioritizing the proposed intervention activities. Details of the stakeholder engagement during the PPG Phase were provided in Section 2.9 above. On-going public consultation is critical for successful implementation. This section outlines some of the key consultation principles and processes at a strategic level that will need to be translated into practical action during the project implementation. It provides guidance based on the initial stakeholder analysis, conducted as part of the project preparation process, and the consultations so far. This can be used to define exact activities that will form part of a communications and consultation strategy developed during the inception period of implementation.

Objectives

The stakeholder consultation during project implementation will be expected to support all outcomes. Overall, the objective of the consultation plan is to provide a framework to guide and promote two way engagements between the key Project Beneficiaries (DNM, DG-Eau, CRHOB and ANPC)and the end-users with whom the project will engage and directly impact upon.

It is proposed that several more specific objectives for consultation are adopted:

1. To ensure a general vision and understanding of the project and its expected outcomes by all concerned stakeholders;
2. To engage key stakeholders in planning, implementing and monitoring of specific interventions;
3. To ensure consistent, supportive and effective communication (information, documentation, sharing, lessons learned and feedback) processes with key beneficiaries as well as the wider public including subsistence farmers and pastoralists.
4. To influence and ensure strategic level support for project implementation from state and non-state organizations and international agencies through engagement in effective community, private sector and donor forums or platforms.

In deliveringthese objectives, there are a number of simple qualitative considerations that need to be taken into account when planning engagement processes and what they should be seeking to achieve:

- Identify constraints and solutions: As a two way engagement, the consultation process should be used as an opportunity to identify with stakeholders possible constraints to or with the project's implementation and to work with the stakeholders in finding sustainable solutions.
- Managing expectations: The LDCF investment is relatively minor, compared to the adaptation demands facing the country. It will be important that consultations take due consideration to manage expectations of stakeholders and stakeholder groups.
- Partnerships for co-financing: The LDCF seek to add value to their investments by building on existing and parallel projects that represent co-financing and consultations should consider opportunities for partnerships that will leverage co-financing into innovative approaches or technologies that may improve efficiencies and enhance impact.

Stakeholders

Stakeholders include a range of types of groups, all with their own interests and concerns. They have different roles to play in the project and the Table below indicates key stakeholders and their possible roles.

Activities planned during implementation and evaluation

During implementation, the communication and consultation process should be divided into three main phases, being:

Phase 1 – this is the **mobilization** phase in the first year of the project. The fine details of the activities and implementation structures will be designed, partnerships for action will be forged and stakeholder engagement will focus around these design processes.

Phase 2 – represents the main **implementation** phase where investments will be made on the ground in the target areas and stakeholder consultation about engagement will focus on output oriented action.

Phase 3 – represents the **completion** of the project and the plans for scale-up and long-term sustainability of the LDCF investments. Consultation will focus on learning, bringing experience together and looking at processes for continued post-project impact.

Phase I – Developing a strategy and action plan

At mobilization, a simple communications strategy should be developed. Key principles to be considered in the development of the strategy include:

Who? Implementers need to understand the stakeholders well – their needs, the impacts of interventions on each stakeholder group, the opportunities for contribution/engagement, and their power/influence. Whilst, as part of the project preparation, a stakeholder analysis was carried out, during this phase this should be reviewed as stakeholders should be seen as dynamic. The stakeholders that may be involved in or affected by the project are multiple, diverse; so an effective stakeholder identification process will be an important contributor to identifying key factors for success and risks to mitigate.

Gender: In engagement with the project implementation, it will be important to consider the different ways that the early warning products are easily accessed, understood and used by both women and men. The project implementer will need to consider how these two groups access information and interpret it and get feedback through consultation process in selected areas of implementation.

Table 1: Matrix of stakeholders and activities planned during implementation and evaluation

	Outcome 1 Enhanced capacity of national hydro-meteorological services (DNM/DGEau) and coastal monitoring institutions (CRHOB) to monitor extreme weather and climate change (droughts, floods, strong winds, coastal erosion, seal level rise)					Outcome 2 Efficient and effective use of hydro-meteorological and coastal monitoring information for making early warnings and seasonal forecasts which feed into long-term development plans						
Stakeholder	Project Board (PB) Project Support (PS) Decentralization Support (DS)	Procurement AWS	Procurement HYDRO	Coastal monitoring equipment	O&M Training	FORECASTING training	TAILORED Climate Products	Improve SYNERGY	Open-Access DATA Portal	COMMUNICATION SOP	RURAL awareness	M & E
Federal/Sector												
Direction Nationale de la Météorologie (DNM)	x	x			x	x	x	x	x	x		
Direction du Conseil Agricole et de la Formation opérationnelle (DICAF)	x						x	x	x			
Direction Générale de l'Eau (DG Eau)	x		x		x	x	x	x	x	x		
Direction Générale de l'Environnement (DGE)	x							x	x			
Agence National de la Protection Civile (ANPC)	x							x	x	x		
Direction of Communication and Private Media										x		
CRHOB				x	x		x					

	Outcome 1 Enhanced capacity of national hydro-meteorological services (DNM/DGEau) and coastal monitoring institutions (CRHOB) to monitor extreme weather and climate change (droughts, floods, strong winds, coastal erosion, seal level rise)					Outcome 2 Efficient and effective use of hydro-meteorological and coastal monitoring information for making early warnings and seasonal forecasts which feed into long-term development plans						
Stakeholder	Project Board (PB) Project Support (PS) Decentralization Support (DS)	Procurement AWS	Procurement HYDRO	Coastal monitoring equipment	O&M Training	FORECASTING training	TAILORED Climate Products	Improve SYNERGY	Open-Access DATA Portal	COMMUNICATION SOP	RURAL awareness	M & E
Technical / Research Institutions												
Laboratoire d'Hydrologie de la FAST			X			X	X					
Laboratoire de Climatologie, FLASH UAC		X				X	X					
Community Sector												
Comité local de Protection Civile										X	X	
Comité Communal de Protection Civile										X	X	
Comité d'Arrondissement de Gestion des Catastrophes										X	X	
Association villageoise des Crédits ''Avec''										X	X	

	Outcome 1 Enhanced capacity of national hydro-meteorological services (DNM/DGEau) and coastal monitoring institutions (CRHOB) to monitor extreme weather and climate change (droughts, floods, strong winds, coastal erosion, seal level rise)					Outcome 2 Efficient and effective use of hydro-meteorological and coastal monitoring information for making early warnings and seasonal forecasts which feed into long-term development plans						
Stakeholder	Project Board (PB) Project Support (PS) Decentralization Support (DS)	Procurement AWS	Procurement HYDRO	Coastal monitoring equipment	O&M Training	FORECASTING training	TAILORED Climate Products	Improve SYNERGY	Open-Access DATA Portal	COMMUNICATION SO	RURAL awareness	M & E
NGOs/CSOs												
Care International	X									X	X	
CARITAS	X									X	X	
IDID	X						X			X	X	
CRS	X									X	X	
Plan Bénin	X									X	X	
OXFAM										X	X	
Croix-Rouge Benin										X	X	
Réseau des Journalistes										X	X	
Donor Partners												
EU												
GIZ											X	
Dutch Ministry of Foreign Affairs											X	
World Bank	X										X	
UNDP / UNDP-GEF	X	X										X
USAID	X											

Why? Implementers need be clear about the purpose of the consultation process as so that the right stakeholders make the right inputs to the planned activities. During Phase I, the**National Project Coordinator** with the support of the **Technical Management Committee and the Decentralization Support Groups** will seek to have secured the support and commitment of key stakeholders required for project implementation.

Implementers should make key stakeholders aware of the plan and its intended activities and outcomes and make clear their role and scope for contributing to project decisions and activities.

What? In planning stakeholder involvement, the strategy should make as much use of existing mechanisms (institutions and process) as possible, avoiding establishing project oriented structures.

Types of consultation mechanisms:

- Preparation meetings with NGOs/CSOs to be implicated in alert communication;
- Initial consultation meetings in target regions;
- Information briefings for government and co-financing institutions;
- Initiation of public awareness campaign on EWS and the utility of CI for private sector representatives

Phase II - Consultation through implementation

Once implementation begins, public consultations should become more of an ongoing exchange of information, and there are two main purposes for the various mechanisms outlined under Phase I:

- to gather information from beneficiaries and stakeholders about the impact and effectiveness of the planned adaptation packages (efficient and reliable EWS) to support adaptive management; and
- to provide interested government and donor stakeholders and the general public with information about the progress and impact of the project as it is implemented.

The first purpose relates to engagement for effective implementation and monitoring, whilst the latter is more concerned with information dissemination, 'public relations' and expectation management. Good public relations will also help encourage collaboration with respect to the objective of the LDCF project.

Phase III - Project completion and scale up promotion

This will be a process of ensuring completion, hand-over and long-term sustainability of the LDCF investment. Consultation will focus on bringing experience together, sharing key lessons learnt (through the UNDP ALM and other forums) and looking at processes for promoting scale up of this project in order to have efficient and reliable EWS in the country.

Annex 6: Terms of Reference

A. Project Steering Committee(PSC)

The Project Steering Committee is responsible for making management decisions for a project. The Project Steering Committee plays a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the National Project Coordinatoras well as any delegation of its Project Assurance responsibilities. Based on the approved Annual Work Plan, the Project Steering Committee can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans.

The Project Steering Committee (PSC) shall comprise national and sub-national representatives to guide and oversee the project. The PSC will be housed within Ministry of Water and chaired by the Director of the Ministry of Water. The PSC will convene annually to discuss project progress and approve annual work plans. The PSC will comprise representatives from UNDP, UNDP-GEF and senior officers from the Ministry of Transport (DNM and ASECNA), Ministry on the Environment (DGE), Ministry of Interior (ANPC), Ministry of Higher Education (University of Abomey-Calavi: Laboratory of Applied Hydrology, Laboratory of Climatology and Laboratory of Bioclimatology, the Benin Oceanographic and Fishing Research Center CRHOB), National Platform on Catastrophe Risk Reduction and Adaptation to Climate Change (PNRCC), the Ministry of Agriculture (DICAF) and NGOs/CSOs. The National Project Coordinator (NPC) Officer will be an ex officio member of PSC responsible for taking minutes. Potential members of the Project Steering Committee are reviewed and recommended for approval during the PAC meeting. Representatives of other stakeholders can be included in the Board as appropriate.

The responsibilities of the PSC will be to:

- Supervise and approve the annual workplans and short term expert requirements
- Supervise project activities through monitoring progress and approving annual reports
- Review and approve work plans, financial plans and reports
- Provide strategic advice to the implementing institutions to ensure the integration of project activities with national and sub-national sustainable development and climate resilience objectives
- Ensure inter agency coordination and cross-sectoral dissemination of strategic findings
- Ensure full participation of stakeholders in project activities
- Assist with organization of project reviews and contracting consultancies under technical assistance
- Provide guidance to the National Project Coordinator

B. National Project Director (PD)

The National Project Director (PD) will report to the PSC and will lead the project team through the planning and delivery of the Project. The PD will be housed at Ministry of Water and will have the authority to run the project on a day-to-day basis on behalf of the Implementing Partner, within the constraints laid down by the Project Steering Committee. The National Project Director's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. The PD will be responsible for financial management and disbursements, with accountability to the government and UNDP. The PD will meet monthly with the Technical Management Committee which will contain focal points from all EWS information production agencies and ANPC.

Responsibilities

- Ensuring effective partnership working between the sub-national implementing Bureaus and the participating national agencies.
- Managing human and financial resources in consultation with the National Project Coordinator(PC) to achieve results in line with the outputs and activities outlined in the project document.
- Leading the preparation and implementation of annual results-based work plans and logical frameworks as endorsed by the management.
- Liaison with related and parallel activities with cooperating implementing Ministries and Bureaus.
- Monitoring project activities, including financial matters, and preparing monthly and quarterly progress reports, and organising monthly and quarterly progress reviews.
- Supporting the PCto organise task team meetings and annual lesson learning conferences
- Coordinating the distribution of responsibilities amongst team members and organising the monitoring and tracking systems.
- Reporting and providing feedback on project strategies, activities, progress, and barriers to PSC.
- Meeting quarterly with the Technical Management Committee

C. National Project Coordinator (PC)

The National Project Director will appoint a National Project Coordinator (PC) who will be responsible for the overall administration of the project and liaising with UNDP. The PCwill be located within Ministry of Water and will be responsible for

- Day-to-day oversight and coordination of implementation of project activities
- Organize the recruitment of technical personnel with UNDPand supervise implementation of the project
- Developing and maintaining close linkages with relevant sectoral government agencies, UNDP, NGOs, civil society, international organisations and implementing partners of the project
- Coordinating the project team in carrying out their duties at an optimum level through ensuring efficient and effective resource utilization
- Coordinating inputs into annual results-based work plans and logical frameworks as endorsed by the management
- Preparing detailed annual breakdowns of the work plan for all project objectives. And preparation of quarterly work plans
- Coordinating inputs into all project reports as required (including Annual Project Reports, Inception Report, Quarterly Reports and the Terminal Report)
- Preparing quarterly status and financial reports for comments and approval by the PD
- Coordinating the establishment of sub-national project Task Teams
- Organising annual task team meetings to share experiences and lessons learned

D. Technical Management Committee

The Technical Management Committee will contain focal points from the National Directorate on Meteorology (DNM), the General Directorate on Water (DG-Eau), the General Directorate on the Environment (DGE), the National Advisory on Civil Protection (ANPC) and the Benin Oceanographic and Fishing Research Center(CRHOB). They will meet monthly with the National Project Coordinator to provide technical guidance. They will also provide project administration and management support to the PC as required by the needs of the individual project or PD.

E. Administrative and Financial Assistant

One administrative and financial assistant will report to NPC and will contracted by the Ministry of Water. His/her responsibilities will be to:

- Set up and maintain project files and accounting systems whilst ensuring compatibility with Ministry of Water and UNDP financial accounting procedures.
- Prepare budget revisions of the project budgets and assist in the preparation of the annual work plans.
- Process payments requests for settlement purposes including quarterly advances to the implementing partners upon joint review.
- Update financial plans, prepare status reports, progress reports and other financial reports.
- Organize closure formalities including submission of terminal reports, transfer and disposal of equipment, processing of semi-final revisions, and support professional staff in preparing the terminal assessment reports.
- Assist in the timely issuance of contracts and assurance of other eligible entitlements of the project personnel, experts, and consultants by preparing annual recruitment plans.
- Collect and maintain project related information data and establish document control procedures
- Administer Project Steering Committee meetings
- Administer project revision control
- Compile, copy and distribute all project reports
- Provide support in the use of Atlas for monitoring and reporting

F. Monitoring and evaluation expert (National, Long-Term)

The M&E expert will report to the NPC and will support the NPC, PC and the project task teams to prepare the relevant M&E systems required to monitor and assess quality of progress, to identify, collect, analyze, document and disseminate lessons learned through an annual project meeting, and support the preparation of project evidence for sharing through the UNDP ALM.

Responsibilities

- Establish the overall results-based M&E strategy in accordance with M&E plans outlined in the project document.
- Guide and coordinate the review of the Project Results Framework, including:
    a. Provide technical advice for the revision of performance indicators.
    b. Facilitate annual review of risks by PC.
    c. Evaluate if targets have been achieved.
- Prepare reporting formats and support NPC to prepare the required reports. Guide project task teams in preparing their progress reports in accordance with the approved reporting formats. This includes quarterly progress reports, annual project reports, inception reports, and ad-hoc technical reports.
- Foster participatory planning and monitoring by advising the training institutions on content for participatory monitoring and evaluation of activities.
- Assist the NPC to collate technical reports and other documents from the project and contribute to the ALM.

G. Multi-agency platform (CIMS)

The multi-agency platform (Comité Inter institutionnelet Multi disciplinaire de promouvoir la Synergie, CIMS) will be created under the project to ensure synergy between EWS agencies and among EWS-related initiatives during project implementation. This platform will be a multi-disciplinary group which will contain designated focal points from all relevant ministries/organization on national and local levels. Members must represent the following organizations at a minimum: ANPC (national and local representatives), DG-Eau, DNM, CRHOB, the Ministry of Health (DNSP), the Directorate of Agricultural Council and Professional Training (DICAF), the National Office for Food Security (ONASA), University Laboratory representatives and the NGO, Caritas. They will be seconded to work for the project bi-annually (preferably, before times of high weather/climate risk) and will report to the Project Steering Committee and the UNDP CO.

Roles of the focal points will include:

- Ensure coordination and collaboration between EWS agencies
- Ensure synergy among EWS-related initiatives
- Resolve duplicate roles

Deliverables must include:

- An initial report during the first quarter of the Project to be submitted to the Project Steering Committee and the UNDP CO indicating
  - ✓ which projects require synergy-building with justification
  - ✓ which agencies require improved collaboration efforts with justification
  - ✓ action plan required to implement synergy building activities
- Bi-annual update reports to be submitted to the Project Steering Committee and the UNDP CO demonstrating how synergy has been created/reinforced
- Final summary report on synergy building and how it can be extended after the duration of the project

H. Weather forecasting specialist (International Short Term)

The specialist will support the project by providing weather forecasting expertise on short timescales (early warning, daily and weekly). The specialist will train the relevant officials in the use and treatment of weather observation data, forecasting and establish specifications for down-scaling forecasts to be localized to the country's particular climate zones. They will help train DNM staff in the interpretation of weather risk and vulnerability scenarios for evaluating mitigation and mobilization efforts and will report to the Project Management Unit.

Responsibilities

- Prepare weather data specifications and data collection protocol.
- Review quality and utility of existing data and advise on additional data collection requirements and data rescue.
- Review Numerical Weather Prediction models and recommend best model(s) for country-use, considering the technical, financial and operating capacities of the Met Service
- Provide training specifications and protocol for Numerical Weather Prediction and forecast downscaling
- Focus predictions on the most pertinent extreme weather threats (floods, droughts, strong winds)

- Set up collaboration with the DG-Eau and CRHOB to ensure data sharing for extreme weather prediction (e.g., rainfall intensity measurement and soil moisture satellite data)
- Work with DG-Eau to set-up criteria and Standard Operating Procedures to designate alert thresholds
- Prepare knowledge-exchange planning (financial estimates included) indicating which WMO continuing training opportunities should be exploited, both regionally and internationally

I. Climate risk and vulnerability specialist / Climate information platform specialist (International Short Term)

Climate affects almost all human endeavors. Its inherent variability, including extreme meteorological events (such as floods, droughts, and hurricanes), also affects the terrestrial and biological systems on which society depends for survival. Public awareness of climate impacts places demands on the meteorological profession to provide pertinent climatic information to a diverse user group in a timely and effective manner. The applied climatologist often combines a broad background in the social sciences with detailed knowledge of the physical sciences, theory from the research community, and model-generated and monitored environmental data to answer specific client questions. The specialist will support the project by providing climate scenario analysis on longer timescales (seasonal and greater). The specialist will train the relevant officials in the use and treatment of climate observation data and the development of climate risk and vulnerability scenarios. They will help train DNM, DG-Eau and CRHOB staff with aspects of climate risk analyses, capacity building and integrated climate planning and will report to the Project Management Unit.

During the 3rd year of the project, this specialist will focus more on building a climate information platform help to build climate resilience in various socio-economic sectors throughout Benin. The specialist will analyse private sector investment and how to develop a pilot study to tailor climate/weather products. The specialist will support the development of a commercially viable climate information platform that will provide reliable, timely weather and market data to a range of socio-economic producers and other stakeholders such as insurance providers. Selected investments will be chosen based on their ability to enhance the adaptive capacity of local populations (e.g. agriculture) and private sector interests (e.g., cotton sector). The Expert will set the groundwork to test the most viable investment for tailored climate products in a pilot study.

Responsibilities

- Review quality and utility of existing data. Outline data requirements and analytical frameworks for risk and vulnerability analyses. Support DNM/ DG-Eau/CRHOB to undertake the analyses
- Oversight of observational and measurement techniques to maintain the integrity and representativeness of short- and long-term databases to permit an accurate and unbiased evaluation of climate change
- Prepare climate data specifications and a data collection protocol.
- Study the area's climatic trends and prepare climate projection overlays
- Model potential future impacts on climate sensitivity and vulnerability analyses in the context of population and economic growth trends
- Assist in the preparation of future climate scenarios and their evaluation for planning purposes, including climate impact assessments and trade-off analyses
- Support information producers to identify policy and practical implementation options to integrate climate resilience initiatives according to their mitigation potential, cost-effectiveness, co-benefits, political feasibility and public acceptance

- Assists the Project Management Unit to draft climate resilient plans based on options analysis, and lessons from pilot implementation
- Prepare knowledge-exchange planning (financial estimate included) indicating which climate risk and vulnerability training opportunities should be exploited, both regionally and internationally
- Participate in and present materials where appropriate at stakeholder workshops and Project Steering Committee meetings

For setting up a climate information platform, responsibilities include:

- Identify the sectors and business segments with a need for access to climate information, the required frequency of access and the willingness and readiness to pay for improved climate information
- Identify the modality of information access currently used including the information and communication technology (ICT) capacity, access to media channels and cost of access
- Analyse the capacity to process and translate data into risk analyses tailored to various needs and demands of different end-users.
- Analyse the current revenue models.
- Identify the necessary phases for the setting up of a climate information platform
- Identify factors critical to the success of the climate information platforms.
- Develop a pilot study with the support of DNM, DG-Eau and CRHOB to implement the most viable climate information platform financially which enables a maximum number of beneficiaries
- After completion of the pilot study, assess pilot study results and create a synthesized report for the PCU, DNM, DG-Eau and CRHOB

J. Information Technology and Business Development Specialist on Mobile-Phone Platforms (International Short Term)

Building resilience to extreme weather, climate change impact and food insecurity is a critical challenge in Benin. By providing climate information and weather forecasts to farmers by mobile phone communication, the resilience of even the most vulnerable populations can be improved. To assist with climate information (CI) and early warning system (EWS) message dissemination, a specialist is required for 1 month to conduct market and technical research on how to link CI/EWS to mobile-phone platforms.

Responsibilities of the specialist must include:

- Working with cell phone providers, DNM, DG-Eau, CRHOB and the Ministry of Agriculture (DICAF) and ONASA to see how climate information and alerts can be provided most cost-effectively to the general public by SMS and voice messages
- Conducting market research on the needs of localized Benin farmers including which fruit/vegetable product information is needed at various times of year
- Developing a feasibility study on how Benin can contribute climate information and alerts to existing mobile-phone platforms, for example, the CABI/Plantwise knowledge bank and other related initiatives
- Formulating a plan on how Benin can best integrate the LDCF project with the Pilot Project on Climate Resilience (PPCR) and how to link with regional and international initiatives

K. National hydrology expert (National 32 days per year, first 3 years)

The hydrologist will work closely with DG-Eau to conduct field monitoring and evaluation campaigns to calibrate equipment and validate rating curves. The specialist must have expertise with watershed management and hydrological monitoring equipment, including Acoustic Doppler Current Profilers (ADCP). The candidate should be well-acquainted with hydrological equipment calibration. He/she should also be familiar with conventional and modern equipment and techniques for hydrological data collection, including up-to-date knowledge on remote sensing and data transmission technology.

Responsibilities include:

- Calibrate manual and automatic hydrological flow meters (including ADCPs)
- Assess the needs for hydrological information, to contribute to the formulation of standards on measurements and data processing and to formulate proposals for integrated monitoring network design and assessment
- Provide best available practices and on national standards in estimation of hydrological design data for extreme floods occurrences
- Carry out an investigation of methods of PCP/PCF derivation and other methods for extreme flood estimation

L. Installation, Operation and Maintenance Training for Met Infrastructure (International)

Due to the procurement of new weather stations, an expert is required to build the capacity of DNM to learn to operate and maintain the weather stations. The expert(s) will be responsible for:

- Installing automatic synoptic and climate stations
- Training DNM on how to operate the stations including data transmission/storage/treatment requirements
- Training DNM on how to maintain and repair the stations with spare parts
- Building capacity within DNM on how to budget for recurring costs

M. Installation, Operation and Maintenance Training for Hydrological Monitoring Infrastructure (International contract)

Due to the procurement of new hydrological equipment through this project, an expert is required to build the capacity of DG-Eau to learn to operate and maintain the equipment. The expert(s) will be responsible for:

- Installing water flow and water level measuring equipment
- Training DG-Eau on how to operate the equipment including data transmission/storage/treatment requirements
- Training DG-Eau on how to maintain and repair the equipment with spare parts
- Building capacity within DG-Eau on how to budget for recurring costs

N. Capacity Building for National Technical Experts (National, long-term)

A series of knowledge sharing opportunities will be provided to qualified technical personnel to support the collection of hydro-meteorological information and the development of a national multi-risk Early Warning System. Vocational and practical training (i.e., learning by doing) in the latest practices and techniques will be provided national as well as regional and international agencies.

Personnel will be hired in the following institutions:

DNM

- Training on calibration, operation and maintenance of meteorological monitoring equipment
- Climate modelling and climate data analysis
- Numerical Weather Prediction
- Training in tailoring agricultural advisories/weather forecasts and climate predictions based on end user needs

DG-Eau

- Training on calibration, operation and maintenance of hydrological monitoring equipment
- Training in hydrological modelling and flood/drought forecasting scenarios

All personnel will be responsible to their institution and will be required to remain in the institution for at least 5 years post capacity building. The person selected will also be required to seek finance for continued capacity building and knowledge sharing after the project by planning to interact with other scientists through national and international conferences.

Annex 7: Implementing Partner Capacity Assessment (HACT)

FICHE DE SUIVI DES REALISATIONS FINANCIERES PIP 2013

Bilan au 31 mars 2013

Titre du Projet: Gestion des Ressources en Eau Début: BN Fin:

Structure responsable: **Direction Générale de l'Eau**

Localisation: Tous les départements Coordonnateur :**Arnaud ZANNOU**

Objectifs du Projet	**Coût global par source de Financement**		**Dépensescumulées au 31/12/12**	**Programmationfinancière 2013**	**Réalisationfinancière au 31/03/2013 (millions fcfa)**		**Taux de réalisation (%)**	
	Financement	**Montant**			Base engagement	Base ordonnan-cement	Base engagement	Base ordonnan-cement
Promouvoirunegestionintégrée des ressources en eau pour en optimiser le bénéfice social et économique	BN	3 375	1806.5	600.0	5.917		0.99	0.00
					144.046			
	GTZ	342	137.4					
	IRD, AFD		28.5					
	BOAD	4 000	568.39	143.195	119.249		83.28	0.00
Total		**7 717**	**2 541**	**743**	**269**	**0**	**36.22**	**0.00**
Difficultésrencontrées				**Solutions envisagées**				

Visa du responsable de la Structure
leDirecteurGénéral de l'Eau par intérim
Victor Yédé
YOXI

FICHE DE SUIVI DES REALISATIONS PHYSIQUES PIP 2013

Bilan au 31 mars 2013

Titre du Projet: **Gestion des Ressources en Eau** Début:

Structure responsable: Direction Générale de l'Eau Fin :

Localisation: Tous les départements **Coordonnateur** : Arnaud ZANNOU

Objectifs du sous programme	Coût global par source de Financement		Programmation 2013	Unité	Réalisation physique au 31/03/2013	Taux de réalisation (%)
Promouvoirunegestionintégrée des ressources en eau pour en optimiser le bénéfice social et économique	BN	**3 375**			Tenue du Comité de Pilotage du PHPA, Suivi de l'Observatoire de Recherche et du gravimètre de Djougou ,tenue de l'Atelier PHI-UNESCO sur les inondations, mission de finalisation du rapport sur les barrages hydroélectriquesmultifonctions	65
	PNUD	**2 080**				
	GTZ	**342**				
	BOAD	**4 000**			Suivi des chantiers de construction du barrage de Sépounga et de réhabilitation du barrage de Kogbétohoué, Signature en cours des contrats de réhabilitation du barrage de Nawari	65.0
	BANQUE MONDIALE	**9 398**			Validation de documents de l'appeld'offresrelatifs aux réhabilitations des barrages et aménagements de périmètresirriguésdans la bassin du Niger	35.0
Total		**19 195**				**55.0**
Difficultésrencontrées			**Solutions envisagées**			

Visa du responsable de la Structure
leDirecteurGénéral de l'Eau par intérim
Victor Yédé YOXI

ANNEXES II: QUESTIONNAIRE

Liste de contrôle A
Questionnaire sur la capacité de gestion financière des partenaires d'exécution ayant une expérience de travail avec l'UNCT

Évaluation sommaire

Nom du partenaire d'exécution (PE): Direction Générale de l'Eau _____

Date: 07 Mai 2013_____

Nombre d'années pendant lesquelles l'organisme a travaillé avec le PE: 7 années_____
(si moins de deux ans, le questionnaire de la liste de contrôleB doit être rempli)

1. Le volume des dépenses prévues est-il sensiblement différent de celui des dépenses dans le passé ? 2. Y a-t-il eu des changements importants dans l'administration ces deux dernières années ? 3. Des incidents se sont-ils produits qui indiquent que les rapports financiers ont été inexacts ou sujets à caution ?	Oui/Non OUI Oui/Non Oui/Non	Si la réponse est oui, n'allez pas plus loin et remplissez la liste de contrôle B. Si la réponse est oui, n'allez pas plus loin et remplissez la liste de contrôle B. Si la réponse est oui, n'allez pas plus loin et remplissez la liste de contrôle B. Si la réponse est non, veuillez joindre les justificatifs (p.ex. confirmation et rapports sur la vérification NEX, états de règlements précédents)
4. Les organismes ont-ils constaté des problèmes qui pourraient aboutir à une utilisation impropre des fonds : • Manque de séparation entre les fonctions • Manque de supervision du personnel • Suivi insuffisant • Personnel inapproprié /mal formé • Opérations importantes en espèces	Oui/Non Oui/Non Oui/Non Oui/Non Oui/Non Oui/Non	Si l'une quelconque des réponses est oui, n'allez pas plus loin et remplissez la liste de contrôle B.
5. Est-il arrivé que des rapports financiers aient été indûment retardés ?	Oui/Non	Si la réponse est oui, l'UNCT doit en examiner les raisons. Si c'est un motif grave de préoccupation, veuillez utiliser la liste de contrôle B. Si ce point n'est pas un motif grave de préoccupation, veuillez en donner l'explication.
6. Y a-t-il des éléments, outre les problèmes susmentionnés, qui indiquent qu'il y a des lacunes dans les mécanismes de contrôle interne et/ou la gestion financière qui nécessiteraient une évaluation spécifique de la capacité de gestion financière ?	Oui/Non	Si la réponse est oui, remplissez la liste de contrôle B. Si la réponse est non, veuillez conclure l'évaluation.
Résultat de l'évaluation		

Si toutes les réponses sont négatives, le risque global est considéré comme faible.

Si l'une quelconque des réponses est affirmative, l'UNCT doit remplir la liste de contrôle B.

Annex 8: Capacity Assessment Scorecard

Capacity Assessment Scorecard

Project: Strengthening Climate Information and Early Warning Systems in Africa for Climate Resilient Development and Adaptation to Climate Change

This capacity assessment scorecard will be adapted and applied to:

PROJECT OUTCOME 1: Enhanced capacity of national hydro-meteorological services (DNM/DG-Eau) and environmental institutions (CRHOB) to monitor extreme weather and climate change (droughts, floods, strong winds)

PROJECT OUTCOME 2: Efficient and effective use of hydro-meteorological and environmental information for making early warnings and seasonal forecasts which feed into long-term development plans

The scorecard is arranged according to functional capacities for agencies to both monitor and forecast climate-related hazard information, share and package such information with relevant agencies, disseminate both warnings and advisories based on such information and provide appropriate legal and procedural frameworks.

To establish the baseline capacity stakeholders are asked to score their understanding of the existing capacity, where they would like to move the capacity to in the project timeframe, and how they would prioritize each capacity.

The scoring can be adapted and locally defined. The standard scale is:

No evidence of capacity

Anecdotal evidence of capacity

Partially developed capacity

Widespread, but not comprehensive capacity

Fully developed capacity

CAPACITY OF AGENCIES TO PRODUCE INFORMATION							
Capacity Indicator	Baseline: Level of Existing Capacity					Target level of Capacity in the project timeframe	Priority of Capacity (h/m/l)
	1	2	3	4	5		
Capacity to service the observational infrastructure e.g. hydrological and meteorological stations, radar, upper air monitoring, satellite technology etc.		2				5	H
Capacity to generate weather/climate forecasts e.g. Numerical weather prediction (1-7 days), seasonal forecasts etc.	1					4	M
Capacity to utilize internationally and regionally available monitoring and forecast products		2				5	M
Capacity to send local observations to international centres		2				5	L
Capacity to record and use national/local observations for monitoring current meteorological and hydrological hazards in a timely manner		2				5	H
Capacity to record and use national/local observations to forecast future meteorological and hydrological hazards in a timely manner	1					4	H
Capacity to utilise satellite information for climate and environmental monitoring.		2				5	H
Capacity to form partnerships with key stakeholders to ensure effective delivery of agricultural/hydrological support services			3			5	H
Capacity to be able to monitor the cost of operations and maintenance of current equipment		2				5	H
Capacity to assess and understand key stakeholder's needs for climate information		2				5	H
Capacity to enable a free flow of information (e.g. generate, and provide access to data and information to partners and other users)		2				5	H
Capacity to plan cost recovery mechanisms	1					4	H
Capacity to sell products to the private sector	1					5	H

CAPACITY OF AGENCIES TO PACKAGE INFORMATION							
Capacity Indicator	Baseline: Level of Existing Capacity					Target level of Capacity in the project timeframe	Priority of Capacity (h/m/l)
	1	2	3	4	5		
Capacity to fully understand impacts of climate variability and change on food security (e.g. on fisheries , crop production, livestock, etc)			3			5	H
Capacity to fully understand impacts of climate variability and change on water resources and flooding (e.g. dam management and flood risk modelling)			3			5	H
Capacity to combine climate monitoring and forecast information with current agricultural assessments to provide agriculturally specific advisories		2				5	H
Capacity to combine climate monitoring and forecast information with current hydrological assessments to provide hydrologically specific advisories		2				4	H
Capacity to partner with national government structures and academic institutions to develop tailored, sectorally specific information and packaged products	1					4	M
Capacity to feed climate information into policy briefs and long-term strategies		2				5	H
Capacity to analyze relevant data/information for policy strategies such as agricultural production, infrastructure development, credit, insurance and marketing	1					4	M
Capacity to feed climate information, forecasts and tailored information to disaster risk management agencies and frameworks	1					4	H
Capacity of disaster risk management agencies to assess information in a timely manner	1					4	H

CAPACITY OF AGENCIES TO DISSEMINATE INFORMATION							
Capacity Indicator	Baseline: Level of Existing Capacity					Target level of Capacity in the project timeframe	Priority of Capacity (h/m/l)
	1	2	3	4	5		
Capacity to disseminate warnings and advisories in local languages			3			5	M
Capacity to disseminate alerts in a wide range of media (e.g., privileged telephone communication systems, CB radios, SMS alerts etc.)			3			5	H
Capacity for district and community focal points to understand the content of warnings and advisories	1					4	H
Capacity to establish and sustain mechanisms to raise awareness on the impacts of climate shocks and long-term change		2				4	M
Capacity to coordinate with government agencies to respond to warnings	1					4	H
Capacity to coordinate with CSOs to respond to warnings		2				4	H
Capacity to disseminate warnings and advisories to the district level or community focal points		2				5	H
Capacity of local populations to understand climate change and it's long term effects		2				4	M
Capacity to receive feedback on the usefulness of alerts from affected communities	1					4	H

CAPACITY OF LEGISLATIVE AND GOVERNANCE FRAMEWORK							
Capacity Indicator	Baseline: Level of Existing Capacity					Target level of Capacity in the project timeframe	Priority of Capacity (h/m/l)
	1	2	3	4	5		
Capacity for national coordination of emergency response activities	1					4	L
Capacity of standard operating procedures to guide the production, dissemination and response to warnings	1					5	H
Capacity of legislative system to mandate designated authorities e.g. which authority will disseminate warnings, which will produce warnings etc.		2				3	L
Capacity of multiple agencies to contribute to the issuing of warnings through national structures e.g. disaster management committees etc.		2				4	M

BASELINE: 74; TARGET: 161

Annex 9: Environmental and Social Screening Procedure(Double click to access original document)

UNDP Environmental and Social Screening Template (December 2012)

QUESTION 1:

Has a combined environmental and social assessment/review that covers the proposed project already been completed by implementing partners or donor(s)?

Select answer below and follow instructions:

☐→YES: Continue to Question 2 (do not fill out Table 1.1)

☒→NO: No further environmental and social review is required if the existing documentation meets UNDP's quality assurance standards, and environmental and social management recommendations are integrated into the project. Therefore, you should undertake the following steps to complete the screening process:

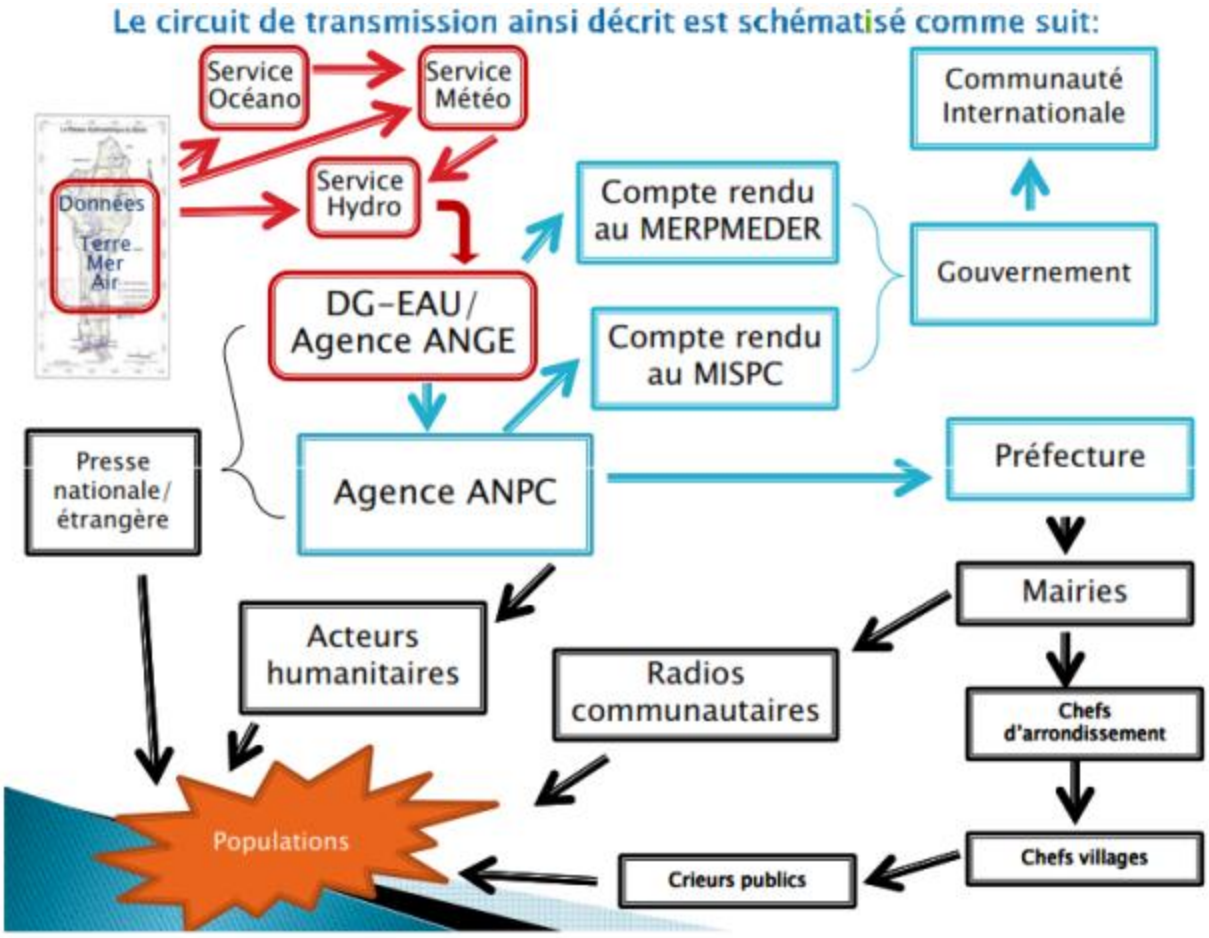
1. Use Table 1.1 below to assess existing documentation. (It is recommended that this assessment be undertaken jointly by the Project Developer and other relevant Focal Points in the office or Bureau).
2. Ensure that the Project Document incorporates the recommendations made in the implementing partner's environmental and social review.
3. Summarize the relevant information contained in the implementing partner's environmental and social review in Annex A.2 of this Screening Template, selecting Category 1.
4. Submit Annex A to the PAC, along with other relevant documentation.

Note: Further guidance on the use of national systems for environmental and social assessment can be found in the UNDP ESSP Annex B.

TABLE 1.1: CHECKLIST FOR APPRAISING QUALITY ASSURANCE OF EXISTING ENVIRONMENTAL AND SOCIAL ASSESSMENT	**Yes/No**
1. Does the assessment/review meet its terms of reference, both procedurally and substantively?	
2. Does the assessment/review provide a satisfactory assessment of the proposed project?	
3. Does the assessment/review contain the information required for decision-making?	
4. Does the assessment/review describe specific environmental and social management measures (e.g. mitigation, monitoring, advocacy, and capacity development measures)?	
5. Does the assessment/review identify capacity needs of the institutions responsible for implementing environmental and social management issues?	
6. Was the assessment/review developed through a consultative process with strong stakeholder engagement, including the view of men and women?	
7. Does the assessment/review assess the adequacy of the cost of and financing arrangements for environmental and social management issues?	

Annex 10: Proposition for Communication Standard Operating Procedure (SOP)

by DG-Eau based on their experience with distributing flood alerts. For the multi-risk LDCF project, DNM must have a direct link with ANPC and ONASA must be an additional recipient of EWS/CI alerts.



Annex11: Responses to Project Reviews

United States Government Comments	
Gambia: Strengthening Climate Services and Early Warning Systems in the Gambia for Climate Resilient Development and Adaptation to Climate Change- 2nd Phase of the GOTG/GEF/UNEP LDCF NAPA Early Warning Project.	
Include detailed activities related to production of climate/hydrological information, communications and sustaining this work and retaining expertise, particularly under component 2.	Activities regarding the production of climate/weather/hydrological information are focused on developing a rapid and targeted delivery of climate information including early warnings based on user-needs, both public and private (p. 12). Output 2.2 (p 39) provides detailed activities on how the project will tailor climate/weather forecast information based on user-needs. Concretely, bulletins specific to a variety of crop (e.g., soil moisture for cotton production) are required on daily and seasonal timescales by subsistence farmers. Need for tailored products was indicated in a previous EWS pilot project managed by the NGO, IDID, where they produced monthly weather bulletins in pilot agricultural regions (Section 2.3.1 p. 22). Under Output 2.2, a market research plan will be used to evaluate the economic potential for generating mobile phone based agricultural advisories which have shown success in neighboring Niger (Plantwise.org). Weather/climate products will also be tailored to the private sector to generate a source of revenue. It was suggested to target service delivery of climate/weather information products for weather-index based insurance during project preparation. The revenue will be used to sustain the collection of data by investing profits to build technical (i.e., equipment and humans resource) capacity in the NHMS for improved data retrieval/usage. Outputs 2.6 and 2.7 (p 42-43) focus on the communication of information including the development of a Standard Operating Procedure (SOP) to clearly identify the role of the Disaster Risk Management unit (ANPC) and how it will have a chain of communication with NGOs/CSOs down to the local level (mayors). Also, Output 2.7 includes a public awareness campaign to inform the local populations on the utility of this information for adaptation to climate change. Expertise in generating hydro-meteorological information will be retained by mandating all trained technicians/engineers within the NHMS to remain in their position for 5 years to ensure knowledge sharing.
Maintain close relationships and establish partnerships with relevant organizations working on climate and hydrometeorological services in the project region and make use of lessons learned from related efforts. This will strengthen capacity and connectivity within the broader region.	This project will ensure there is a solid collaboration with EWS-related projects supporting climate and hydrometeorological services in the west African region including ClimDevAfrica (climate information in Africa), AgryMet (agriculture), ViGIRisC (establishement of vigilance systems for climate risk), Niger-Hycos (transboundary hydrological modeling in the Niger watershed) and AMESD (satellite data retrieval to assist with food security forecasts). The LDCF project will also work with initiatives which are focusing on marine services in West Africa including among others the Programme of Cooperation for Development of NMHSs of West African Countries, the Adaptation to Climate Change in Coastal Zones of West Africa (ACCC) project and the West African Economic and Monetary Union, with its project on coastal erosion (See p 22, Related Initiatives section). It is essential to build a strong synergy with WMO's regional initiative, the Global Framework for Climate Services (GFCS) because this program focuses on Development of a framework of regional and national climate services , Rehabilitation and upgrading of the observation network , Demonstration projects focused on development and use of customised climate information products e.g. in the health sector.
Describe how the project will ensure that the production of information is driven by the needs of the users and delivered through appropriate user-friendly channels	Outputs 2.2 and 2.6 (p 40 and p 43) address the tailoring of climate/weather products based on user-needs and the development of a Standard Operating Procedure for EWS/CI communication respectively. Bulletins specific to a variety of crop (e.g., soil moisture for cotton production) will be produced on daily and seasonal timescales for subsistence farmers as per their request in a previous EWS pilot project managed by the NGO, IDID (Section 2.3.1 p. 22). As discussed during project preparation, service delivery of climate/weather information products will be targeted towards the weather-index based insurance (Annex 4). Relative to user-friendly communication, SMS services and local radio will be supported to provide information. LDCF funds will support the development of partnerships between the DRM (ANPC) and local radio networks which require payment (Activity 2.6.3, p 42). End-user feedback on the utility of information will be highly valued in project implementation and thereafter by including a feedback chain to enable end-users to voice their needs/concerns to local EWS focal points (Activity 2.6.5 p 43).
Include clear explanations of how local communities and women will be involved	Local communities will take part in the development of the Standard Operating Procedure for communication; Grass-roots based NGOs/CSOs and local mayors will be trained on how to most efficiently and effectively communicate alerts and information in Activity 2.6.6 (p 40). EWS/CI focal points who the local communities can contact will be designated. End-user feedback on the efficacy and

in shaping the project and describe how the project will benefit vulnerable populations and individuals.	speed of EWS/CI alerts will be made possible by including a feedback chain to enable end-users to voice their needs/concerns to the local EWS/CI focal points (Activity 2.6.5 p 40). Furthermore, local populations will be used to assess the project indicators (See Project Results Framework Section 3). In the beginning of the project, a gender dis-aggregated survey will be conducted to determine how many people receive alerts (highlighting women). This same survey will be conducted at the end of the project once the EWS system has been implemented. The Stakeholder Involvement Plan (Section 2.9 p 52 Annex 5) describes how women-focused NGOs/CSOs (Plan Benin, Caritas, Care International) will be responsible for conducting the survey in order to ensure that women receive alerts. Furthermore, during the preparation phase (see Annex 4, Key assessment report and section 2.9 Stakeholder Baseline Analysis p 52) these women-focused NGO/CSOs were fully integrated into the participatory design process.
Activities related to data stewardship should be expanded to include a plan for data sharing throughout the region and globally.	Data sharing is quite critical for a country like Benin where watersheds traverse country boundaries and weather patterns move progressively over the region (p 12). This project will facilitate data sharing by developing a centralized EWS information server (Output 2.4, p 41). Technical NHMS, research organizations and the Disaster Risk Management Unit (DRM) will be able to have priveledged access to this information. A ftp connection will also be established to facilitate data sharing regionally. Globally, data will be communicated to the Global Telecommunication System in Activity 2.4.1.
Clearly articulate the sectors that will benefit from the project, and include considerations of the adaptation priorities and needs of local communities.	The largest benefits are expected from building capacity of the climate/environmental information production agencies to provide rapid alerts and tailor climate products to the needs of various socio-economic sectors (e.g., agriculture, health, cotton) (Approximately 340 people will benefit in the NHMS and the DRM, see Section 2.3.4 p24). By the project enabling a pilot study on tailoring climate services and market research on the potential for mobile phone-based agricultural advisories, the foundations will be set for self-sustainable NHMS. For instance, although total food production has steadily increased in Benin , over the past decades, per capita food production has decreased. As such, Benin farmers can take advantage of improved local forecasts of winds, rain and temperature. Together with satellite imagery used for land-use planning and monitoring, tailored climate products can also provide significant local environmental benefits, such as detailing best coastal management practices which is crucial to help Benin adapt to and fight against coastal erosion. At the local level, early warnings and climate hazard mapping can provide economic benefits by reducing losses of agricultural produce, infrastructure (roads and bridges) and disruption to people's livelihoods. The selected four target zones are considered the most vulnerable agro-ecological zones as identified in Benin's NAPA (2008). Communities will also immediately benefit from the Standard Operating Procedure to be implemented for alert communication. The total population benefiting from these developments is estimated to be 3.2 million (Section 2.3.4 p25)and has the potential to grow immensely if warnings extend to a reasonable percentage of the total population e.g. through a mobile phone relay. Also, the feedback mechanism can enable the communication mechanism to be improved via end-user comments/suggestions.
The proposal requests funding for an "appropriately equipped hydrological boat for comprehensive profiling of salinity". We request UNEP and UNDP to explain why this platform was chosen over lower cost platforms.	In this project, two Zodiac inflatable boat (1 for the Hydrological Service, DG-Eau and 1 for the Oceanographic Research Center, CHROB) will be purchased because it is the most cost-effective method to deploy non-fixed instruments for coastal and hydrological monitoring to sample flowrates at different places in water bodies.
Given the similarity between all the PIFs, it is recommended to develop one regional PIF OR conduct more in-depth analysis of gaps and needs for each country.	The outputs for this LDCF project have been tailored to address the gaps and needs for the NHMS, (DNM/ASECNA, DG-Eau and CRHOB) as well as the Disaster Risk Management Unit (ANPC), relevant NGOs/CSOs (see Stakeholder section 2.9 p 55) and local communities in Benin. The gaps and needs of these key early warning institutions and end-users of early warning system information have been identified through multi-stakeholder consultations conducted including i) the inception workshop held during September 2012 which was used to identify relevant EWS agencies involved with climate and hydro-meteorological information production as well as agencies that should be implicated in alert dissemination to vulnerable populations, most notably farmers and rural women. It was also used to

	detail the baseline of EWS-related initiatives (outlining gaps, successes and failures) and identify potential co-financing sources including institutions who are managing/developing relevant on-going/planned EWS related initiatives, ii) the second mission workshop in January 2013 was used to 1) to define and validate Early Warning System (EWS) costs provided by each agency in Benin 2) to perform a capacity assessment of all information production and dissemination agencies and 3) to formalize the roles of each EWS agency in information dissemination. Results from the self-assessment on capacity and prioritized needs are detailed in Annex 4. iii) Most recently, the final validation workshop was held in April 2013 and was used to confirm the Management Arrangements, partnerships, project indicators, risks, assumptions, synergy mechanisms and project outputs and budgets.
Long term data records require sustainability and therefore need more detail for output 2.5 (sustainable financing) and how it will overcome barriers.	Long-term data records will be reinforced by digitizing data in Component 1 (Activities 1.1.5 and 1.2.6 p 32,34) and having designated servers for data storage, including back-up methods, in each information production agency. In order to ensure that data will continue to be collected, several design aspects to ensure project financial sustainability have been made (See Sustainability Section 2.7 p 53 for more details). 1) Equipment procurement will be staggered so that enough technical support is available to continue operation and maintenance of existing equipment and to be trained on new equipment installations. This will prevent any interruptions in equipment operation/data collection. 2) Continued support for monitoring will be established by developing a framework for DNM/ASECNA/DG-Eau/CHROB to properly plan sustainable government budget lines including cost recovery mechanisms (Output 1.4 p 35). In particular, Benin's budget lines will be analyzed so that financing can be made available to fund a radar in the future (Activity 1.2.7 p 34). To date, all equipment operation and maintenance is funded by existing government budget lines. 3) Tailoring products to the private sector will also serve as a way to recover costs. Significant capacity building regionally will be supported so that cross-sectoral weather/climate/hydrological products can be delivered. By making EWS/CI more useful to various sectors, this pushes the Government to include core budget lines to support monitoring equipment operation and maintenance due to the cross-sectoral importance of EWS/CI (e.g., health epidemics linking to temperature trends, agricultural advisories based on rain patterns).
Ensure that integration of hydro-met system, satellite, gauges and radars is considered. Radars are expensive to install and maintain and can exceed national budgets.	Benin is focusing on rehabilitating/procuring hydro-met and coastal monitoring infrastructure only. Through the AMESD project, they receive satellite information and are able to fully exploit this data with their SYNERGIE system (MeteoFrance). The SYNERGIE system also collects radiosonde information from neighboringcountries which can be considered representative of the vertical atmospheric profile of Benin. Considering the high costs and lack of existing infrastructure, investing in a new radiosonde launching station is not cost-effective (launches are $100/day). Benin is focusing on planning to purchase a radar. Activity 1.2.7 (p 34) will use LDCF funds for capacity reinforcement on long-term planning and financial budgeting for DNM to have the ability to procure radar in the future.
Projects will be challenged by a lack of IT infrastructure (bandwidth, etc.) to collect, analyse, exchange and archive data.	Significant IT equipment has been included in Component 1 for data downloading, data archive and exchange and in Component 2, the open-access data server will serve to exchange data. Back-up servers will also be acquired where appropriate. It is recognized that bandwidth is limited in Benin and is listed as a risk in the Project Results Framework Section 3 and the Risk Analysis Annex 1. To improve bandwidth, an activity has been developed to establish a service level agreement with the GSM operator (MTN) which will give a bulk rate for servers and modems as well as increased bandwidth for internet connections through the purchase of a yearly subscription. For the new IT developments, training in data transmission/storage/usage will be provided by a Communications expert in Output 1.4 (p 35) for DNM/ASECNA, DG-Eau and CHROB.
There is a lack of workstations to make forecasts, access global products for downscaling etc.	Forecasting equipment in Component 2.1 includes the exploitation of the existing SYNERGIE system (MeteoFrance) and procurement of IT equipment to handle forecast visualization, data assimilation and downscaling. Data in SYNERGIE comes from a combination of weather station, radiosonde and satellite observations.There is significant budget allotted to continue training for the SYNERGIE system as well as budget and an activity to plan for license renewal after completion of the project. Four (4) work stations for data collection/use and forecasting will be procured under Activity 1.2.4 p 34.
There is a lack of private capital to support the large costs of modernisation.	Future investment by private agencies will be facilitated by reinforcing the capacity of the DNM/ASECNA, DG-Eau, and CHROB to produce tailored climate products and hence the attractiveness of products that the private sector is willing to pay for. Bilateral consultations during the project development phase indicated that potential private clients include weather index-based insurance companies, building construction firms and the cotton industry (Annex 4). Revenues obtained from selling tailored products to the private sector support can help with equipment O&M costs and costs to continue to modernize equipment. Recurring costs for weather/climate/environmental monitoring will be

	included in national budget lines in order to ensure their financial sustainability.
Specific details on which hazards are important and where should be included.	Benin hazards include floods, drought, coastal erosion, sea level rise, storm surges and strong winds. The 4 vulnerable agro-ecological zones chosen where the EWS/CI system will be tested have their own specific risks. As shown in Figure 2 p 26, maps of the relative risk of strong winds, versus heavy rainfall events versus increased temperatures are compared amongst the four target zones.
More analyses of climate needs to be included in determining where hydromet stations should be located.	Climate stations with the role of measuring climate variables (namely temperature and rainfall) will be procured. DNM/ASECNA conducted a feasibility study with the Ministry on the Environment to see what time of equipment is needed for monitoring and where these specific stations should best be placed (Evaluation on Systemic Observation Systems and Research on Climate Change in Benin (2011), Annex 4). Two new synoptic stations are to be placed in Bembèrèkè, Djougou and 3 new climate stations will be placed in locations to complement the existing networks (See Annex 4 for DNM's analysis). Type and placement of rain gauges were discussed thoroughly at the Validation workshop in late April 2013. Automatic rain gauges will be used and placed by both the Met and Hydro Services in complementary locations as shown in the list provided in Annex 4).
To ensure that the appropriate climate observations are recorded and applied, the following considerations should be included:	
Clear descriptions of the types of observations that are required and how they will feed into an EWS appropriately.	Types of observations: weather station, hydrological / coastal monitoring equipment and SYNERGIE forecasting observations. Synoptic weather stations will measure temperature, rainfall, soil moisture, evapotranspiration and pressure variables on the surface or in the case of wind, 2 or 10 m above the surface each hour. Climate and agro-meteorological stations will measure rainfall amount, maximum and minimum temperatures each day. Flow meters and water level meters will provide discharge measurements every hour. Coastal monitoring equipment will measure sea levels, sea surface temperatures and erosion rates daily. Combined, these observations will provide information to support daily weather forecast generation. Forecasts will be generated using the SYNERGIE system (MeteoFrance) which can display satellite images, upper air observations and combines regional weather station data for fore and now-casting. For climate analyses, climate and agro-meteorological stations as well as coastal monitoring equipment and existing satellite image software used to detect images of the Earth's surface on a daily basis (provided through the AMESD project) will be used to predict climate trends such as drought periods by looking at soil moisture measurements and dry periods over several months.
Provide data to world climatic data centres.	Yes, climate/meteorological data will be supplied to GTS (Activity 2.4.1 p41) (Global Telecommunication System) – the international system for met data collection/analysis and hydrological data will be provided to the WHYCOS project (World Hydrological Cycle Observing System, WMO). Benin provides data to WHYCOS through its on-going Niger-Hycos project.
Clearly distinguish between weather and climate observations and how they are used.	Weather observations will be used in hydro-meteorological models to produce daily forecasts for predicting extreme and severe weather or for seasonal forecasts (timescale of up to 6 months in advance). Climate observations will be used for long-term predictions (on the order of years) and will be provided to planners (ONASA, CHROB) and will feed into the next PRSP, the Priority Action Programmes (PAP), the Environmental Management Plan (PNDC-GEM) and the Agricultural Revival Strategy, NGSPR . Outout 2.1 p 39 and Output 2.5 p 42.
Details should be provided on whether additional funding for procurement of technology can be accessed.	The project document details the co-financing sources and baseline projects which have been used or will be used to procure equipment complementary to those planned in this project. In Benin, there are 3 other EWS initiatives for floods in either the Mono or Ouémé basins (funded by the World Bank, GIZ and the EU) which will be used to procure hydro-met equipment (See Baseline Section 2.4.1 p 29). With these equipment installations, Benin will be in a good position to create forecasts/predictions. However, as concluded during the Validation Workshop in April 2013, an activity on capacity reinforcement (Activity 1.2.7 p 24) is necessary to provide Benin long-term planning and financial budgeting expertise for DNM to have the ability to procure a radar in the future.
Project goals include mitigation of flood/drought losses but have insufficient hydrological modeling described in the PIF.	Hydrological modeling with HECRES and MIKEBASIN models (to provide watershed modeling and hydropower/pipeline modeling respectively) has been emphasized. This capacity has been partially built during small-scale EWS flood projects. Capacity reinforcement will build off the existing hydrological modelling expertise gained with these other flood modelling projects. Please see Output 1.1 for details.
Include considerations of how capacity of hydrological services	The hydrological service (DG-Eau) has focused on single watershed floods and some dam management modeling up until now. This project will be used to combine this information with a complete upstream/downstream watershed model in order to predict floods across the country and potential

(and agriculture) can be improved e.g. issue flood and drought monitoring and early warnings.	periods of droughts (e.g., when reservoir levels are low).
Address links and gaps between representatives of hydromet and agriculture e.g. will the meteorological data work with hydrological/agricultural models, or will it require manipulating?	The NHMS and the agriculture sector already work together to produce alerts for famine. The National Office for Food Security (ONASA) works with the Met Service (DNM) and the Hydrological Service (DG-Eau) to produce alerts. Also, in the NAPA1 project funded by LDCF, the Ministry of Agriculture has worked with DNM to install rain gauges to create a smaller-scale EWS for food security through the establishment of multi-disciplinary working groups (GTPA). These existing collaborations including the GTPA groups will continue to be expoited in this project. DNM and DG-Eau will be responsible for weather/climate information production, ONASA and the Ministry of Agriculture will serve as responsible parties on the Project Steering Committee and the GTPA groups will be one of the coordination entities. Data will not require manipulating. Generally, the hydrological/agricultural models require temperature, rainfall, wind, evapotranspiration and soil moisture input on seasonal timescales which are provided by existing stations. New or rehabilitated stations will expand the network coverage providing more expansive and representative weather/climate measurements.
In Component 2 there is a need to articulate the types of forecasts that will be produced.	Benin requires early warnings on short-term scales, (hourly, daily and weekly) to produce flood forecasts and weather forecast bulletins indicating rainfall intensity and wind speeds. They also require long-term seasonal forecasts for extreme weather (droughts) and long-term climate predictions for coastal erosion and sea level rise. (Output 1.2 p 24)
The focus of the PIF tends to be on early warnings and does not include long term changes to extreme weather events. Ensure that climate information can be integrated into development plans.	The project is indeed focused on strengthening climate information for seasonal forecasts and long-term climate predictions. Coastal sea level and erosion measurements will be used to predict long-term coastal damage. Integration of EWS/CI into the the Poverty Reduction Strategy paper (SCRP), the Priority Action Programme (PAP), the Environmental Management Plan (PNDC-GEM) and the Agricultural Revival Strategy (NGSPR) that integrate climate information in their formulation of proverty reduction strategies at local levels is an activity in Output 2.5. Activity 2.5.1 (p 42) mandates the EWS synergy building platform (CIMS) to facilitate and promote as a national priority the integration of EWS/CI into development plans to help Benin prepare for crises/catastrophes.
Hydrometproducts which are sold for a fee will limit uptake by vulnerable populations.	Hydromet products will be free for the general population such as the current situation. Fees will be obtained from the private sector who have the means to pay for tailored climate products for particular sectors and locations. Revenue from these fees will be used to tailor products for local end-users (e.g., subsistence farmers) who do not have financial means to pay. A market research study will also be conducted to see if it is feasible to sell mobile-phone agricultural advisories such as the idea of Plantwise.org.
Include consideration of how the project will benefit women, noting that evidence suggests that women do not receive EW messages via radio.	As referenced in Karen O'Brien's research on women's lack of involvement in EWS, the gendered division of household labour in Benin means that women are generally charged with the responsibility to secure water, food and fuel for cooking and heating and often have very little time to devote to alternative sources of income due to domestic and farming responsibilities; in addition, they may be excluded from some activities due to cultural norms, or due to lack of capital and ownership arrangements that confer all rights to men in the family. In effect, this project focuses on providing EWS/CI to women to improve their ability to adapt to climate change. Women's receipt of EWS/CI will be gauged with an indicator in the Project Results Framework (Section 3). In the beginning of the project, a gender dis-aggregated survey will be conducted to determine how many people receive alerts (highlighting women). This same survey will be conducted at the end of the project once the EWS system has been implemented. The target is to have an increase of 50% for the receipt of EWS/CI by women. In addition, the Stakeholder Involvement Plan (Section 2.9 p 55 Annex 5) describes how women-focused NGOs/CSOs (Plan Benin, Caritas, Care International) will be responsible for conducting the survey in order to ensure that women receive alerts. Furthermore, during the preparation phase (see Annex 4, Key assessment report and section 2.9 Stakeholder Baseline Analysis p 55) these women-focused NGO/CSOs will be fully integrated into the participatory design process.
ACMAD, GEO and AfriGEOSS are not mentioned despite coordinating earth observations and climate	ACMAD, responsible for the African Early Warning and Advisory Climate Services, AEWACS project is mentioned in Section 2.4.2 p 28. The Benin project must collaborate with ACMAD's ViGiRiCproject which is developing a regional EWS and vigilance systems to cope with climate risks in Africa. Although ViGIRisC is on a regional level, it will require data from the LDCF project. Technical personnel from DNM/ASECNA will be sent to ACMAD's forecasting training centers Under Output 2.1.

observations.	Costs for sending technical personnel are included in the budget. GCOS and ClimDevAfrica are currently working with DNM/ASECNA in collaboration with ACMAD and the GEO project is working with UNEP Benin. These are all considered on-going relevant national and regional initiatives (Section 2.4.1 p 31). This project will also build a collaboration with the ClimDevAfrica programme part of GCOS (the Global Climate Observing System). Furthermore, a related initiative in Benin is the AGRHYMET initiative which incorporates satellite data (formerly the AMESD project and now the MESA project) to improve climate information and the WHYCOS (World Hydrological Cycle Observing System) projects (Volta-HYCOS and Niger-HYCOS) which exploit and share satellite information related to hydrology to model common drainage basins which traverse country boundaries (Section 2.4.2 p28).
There is a need to include WMO and the GFCS initiative.	The WMO regional focal point is active in Benin and acts as a source of technical support. He assisted with a feasibility study on station placement with DNM/ASECNA (Annex 4). Due to his knowledge of regional weather/climate initiatives, he is considered a coordination entity in the Implementation Arrangement and will be consulted when there are duplication issues with other project initiatives (See Management arrangments Section 5 p68. The GFCS is considered an on-going related initiative in Benin (Section 2.4.3 p37), but has not yet done any concrete actions.
Clarify how it plans to promote coordination between ministries at both the national and provincial level. We appreciate the involvement of multiple government agencies and institutions as this EWS will not only require input from various sector experts but also produce information applicable to numerous ministries and institutions.	During the implementation phase of the UNDP-GEF/LDCF initiative, the Multi-agency and Inter-disciplinary platform for Synergy (CIMS) will be created to ensure coordination with other EWS agencies (from national down to local levels) and synergy with EWS-related initiatives to maximize project complementarity. This includes early warning systems already in place for famine and localized flooding. Technical focal points from information production and dissemination agencies will form a technical support group. They will work with the already formed GTPA, which have recently been established through the NAPA1 project, to assist with famine alerts and include focal points from cross-sector institutions/organizations. The Disaster Risk Management agency, ANPC, will have a decentralization support committee including representives on regional (prefect), local community levels (mayors), and representatives from NGOs/CSOs to help with information and alert dissemination.
Outline how users will be involved both in the design of the EWS and in deciding what information is produced from the EWS as well as how information will be disseminated. Better results can be achieved by ensuring that climate information and early warning system products are user-driven and communicated to users through various innovative channels	The Benin EWS/CI includes the development of a feedback mechanism in the Standard Operating Procedure for communication to be implemented. The feedback mechanism via SMS and toll-free numbers to designated EWS focal points will ensure that end-users are engaged and are able to provide their suggestions on how to improve communication and alerts. They will also be able to get involved in a pilot study to demonstrate how best agricultural weather advisories should be customized to their needs. Climate/weather products that are service-based and end-user driven, such as weather bulletins and sms agricultural advisories (Plantwise.org) will be developed under Output 2.2.
Clarify how it will communicate results, lessons learned and best practices identified throughout the project to the various stakeholders both during and after the project; and	The Multi-agency and Inter-disciplinary platform for Synergy (CIMS) will hold regular information, lessons learnt and good practices meetings to strengthen collaboration among EWS agencies and EWS-related initiatives. From a project development point of view, the UNDP Monitoring and Evaluation mechanism will be used to track project progress with the quantitative indictors outlined in the Project Results Framework (See Section 3).
Engage local	All relevant NGO/CSOs including women representing NGOs (Caritas, Care International and Plan

stakeholders, including community-based organizations and environmental NGOs in both the development and implementation of the program	Benin) have been consulted during project development and will continue to be engaged through the Stakeholder Implementation Plan. Also, Output 2.7 is dedicated to working with the local stakeholders through a public awareness campaign and holding workshops in the target EWS regions in order to get local stakeholder input.

Germany comments on the PIF "Strengthening Climate Services and Early Warning Systems in the Gambia for Climate Resilient Development and Adaptation to Climate Change- 2nd Phase of the GOTG/GEF/UNEP LDCF NAPA Early Warning Project"	
A robust strategy to ensure sustainability of project, particularly with reference to investments in infrastructure and climate services, should include commitments from partners as well as an assessment of risks related to the sustainability of investments.	This project is heavily focused on making investments in infrastructure and climate services. To ensure these investments continue to provide benefits after the project ends, co-financing agreements have been made to leverage other projects and be leveraged by these projects. For example, the European Union through their PAPGFDC project has agreed to co-finance this project for $10.4m because the PAPGFDC project is trying to mitigate flood impacts in the Ouémé watershed (See other co-financing agreements in Table 9 p 48). Furthermore, Output 2.2 (p 39) will strengthen DNM/ASECNA, DG-Eau, DGE and CRHOB's capacities to tailor early warnings and CI to public and private end-users from various socio-economic sectors. A pilot project will be implemented to demonstrate the potential for targeted service delivery of climate/weather information products (e.g., for weather-index based insurance). Market research will also be conducted to develop mobile-phone based agricultural advisories (Activity 2.2.5 p 39). TORs to find expertise to support tailoring weather/climate products and market research have already been drafted and agreed upon by Stakeholders during the Validation workshop (Annex 6). Collaboration between the information production agencies, NGOs/CSOs, the National Office for Food Security (ONASA) and the Oceanography Institute (CRHOB) will ensure forecast bulletin or alert information is provided in useful quantitative units (e.g., crop yield, area of flood plain, sea surface temperatures) at desired frequencies for various economic sectors (e.g., seasonal for agricultural) including the rural populations who are most vulnerable. Through this approach, the Government will gain incentive to include budget lines to provide continual support for climate/weather/environmental monitoring due to its cross-sectoral importance. Also, capacity for long-term operation and maintenance planning and budgeting will be built in all information production agencies through Activity 1.4.4 p 36 with the support of regional technical expertise. All of these initiatives are meant to combat the 2 main risks to the sustainability of the project (Table 7 p 47); 1) Continuity breaks in National Hydro-meteorological services due to the work required with new equipment and 2) Benin does not have enough government financing to continue monitoring and to cover recurring O&M costs.
As the proposed project requires very specialized technical expertise on meteorology (hardware and software), provide detailed information on how expertise and comparative advantages of partners is incorporated in the project	This project is unique in that it will have a regional component to enhance coordination, increase cost effectiveness and, most importantly, enable the participating EWS/CI countries to exploit specialized technical expertise. 10% of the budget is allotted to support regional experts in the fields of hydrology, meteorology/climatology forecasting and prediction, and communication systems. (See TORs in Annex 6). Additionally significant technical capacity building is included for DNM/ASECNA in Output 2.1 (p39). The existing partnership between DNM and ASECNA (See Decree in Annex 2 Agreements) will be strengthened because currently all forecasting skill is housed within ASECNA. As DNM is responsible for their outputs for civil aviation, ASECNA will become responsible to DNM for transferring their forecasting skills and sharing their hardware (work stations) and software (SYNERGIE system) with DNM. Furthermore, Activity 2.2.2 (p 40) will support knowledge sharing for DNM on Numerical Weather Prediction models (e.g., WRF and COSMO) with international centers (e.g., MeteoFrance) and regional centers (ACMAD, responsible for the African Early Warning and Advisory Climate Services, AEWACS or ViGIRisC project and for the ClimDevAfrica programme) to build forecasting expertise.
The additional cost reasoning should be outlined more clearly. Much of the investment is for the weather related	Current hydro-meteorological infrastructure (water level meters, synoptic and agro-met stations) is not regularly maintained and this is exacerbated by the fact that the equipment is antiquated. Equipment failure is also related to inadequate placement of the technologies which has caused the equipment to be impacted by weather risks or acts of vandalism. Outputs 1.1 and 1.2 of this project will be used to procure, install and/or rehabilitate critical infrastructure required to build and strengthen the climate-related observational network nationally for multi-risk purposes (floods, droughts, sea level rise / storm surges and strong winds). All existing EWS projects are focused on predicting floods or famine in localized geographical areas. In contrast, this component will focus on establishing national hydro-meteorological monitoring capabilities in order to produce

observational network and brings considerable co-benefits for economic activities, logistics and transport. However, a baseline development of maintaining and upgrading of infrastructure is not described. Please elaborate on the climate and climate change related benefits in comparison to the business as usual investment.	EWS/CI for both climate zones in Benin, particularly the most vulnerable agro-ecological zones indicated by the NAPA. Data transmission from stations will be supported by improving SMS transmission (for existing manual stations) or with GPRS connections (in the case of automatic weather stations). Data will also be transmitted through the acquisition of privileged phone communication systems (CB radios) provided for key information producers (Activity 1.2.4 p 34). Capacity building will initially be provided by the equipment manufacturers (generally for 2 weeks after installation). Capacity will continue to be built to maintain and operate equipment with regional technical support training on at least a biannual basis (See TORs Annex 6). Furthermore, equipment has been budgeted to include the cost of spare parts (approximated to be 25% of running costs if not known) and field trip validation costs to verify equipment operation are considered (Output 1.1 and 1.2 p 32 and 34).
An up to five percent fee for "National implementation" is mentioned. Strong partner involvement and ownership in the implementation of this project is important but should not be at the expense of overall project management fees. Please outline how the five percent fee relates to the agency fees.	The 5% fee are the Project Management Costs, the costs to run the project by the National Implementing Partner (The Ministry of Water for Benin). These funds will be used to support the Project Coordinator and the Financial and Administrative Assistant . They will also cover in-country logistics and supplies. These costs are distinct from Agency fees which are to provide oversight and quality assurance of the project-- which in this case is by UNDP (through its country office, region based staff and HQ-based staff).
Liberia:	
Recommend targeting the amount of people that should be reached through communication channels in sub-component 2.2 (quantification) and to make sure that the most vulnerable populations are reached.	Every part of Benin requires monitoring for extreme events because as recent events have proven, the entire country could be subject to devastating floods, dry spells, and strong winds. Benin's NAPA has outlined that, currently, four key regions require improved forecasting of floods, droughts and/or strong winds (see Figure 1 p 25). These regions have been chosen because the weather risks and prevailing livelihood strategies differ in the four zones (Figure 2 p 26). As a result, they have specific needs for risk forecasting and rapid warning for food security in accordance with Benin's National Adaptation Programme of Action (NAPA 2008). The project will build Early Warning services based on the needs of the principal end-users: the rural populations including farmers and producers in these regions/zones. Overall, the project will improve the adaptation to extreme weather events for some of the most vulnerable communities in Benin. Directly, it is expected to provide alerts and climate information to over 70% rural and 30% urban people, an estimated 50% of who will be women in the target communities (with the potential for up-scaling). Indirectly; through building the capacity of sub-national institutions to understand and efficiently disseminate alerts, namely for ANPC and NGO local branches, the project will benefit over 3.2 million residents. (Section 2.3.4 National and Local Benefits). The most vulnerable will be reached by including the NGO/CSOs who are familiar with the regions and have a ground presence (Caritas, Plan Benin, See Stakeholder Implementation Plan Section 2.9.1 p 55).

It is recommended to explain the selection process i.e. definition of the "most vulnerable communities" in Output 3.2.	This project is targeting to implement and test EWS/CI in 4 vulnerable agro-ecological zones as defined by the NAPA. The local people's vulnerability is in reference to their inability to be food secure and/or to have been greatly impacted by weather/climate risks such as drought, coastal erosion, coastal or river floods (Section 2.3.4, National and Local Benefits p 24).

The World Bank's comments on LDCF EWS PIFs	
There is concern that approving these projects based on a template is at the expense of more robust proposals (perhaps more targeted) and could pose a reputational risk to the GEF.	Project development has targeted EWS/CI specific to Benin. Component 1 deals with specific equipment procurement/rehabilitation and training needs for DNM/ASECNA/DG-Eau and CRHOB (the Met, Hydrological and Oceanographic Services respectively). The second component deals with how the data collected will be targeted to the subsistence farmers and the potential private sector clients (building, weather insurance and cotton). The project will build off regional initiatives (ViGIRisC, AMESD) and baseline projects (GIZ, EU, WB). All risks, assumptions, outputs and indicators are specific to Benin. The only component of this project, which is not specific to Benin, is the regional technical supportincludingexperts in the fields of hydrology, meteorology/climatology forecasting and prediction, and communication systems who will be recruited (See TORs in Annex 6) to ensure international standards and processes are maintained/developed. The remainder of the project is based on 3 separate stakeholder consultations in Benin, as well as the needs articulated by the government of Benin, NGOs and users of early warnings.
There is insufficient assessment of current state of hydro-met sector, past failures and their causes.	Current hydro-meteorological infrastructure is not regularly maintained and this is exacerbated to the fact that the equipment is antiquated. The failure is also related to inadequate placement of technology where equipment is impacted by weather risks or acts of vandalism. Outputs 1.1 and 1.2 of this project will be used to procure, install and/or rehabilitate critical infrastructure required to build and strengthen the climate-related observational network nationally for multi-risk purposes (floods, droughts, sea level rise / storm surges and strong winds). Equipment failure has also been caused by a lack of technical personnel to maintain and operate the equipment. Many technical personnel have recently retired. This project includes significant technical recruitment considering the needs to maintain/operate new equipment and run forecasting models. Terms of reference mandate that any new personnel who are trained must remain in their respective institution for at least 10 years in order to ensure knowledge sharing (See TORs Annex 6). Capacity will continue to be built to maintain and operate equipment with regional technical support training on at least a biannual basis (See TORs Annex 6). Furthermore, equipment has been budgeted to include the cost of spare parts (approximated to be 25% of running costs if not known) and field trip validation costs to verify equipment operation are considered (Output 1.1 and 1.2 p 33 and 34). Also, capacity for long-term operation and maintenance planning and budgeting will be built in all information production agencies through Activity 1.4.4.
There is insufficient consideration of the limitations of current capacity, which currently prevents many of the proposed activities in some countries.	During the design phase, it was noted that current hydro-meteorological infrastructure (water level meters, synoptic and agro-met stations) is not regularly maintained and this is exacerbated by the fact that the equipment is antiquated. Outputs 1.1 and 1.2 of this project will be used to procure, install and/or rehabilitate critical infrastructure required to build and strengthen the climate-related observational network nationally for multi-risk purposes (floods, droughts, sea level rise / storm surges and strong winds). However, some activities which plan to build off the equipment rehabilitation/acquisition will not be able to be fully supported due to existing barriers. Barriers identified include slow data transmission from manual hydro-meteorological and coastal monitoring infrastructure, poor long-term budget planning, and insufficient technically skilled human resources (Section 1.3 p10). As a result, the design reflects what has been learned from trying to tackle these barriers through other projects (See Baseline initiatives Section 2.4.1 p 29) and identified in the risks of the Project Results Framework (Section 3 p 62). Risks now identified include 1) Data sharing is hindered by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks), 2) Benin does not have enough government financing to continue monitoring and to cover recurring O&M costs and 3) Lack of qualified personnel within the NHMS to operate and maintain new equipment, data transmission/treatment/storage processes and forecasting models. Countermeasures and management responses for these risks are listed in the Risk Analysis (Annex 1 p79).
Cost estimates are	Costs are based on budgets provided by each national agency during project development

unrealistic and do not include variation between countries and O&M (operations & management) costs.	(DNM/ASECNA, DG-Eau and CHROB, See Annex 4). The choice of equipment/technology/approach has been based on a cost-effectiveness evaluation (See Section 2.6 p 47). Costs have been weighed against the intensive time and expenses required for training with new equipment. In each of their respective budgets they weighed the future running costs and the ease of maintenance. For DNM/ASECNA, DG-Eau and CHROB a mix of automatic and manual equipment has been proposed (See Outputs 1.1 and 1.2 and 1.3 p 33-35). Some adjustments were made to the proposed costs so that they agreed with suppliers' estimates. Operational costs in terms of supporting data transmission through SMS/GSM have been included. Training for manual observers is also included as well as security costs for hydro-meteorological stations. Maintenance costs such as to re-calibrate rating curves or sensors on weather stations as well as basic upkeep and the costs for associated field visits have been included (Output 1.1 and 1.2). Costs for purchasing additional weather stations include estimates for spare sensors and parts. Twenty-five percent (25%) of the running costs were designated for spare parts in the event that the institution does not yet have enough experience with equipment to be procured.