REQUEST FOR CEO ENDORSEMENT

PROJECT TYPE: FULL-SIZED PROJECT
TYPE OF TRUST FUND: LDCF

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PART I: PROJECT INFORMATION

Project Title: Strengthening climate information and early warning systems in Western and Central Africa for climate resilient development and adaptation to climate change			
Country(ies):	Benin	GEF Project ID:[1]	5002
GEF Agency(ies):	UNDP	GEF Agency Project ID:	5105
Other Executing Partner(s):	Ministry in charge of Water	Submission Date:	June 14, 2013
GEF Focal Area (s):	Climate Change	Project Duration(Months)	48
Name of Parent Program (if applicable): ➢ For SFM/REDD+ ☐ ➢ For SGP ☐	n/a	Agency Fee ($):	400,000

A. FOCAL AREA STRATEGY FRAMEWORK[2]

Focal Area Objectives	Expected FA Outcomes	Expected FA Outputs	Trust Fund	Grant Amount ($)	Co financing ($)
CCA-2	**Outcome 2.1** Increased knowledge and understanding of climate variability and change-induced risks at country level and in targeted vulnerable areas	**Output 2.1.2** Systems in place to disseminate timely risk information	LDCF	2,614,000	6,707,474
CCA-2	**Outcome 2.2** Strengthened adaptive capacity to reduce risks to climate-induced economic losses	**Output 2.2.2** Targeted population groups covered by adequate risk reduction measures	LDCF	1,196,000	7,304,075
		Project Management Cost	LDCF	190,000	500,000
		Total project costs		4,000,000	14,511,549

B. PROJECT FRAMEWORK

Project Objective: 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.

Project Component	Grant type	Expected Outcomes	Expected Outputs	Trust Fund	Indicative Grant Amount ($)	Indicative co-financing ($)

[1]Project ID number will be assigned by GEFSEC.
[2] Refer to the Focal Area/LDCF/SCCF Results Framework when completing Table A.

Transfer of technologies for climate and environmental monitoring infrastructure	INV/ TA	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 . (INV: US$ 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. (INV: US$ 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 CRHOB (INV: US$ 309,000) 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. (TA: US$ 246,000	LDCF	2,614,000	6,707,474

Climate information integrated into development plans and early warning systems	INV/ TA	2. Efficient and effective use of hydro-meteorological, coastal 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.) (INV/TA: US$ 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. (TA: US$ 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 (TA: US$ 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. (INV: US$ 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.(TA: US$ 235,000)	LDCF	1,196,000	7,304,075

			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.(INV: US$ 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. (TA: US$ 120,000)			
Sub-total					3,810,000	14,011,549
Project management cost (PMC)					190,000	500,000
Total project costs					**4,000,000**	**14,511,549**

C. SOURCES OF CONFIRMED COFINANCING FOR THE PROJECT BY SOURCE AND BY NAME ($)

Please include letters confirming co financing for the project with this form

Sources of Co-financing	Name of Co-financier (source)	Type of Co-financing	Co-financing Amount ($)
PAPGFDC project	European Union	Grant	10,400,000
PAPGFDC project	UNDP	Grant	2,465,000
Government budget lines supporting the PAPGFDC project	DGFRN, General Direction on Forests and Natural Resources	Grant	603,150
Millennium Villages Project	UNDP	Grant	670,000
Donor co-financing	UNDP	Cash	300,000
Government budget line DNM-ASECNA	DNM/ASECNA	Grant	73,399
Total Co-financing			**14,511,549**

D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY[1]

GEF AGENCY	TYPE OF TRUST FUND	FOCAL AREA	Country name/Global	Project amount (a)	Agency Fee (b)	Total c=a+b
UNDP	LDCF	Climate change adaptation	Benin	4,000,000	400,000	4,400,000
Total GEF Resources				**4,000,000**	**400,000**	**4,400,000**

[1] In case of a single focal area, single country, single GEF Agency project, and single trust fund project, no need to provide information for this table. PMC amount from Table B should be included proportionately to the focal area amount in this table.
[2] Indicate fees related to this project.

E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS:

Component	Grant Amount ($)	Co-financing ($)	Project Total ($)
International Consultants	487,000	0	487,000
National/Local Consultants	173,000	0	173,000

F. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? NO

(If non-grant instruments are used, provide in Annex D an indicative calendar of expected reflows to your Agency and to the GEF/LDCF/SCCF/NPIF Trust Fund).

PART II: PROJECT JUSTIFICATION

A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF[3]

1. All Outputs have been detailed and contextualized since the PIF stage. Minor changes were made to the original PIF. For Component 1, the original outputs concerned with financing a radar, satellite data and radiosondes were not utilized. The cost of radar is too large given the project's financial constraints. Similarly, the cost to install a radiosondestation and operate a launch per day (approximately $100 / day) is too costly given the more pressing need in Benin to expand the sparse meteorological monitoring network. It was thought to be a waste of financial resources because as shown by the AMMA research project, radiosondes in West Africa frequently become debilitated due to limited abilities to perform repair and maintenance and radiosonde data from neighboring countries (Burkina, Niger and Ivory Coast) can continue to be exploited. Furthermore, the output on improving the use of satellite data was not considered a priority for Benin because the Met Service has 2 functioning satellites and will be able to continue data analysis through the MESA project.

2. Outputs in Component 2 have been restructured to emphasize the needs highlighted during the project preparation phase as noted during workshops and bilateral/multi-lateral consultations. Stakeholder consultations emphasized the following three requirements for a sustainable EWS/CI which have been added as Outputs in Component 2.

1) Creation of platform to improve synergy amongst EWS-related initiatives by improving coordination/collaboration among agencies involved with EWS/CI (Output 2.3);
2) Improving data sharing by facilitating data transfer capabilities between agencies and internationally and establishing a centralized EWS data server (Output 2.4);
3) Reinforcing understanding of EWS/CI on local levelssuch as through a public awareness campaign (Output 2.7).

3. Furthermore, an original output in Component 2 on planning sustainable financing for Operation and Maintenance (O&M) has been included in Output 1.4under the rationale that Output 1.4 focuses on capacity reinforcement for equipment O&M. Similarly, capacity reinforcement for the information production agencies on establishing sustainable cost-recovery mechanisms with revenues generated from selling tailored weather/climate products and risk maps is now included as an activity in Output 2.2 due to this Output's focus on establishing weather/climate services.

[3] For questions A.1 –A.7 in Part II, if there are no changes since PIF and if not specifically requested in the review sheet at PIF stage, then no need to respond, please enter "NA" after the respective question

A.1 National strategies and plans or reports and assessments under relevant conventions, if applical

NAPAS, NAPs, NBSAPs, national communications, TNAs, NCSA, NIPs, PRSPs, NPFE, Biennial Update etc.

Not Applicable (N/A).

A.2. GEF focal area and/or fund(s) strategies, eligibility criteria and priorities.

N/A

A.3 the GEF Agency's comparative advantage:

N/A

A.4. the baseline project and the problem that it seeks to address:

4. 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 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[4]. 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.

5. 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.

6. 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[5] 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.

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

[5] 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 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.

8. 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.

9. 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).

10. Several baseline initiatives have built hydro-meteorological monitoring capacity and will be used to leverage the LDCF project through co-financing. Details of these baseline initiatives providing co-financing are provided below andsummarized in Table C above:

11. **DNM/ASECNA** has an existing SYNERGIE forecasting system and functional synoptic and agro-meteorological stations which serve as baseline equipment for forecasting and national climate/weather monitoring. The value of the existing equipment is **$73,399.** This sum is being proposed by DNM/ASECNA to co-finance the LDCF project.

12. The LDCF project will also build off the hydrological monitoring equipment procured through the PAPDFGC project and provided to DG-Eau. The **PAPDFGC** project, ***Support for Forest Preservation and Production of Numerical Maps*** 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. Co-financing from this project, which will contribute to the proposed LDCF project,comes from several sources, namely the European Union(8 million euros which is approximately**$10,400,000**), UNDP (**$2,465,000**) and government budget lines **(**465,000 euros which is approximately**$603,150**).In order to improve communication of alerts, particularly to women, this project will build off of on-going grass-roots based projects which focus on participative community involvement. Links with local awareness groups established through the PAPDFGC and Millennium Villages projects will be exploited to facilitate warnings and community feedback required to improve the effectiveness of alerts. Importantly it will enable an assessment of 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 LDCF project for dissemination of EWS/CI.

13. Other significant baseline projects and sources of co-financing include :

- The **Millennium Villages Project (MVP),** funded by UNDPfor $9.7m, is contributing to the eradication of extreme poverty in the town of Banikoara by increasing incomes and improving household living conditions through agriculture, health, education, water and sanitation development. It will be implemented in one of the pilot zone areas(a vulnerable, agro-ecological zone as indicated by the NAPA) where EWS/CI will be tested. The MVP project project will provide **$670,000** in co-financing.
- **UNDP** will alsoprovide**$300,000** in co-financing for this project.

The LDCF project will build on the work undertaken by the **PAPDFGC** and the **Millennium Villages** projects in working with locals and exploiting existing decentralized communication mechanisms and community-based networks to facilitate information dissemination.

A. 5. Incremental /Additional cost reasoning: describe the incremental (GEF Trust Fund/NPIF) or additional (LDCF/SCCF) activities requested for GEF/LDCF/SCCF/NPIF financing and the associated global environmental benefits (GEF Trust Fund) or associated adaptation benefits (LDCF/SCCF) to be delivered by the 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, sea levels, strong winds)

Without LDCF Intervention (baseline):

14. 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.

15. 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.

16. 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 sub-catchments 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 **1**.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

17. 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(See Section A.7), ii) the PAPDFGC project funded by the EU which has a component to mitigate flood impacts in the Ouémé watershed (See description in Section A.4), iii) the Flood EWS for the Mono River project funded by GIZ (See Section A.7)and iv) the Niger-HYCOS project, a local watershed modelling initiative within the WHYCOS project(See Section A.7).

18. 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.

19. 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 Lawin 2010) 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.[6] 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 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.

20. 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.

21. 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 securing a 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[7]. 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).

22. 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

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

[7] 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

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. According to consultation with DNM/ASECNA, the MESA project will provide sufficient access to satellite data and 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 **2**.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

23. 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.

24. 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 have resulted in discontinuities in data collection.

Table **3**.Status of existing oceanographic stations in Benin.

Station type	Existing	Fully operational
Oceanographic monitoring station	1	1

25. 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.

With LDCF Intervention (adaptation alternative)

26. 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 localized geographical 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.

27. 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).

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

Build off hydrological 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 (Thisco-financing project is described in Section A.4).
- Continue reinforcing DG-Eau's expertise on flood forecasting: Through the GIZ project (See Section A.7) 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 ViGIRisC project (ACMAD, See Section A.7) 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 (See Section A.7): 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.

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

Without LDCF Intervention (baseline):

29. 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.

30. 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.

31. 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.

32. 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.

33. Furthermore, initiatives trying to build ANPC's capacity 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.

34. 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 Millennium Villages Project (MVP) described in Section A.4 which will be used to co-finance this project. 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.

With LDCF Intervention (adaptation alternative)

35. 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 providers focus 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.

36. 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 Disciplinaire pour promouvoir 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 risks are high.

37. 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 how to communicate 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.

38. 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, See Section A.7) by building 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 collaborations between ANPC and DNM/ASECNA, CRHOB and relevant NGOs/CSOs (e.g., NGOs focused on seasonal droughts).
- Incorporate lessons learned from the PAPDFGC project (See Section A.4) 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 (See Section A.7) 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, See Section A.7). 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 Millennium Villages Project (See Section A.4) 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.

A.6 Risks, including climate change, potential social and environmental risks that might prevent the project objectives from being achieved, and measures that address these 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-	Medium	Procurement will be staggered to ensure

meteorological services due to the work required with new equipment installation and other project needs		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.

A.7. Coordination with other relevant GEF financed initiatives

39. 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.

40. 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.

41. 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.

42. As detailed in SectionA.5, coordinating with projects focused on floods funded by the World Bank and GIZ is important for the development of this project. The LDCF project will also build upon the first NAPA project funded by the LDCF, the GIZ-funded flood EWS (see below) and the PAPGFDC projects, which have acquired hydro-meteorological monitoring equipment (The PAPGFDC project is described in Section A.4). In addition, the World Bank PUGEMU and GIZ projects are building the capacity of ANPC. All of these projects will be coordinated with in the following manner.

- 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).[8] 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.
- 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
- Furthermore, Benin is an active member of a regional project called **ViGIRisC**, funded by the African Center of Meteorological Application Development, (ACMAD). ViGIRisC is a current baseline initiative used to develop capacity within National Meteorological Agencies and to facilitate coordination of other Met Agencies within West Africa. The goal of the ViGIRisC project is to build forecasting expertise within West Africa's National Meteorological Services and train them to establish an EWS for the region.

43. Forecasted images of current environmental/weather/climate parameters generated by satellite (e.g., AMESD) will be supported under projectsincluding the: i) African Center of Meteorological Application Development (ACMAD); ii) Group on Earth Observations' (GEO) AfriGEOSS initiative – and in particular the African Monitoring of

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

the Environment for Sustainable Development (AMESD) and iii) the Monitoring of Environment and Security in Africa (MESA) initiative.

44. 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 detailed below.

45. The first NAPA initiative funded through the GEF-LDCF (LDCF1[9]), ***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 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.

46. This LDCF project is also related to similar initiatives developing climate information and Early Warning Systems in Africa. To date, 10 African countries including Benin, Burkina Faso, Ethiopia, Liberia, Malawi, Sierra Leone, São Tomé & Príncipe, Tanzania, Uganda and Zambia are finalizing project documents detailing how LDCF investments will improve the use of climate information and EWS. These projects will be coordinated through and share a team of experts who will be hired through a centrally coordinated facility. Their role will be to provide specialized support and coordinate the hiring of technical staff, data and information collection (including inter-country data sharing where feasible), training (on equipment operations & maintenance and the development of weather/climate/tailored forecasts) and the effective use of communications technologies and standard operating procedures.

47. Details of activities, which will benefit through the multi-country programme are described in section B.3. For Benin, equipment procurement / rehabilitation Outputs 1.1, 1.2 and 1.3 will be enhanced by exploiting the common pool of regional experts to assist with acquiring the most appropriate/cost-effective technology/equipment and optimal placement/design of hydrological and meteorological monitoring networks. Outputs 1.4 as well as activities under Outputs 2.1 and 2.2 will also use the regional expertise to maximize training on infrastructure operation and maintenance and the development of tailored warnings/advisories/forecasts/climate predictions. Specifically, regional support can be used to engage multi-national corporations to invest in climate services (e.g., cotton and weather insurance industries) and in Activity 2.2.3 which includes a pilot study to explore the economic viability of tailored forecasts / predictions. Further benefits of a regional approach can also be pursued through Output 2.4 where international data transfer can be facilitated to assist with cross-boundary hydro-meteorological forecasts / predictions. Similarly, through Output 2.6, countries can share knowledge on effective warning and communication strategies and integrate warnings issued by neighbouring countries in the case of shared watersheds.

[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.

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

- Centre Regional de Formation et d'Application en Agrométéorologie et HydrologieOpérationnelle (AGRHYMET) funded by the Danish government ($4m, 2013 - 2015) : AGRHYMET 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 information. AGRHYMET hydrological and agro-meteorological monitoring data and forecasts, as well as satellite data will be used to enhance EWS/CI in Benin.
- ProjetPluriannuel Eau et Assainissement de la GestionIntégrée des Ressources en Eau, PPEA2 project funded by the Dutch Ministry of Foreign Affairs : The PPEA2 focuses on constructing reservoirs and dams in the Ouémébassin to manage the distribution of water resources.10 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;
- 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 Programme régional 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.

B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:

B.1 Describe how the stakeholders will be engaged in project implementation.

49. 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 and 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.

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

51. Phase 1 – Developing a strategy and action plan;

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

This is the mobilization phase in the first year of the project. The 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.

52. Phase 2 – Consultation through implementation; and
This is 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.

53. Phase 3 – Project completion and scale up promotion.
The third and final phase represents the completion of the project. The plans for scale-up and long-term sustainability of the LDCF investments will be developed. Consultation will focus on learning, bringing experience together and looking at processes for continued post-project impact.

54. Specifically, in Phase 1, gender-focused NGOs/CSOs (Plan Benin, CARE International, CARITAS) will continue to be implicated and consulted in order to ensure women are properly engaged/warned. They will also conduct the gender disaggregated survey.

55. In Phase 2, public consultations will become more of an on-going exchange of information where there will be two main purposes:

- 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.

56. Phase 3 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.

Overall the types of consultation mechanisms to be used include:

- 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

For more details on the Stakeholder Involvement Plan and a matrix showing stakeholders and activities planned during implementation and evaluation, see Annex 5 of the Project Document.

B.2 Describe the socioeconomic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund/NPIF) or adaptation benefits (LDCF/SCCF):

57. 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[11], 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.

58. 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.

59. 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.

60. 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.

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

62. 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).

63. 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

64. 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

B.3. Explain how cost-effectiveness is reflected in the project design:

65. To ensure cost-effectiveness for Component 1, 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

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

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.

66. 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.

67. 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.

68. The chosen set of activities was reviewed in a validation workshop involving all stakeholders and the multi-stakeholder EWS focus group committee. Based on group consensus, Outputs/Activities were revised accordingly. 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 Table 5below.

69. This LDCF project is not a standalone project; it is part of a wider multi-country programme that will implement similar initiatives on climate information and Early Warning Systems in at least 10 countries in Africa (including Benin, Burkina Faso, Ethiopia, Liberia, Malawi, Sierra Leone, São Tomé & Príncipe, Tanzania, Uganda and Zambia). Synergies between these projects will be used to enhance the cost-effective hiring of specialized technical staff, coordination of data and information (including inter-country sharing where feasible), training (operations & maintenance of equipment; forecasting techniques; tailored advisories and warnings), and effective use of communications and standard operating procedures.

70. By surveying the technical support needs for each country during the project preparation phase, a set of common specialized technical staff were identified, each with particular skills related to the development of hydroclimatic observing systems, the effective design and implementation of standard operating procedures and tailored warnings/advisories, as well as the communication of advisories/warnings. Hiring 3-4 full-time technical staff, which can provide the needed support for all countries, will be more cost effective than hiring the same staff as consultants for each country and all projects will benefit from the diverse technical support that will be provided. Further benefits include time saved on HR procurement procedures (e.g. for hiring, advertising etc.) and the ability to compare and standardize support across countries where possible. UNDP will directly undertake the recruitment for all project staff who will support all countries in this multi-country programme.

71. Training and capacity building for operations and maintenance of the hydromet infrastructure and for modeling and forecasting (Outputs 1.1, 1.2 and 1.3 for equipment procurement / rehabilitation and Outputs 1.4 and 2.1 for training) can be conducted at the regional level, bringing together participants from all countries to encourage knowledge sharing and the development of collective skills. This has several advantages, namely: i) promoting the sharing of information and learning between countries; ii) encouraging discussions of best practices i.e. what works, reasons for failure etc; and iii) increasing the effective pool of skilled resources which each country can draw upon (increasing the potential for future trainings to be conducted by experts within the region). Such activities will be closely coordinated with other regional and international partners/centres e.g. WMO/GFCS, ACMAD, AGRHYMET etc.

72. Regional collaboration will facilitate the integration of warnings issued by neighbouring countries e.g. in the case of shared watersheds. Data sharing abroad will similarly be supported by the regional component when cross-boundary hydro-meteorological data transfer between national data portals (Output 2.4) is required to update forecasting models. Regional support will also be used to help strengthen the development of standard operating procedures in Burkina (both the procedures themselves and their legal basis), for the issuing and communication of

warnings/advisories, supporting Output 2.6 of this project. In the case of mobile (cellular) communications (which may be used for both disseminating alerts and the collection of data used to generate alerts), the regional support programme will leverage collective bargaining for data services, as well as engaging with corporate social responsibility programmes to enhance services where possible. Finally, when tailoring products to the private sector in Output 2.2, the regional component can facilitate the engagement of multi-national corporations in multiple countries to make continual investments in hydro-meteorological / climate services which are geared to specific needs (e.g. cotton cultivation seasonal forecasts or localized, short-term weather forecasts for construction activities).

Table5: 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 Doppler Current and Velocity Profilers) for water level and coast erosion monitoring by CRHOB .	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). **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 the lack of coordination and collaboration amongst EWS agencies and with EWS-related initiatives, including facilitating data sharing	Lack of synergy between agencies and lack of coordination amongst EWS initiatives	**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. **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 to conduct public awareness campaigns	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.

C. DESCRIBE THE BUDGETED M &E PLAN:

73. The project will be monitored through the following M&E activities. The M&E budget is provided in table 6 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.

74. **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.

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

76. 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 (i.e. UNDP-GEF Regional Technical Advisor) 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.

77. 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.

78. 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.

79. Discuss financial reporting procedures and obligations, and arrangements for annual audit.

80. Plan and schedule Steering Committee meetings. Roles and responsibilities of all project organization structures should be clarified and meetings planned. The first Steering Committee meeting should be held within the first 12 months following the inception workshop.

81. 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:

82. 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.

83. **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.

84. 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

85. 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.

86. 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.

87. End of Project: An independent Terminal Evaluation will take place three months prior to the final PB 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 Centre (ERC).

88. 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.

89. 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.

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

Table 6: Project Monitoring and Evaluation work plan 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	Yearly

Type of M&E activity	Responsible Parties	Budget US$ *Excluding project team staff time*	Time frame
		total)	
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)	

PART III: APPROVAL/ENDORSEMENT BY GEF OPERATIONAL FOCAL POINT(S) AND GEF AGENCY(IES)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT(S) ON BEHALF OF THE GOVERNMENT(S):): (Please attach theOperational Focal Point endorsement letter(s) with this form. For SGP, use this OFP endorsement letter).

NAME	POSITION	MINISTRY	DATE*(MM/dd/yyyy)*
DelphinAidji	Director of Planning and Prospecting	Ministry of Environment, housing and planning, Benin	04/24/2012

B. GEF AGENCY(IES) CERTIFICATION

This request has been prepared in accordance with GEF/LDCF/SCCF/NPIF policies and procedures and meets the GEF/LDCF/SCCF/NPIF criteria for CEO endorsement/approval of project.

Agency Coordinator, Agency Name	Signature	Date *(Month, day, year)*	Project Contact Person	Telephone	Email Address
Adriana Dinu, Office-in-Charge, and Deputy Executive Coordinator, UNDP/GEF		July 22, 2013	Mark Tadross Technical advisor, Gr-LECRDS	+27216502884	mark.tadross@undp.org

ANNEX A: PROJECT RESULTS FRAMEWORK(either copy and paste here the framework from the Agency document, or provide reference to the page in the project document where the framework could be found).

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[12] To strengthen the climate monitoring capabilities, early warning systems and available information for responding to climate shocks and planning adaptation to	1.Capacity as per capacity assessment scorecard (BASELINE: 62; TARGET: 157) (see Annex 8)	1.Limited capacity to generate EWS and CI on a national scale for extreme hydro-meteorological phenomena Limited disaster risk prevention capacity on	1. Capacity assessment TARGET score 157 for all combined EWS agencies 2. TARGET 40% increase in domestic	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

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

climate change in Benin.	2.Domestic finance committed to the relevant institutions to monitor extreme weather and climate change	national and local levels within ANPC No Standard Operating Procedure (SOP) for alert communication by ANPC with the support of NGOs/CSOs <u>Current score: 62</u> 2.Existing budget plans do not have sufficient funds to maintain and operate environmental monitoring infrastructure	financing for equipment operation and maintenance across all institutions		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-meteorological information into planning

	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
Outcome 1[13] **Enhanced capacity of national hydro-meteorological services (DNM/DG-Eau) and coastal monitoring institutions (CRHOB) to monitor extreme weather and climate change**	1.% national coverage for climate/weather monitoring (BASELINE: 30%, TARGET: 60%) 2.Frequency and timeliness of climate-related data availability (BASELINE: monthly,	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	1. 60% national coverage to take steps in achieving NHMS optimal monitoring arrangements as defined in feasibility studies with 76automatic 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	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	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

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

(droughts, floods, strong winds, coastal erosion, sea-level rise)	TARGET: daily)	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.	2.TARGET for data transmission frequency: daily	storage servers within each information production agency	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 and coastal information for making early warnings and seasonal forecasts which feed into long-term development plans**	1.% of population with access to improved climate information and flood, drought, strong wind and coastal warnings (disaggregated by gender){BASELINE:8% women, 15% men; TARGET:12% women, 23% men}	1.There are 4 existing EWS initiatives for regional flood warnings and famine alerts, however, a national alert system concerned with extreme hydro-meteorological phenomena is lacking. There is also a limited understanding of	1. 50% increase in population who have access to improved EWS/CI 2. At least 2 of the PRSP policy 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	1. a) Gender disaggregated survey on receipt of alerts b) Record of debriefings by ANPC post extreme weather events c) ANPC record of end-user feedback	Forecasts will be improved by local data assimilation collected from new climate/weather monitoring infrastructure 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)

	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)	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.	phone based agricultural advisories, both supporting targeted weather/climate service delivery	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	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

ANNEX B: RESPONSES TO PROJECT REVIEWS (from GEF Secretariat and GEF Agencies, and Responses to Comments from Council at work program inclusion and the Convention Secretariat and STAP at PIF).

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	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

channels	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 in shaping the project and describe how the project will benefit vulnerable populations and individuals.	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 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,	Benin is focusing on rehabilitating/procuring hydro-met and coastal monitoring infrastructure only.

satellite, gauges and radars is considered. Radars are expensive to install and maintain and can exceed national budgets.	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 neighboring countries 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 (and agriculture) can be improved e.g. issue flood and drought monitoring and early warnings.	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 periods of droughts (e.g., when reservoir levels are low).
Address links and gaps between representatives of hydromet and agriculture e.g. will the	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

meteorological data work with hydrological/agricultural models, or will it require manipulating?	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.
Hydromet products 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	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

coordinating earth observations and climate observations.	ViGiRiC project 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. 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 ClimDevAfricaprogramme 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	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.

innovative channels	
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 stakeholders, including community-based organizations and environmental NGOs in both the development and implementation of the program	All relevant NGO/CSOs including women representing NGOs (Caritas, Care International and Plan 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 ClimDevAfricaprogramme) to build forecasting expertise.

The additional cost reasoning should be outlined more clearly. Much of the investment is for the weather related 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.	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 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 in charge 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 unrealistic and do not include variation between countries and O&M (operations & management) costs.	Costs are based on budgets provided by each national agency during project development (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.

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS[14]

A. DESCRIBE FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION, IF ANY:

B. PROVIDE DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES FINANCING STATUS IN THE TABLE BELOW:

PPG Grant Approved at PIF: **100,000**			
Project Preparation Activities Implemented	***GEF/LDCF/SCCF/NPIF Amount ($)***		
	Budgeted Amount	***Amount Spent To date***	***Amount Committed***
1. Review and technical feasibility study and cost assessment analysis	46,000	32,535	13,465
2. Information collection and stakeholder consultations (including stakeholder workshops)	34,000	32,187	1,813
3. Identification of co-funding sources and formulation of project documents	14,000	12,550	1,450
4. Institutional arrangement for implementation	6,000	4,430	1,570
Total	**100,000**	81,702	18,298

[14] If at CEO Endorsement, the PPG activities have not been completed and there is a balance of unspent fund, Agencies can continue undertake the activities up to one year of project start. No later than one year from start of project implementation, Agencies should report this table to the GEF Secretariat on the completion of PPG activities and the amount spent for the activities.

ANNEX D: CALENDAR OF EXPECTED REFLOWS (if non-grant instrument is used)

Provide a calendar of expected reflows to the GEF/LDCF/SCCF/NPIF Trust Fund or to your Agency (and/or revolving fund that will be set up)