



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 Africa for climate resilient development and adaptation to climate change | | | |
| Country(ies): | Sierra Leone | GEF Project ID: ¹ | 5006 |
| GEF Agency(ies): | UNDP(select)(select) | GEF Agency Project ID: | 5107 |
| Other Executing Partner(s): | Ministry of Transport and Aviation | Submission Date: | July 23, 2013 |
| GEF Focal Area (s): | Climate Change | Project Duration(Months) | 48 |
| Name of Parent Program (if applicable): | n/a | Agency Fee (\$): | 400,000 |
| | <ul style="list-style-type: none"> ➤ For SFM/REDD+ <input type="checkbox"/> ➤ For SGP <input type="checkbox"/> | | |

A. FOCAL AREA STRATEGY FRAMEWORK²

| Focal Area Objectives | Expected FA Outcomes | Expected FA Outputs | Trust Fund | Grant Amount (\$) | Co-financing (\$) |
|--------------------------------|---|---|------------|-------------------|-------------------|
| CCA-2(select) | 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 | 2,560,000 | 12,000,000 |
| CCA-2(select) | 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 | 1,250,000 | 7,400,310 |
| Project Management Cost | | | LDCF | 190,000 | 947,000 |
| Total project costs | | | | 4,000,000 | 20,347,310 |

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 Sierra Leone. | | | | | | |
|---|------------|---|--|------------|-------------------|-----------------------------|
| Project Component | Grant Type | Expected Outcomes | Expected Outputs | Trust Fund | Grant Amount (\$) | Confirmed Co-financing (\$) |
| Transfer of technologies for climate and environmental monitoring infrastructure. | Inv/TA | Enhanced capacity of the Sierra Leone Meteorological Department of (SLMD) and Directorate for Water Resource (DWR) to monitor extreme | Output 1.1: 12 river gauges, 2 water level (limnimetric scale), 6 groundwater data logger, 2 signal counter rotations for hydrological monitoring are installed | LDCF | 2,560,000 | 12,000,000 |

¹Project ID number will be assigned by GEFSEC.

² Refer to the [Focal Area/LDCF/SCCF Results Framework](#) when completing Table A.

| | | | | | | |
|--|--|--|---|--|--|--|
| | | <p>weather and produce sector tailored weather forecasting climate change.</p> | <p>in partnership with SLMD to complement watershed management networks of Guma Valley, Bumbuna Watershed and The Ministry of Water Resources (MWR). (The Ministry of Water Resources (MWR))(INV: US\$ 970,820)</p> <p>Output 1.2: 38 rainfall gauges, 8 synoptic, 8 climatological automatic weather stations, WMO standard, are installed to support the establishment of an integrated weather monitoring network. (Sierra Leone Meteorological Department-SLMD)(INV: US\$ 1,085,730)</p> <p>Output 1.3:Forecasting meteorological tools, software, infrastructure facilities and specialised training are made available to run SYNERGIE, SADIS & AMESD systems to strengthen the capacity of SLMD to produce improved and sector tailored weather forecasts. (Sierra Leone Meteorological Department-SLMD) (INV: US\$ 274,075)</p> <p>Output 1.4: A total of 6 Meteorologists, 16 Meteorological Technicians, 4 Forecasting Superintendent Officers 20 Specialist Superintendent Officers are trained to support EWS data handling and forecasting operations. (Sierra Leone Meteorological</p> | | | |
|--|--|--|---|--|--|--|

| | | | | | | |
|--|--------|--|--|------|-----------|-----------|
| | | | <p>Department-SLMD and the University of Sierra Leone -Fourah Bay College) (TA: US\$ 129,375)</p> <p>Output 1.5: A Communications network is established for SLMD and ONS-Disaster Management Department to support EWS warning and dissemination mechanism. (ONS-Disaster Management Department and Sierra Leone Meteorological Department-SLMD) (INV: US\$ 100,000)</p> | | | |
| Climate information integrated into development plans and early warning systems. | Inv/TA | Efficient and effective use of hydro-meteorological information for generating early warnings and support long-term development plans. | <p>Output 2.1.:At least 13 Meteorologists and 6 hydrologists are trained in EWS sector tailored weather and hydrological forecasting techniques and information Packaging.(Sierra Leone Meteorological Department-SLMD)(TA: US\$ 249,057)</p> <p>Output 2.2.:A multidisciplinary and Inter-institutional Technical Committee (EWS-MITEC) is established to develop SOPs (standard operation procedures) and study/plan/propose integration/delivery of EWS products to the various identified national end users including community sectors. (ONS-Disaster Management Department)(INV: US\$ 258,005)</p> <p>Output 2.3.:A CC-Data Management System (CC-DAMAS) is established to allow systematic storage and mainstreaming of</p> | LDCF | 1,250,000 | 7,400,310 |

| | | | | | | |
|--|--|--|---|--|-----------|------------|
| | | | <p>digital information to support decision making in sector planning. (The Sierra Leone Environment Protection Agency).(TA: US\$ 211,435)</p> <p>Output 2.4:The existing dissemination/response system under the ONS-Disaster Management Department (DMD) is strengthened to support EWS. (ONS-Disaster Management Department and Sierra Leone Meteorological Department-SLMD)(INV: US\$ 200,564)</p> <p>Output 2.5:A framework for financial sustainability based on cost-recovery service provision is established at SLMD to support future EWS operations. (Sierra Leone Meteorological Department-SLMD) (TA: US\$ 105,600).</p> <p>Output 2.6: Community based EWS (CBEWS) network is developed in 3 pilot sites to enhance and test its impact on risk reduction in sectors and population. (ONS-Disaster Management Department and Sierra Leone Meteorological Department-SLMD) (INV: US\$ 225,339)</p> | | | |
| Subtotal | | | | | 3,810,000 | 19,400,310 |
| Project management Cost (PMC) ³ | | | (select) | | 190,000 | 947,000 |
| Total project costs | | | | | 4,000,000 | 20,347,310 |

³PMC should be charged proportionately to focal areas based on focal area project grant amount in Table D below.

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 (\$) |
|---------------------------------|-------------------------------|----------------------|--------------------------|
| GEF Agency | UNDP | Grant | 1,347,310 |
| Other Multilateral Agency (ies) | European Union | Grant | 2,000,000 |
| Other Multilateral Agency (ies) | European Union | Grant | 5,000,000 |
| Bilateral Agency | DFID | Grant | 12,000,000 |
| Total Co-financing | | | 20,347,310 |

D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY¹

| GEF Agency | Type of Trust Fund | Focal Area | Country Name/ Global | (in \$) | | |
|--------------|--------------------|----------------|----------------------|------------------|-----------------------------|-------------|
| | | | | Grant Amount (a) | Agency Fee (b) ² | Total c=a+b |
| UNDP | LDCF | Climate Change | Sierra Leone | 4,000,000 | 400,000 | 4,400,000 |
| Sierra Leone | | | | 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 | 375,650 | 0 | 375,650 |
| National/Local Consultants | 543,150 | 0 | 543,150 |

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 PIF⁴

1. No significant changes in alignment with the project design of the original PIF have been made. All outputs have been contextualized to fit Sierra Leone’s needs as articulated through the project preparatory and design phase. Output 1.3 and 1.4 of the original PIF has not been adopted because the preparatory and design phase found that the procurement of radar and upper air monitoring stations were too expensive and not identified as within the scope of the LDCF project by the Government of Sierra Leone.

A.1 National strategies and plans or reports and assessments under relevant conventions, if applicable, i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NCSA, NIPs, PRSPs, NPFE, Biennial Update Reports, etc.

⁴ 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

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2. The section from the PIF has been slightly adjusted to specifically fit the Sierra Leone context. Please see Section 2.1 of the LDCF project document for further details.

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

NA

A.3 The GEF Agency's comparative advantage:

3. The section from the PIF has been slightly adjusted to specifically fit the Sierra Leone context. Please see Section 2.3.3 of the LDCF project document for further details.

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

4. Hydrological and climate monitoring is recognized by the GoSL as a core public service provided to all economic sectors. As such this LDCF project is founded on a solid baseline of on-going national programming that provides the existing infrastructure, staff and resources of the early warning network. This includes all programming deployed by the Sierra Leone Meteorological Department (SLMD), Directorate for Water Resources (DWR), Office of National Security (ONS) and Disaster Management Department, and The Ministry of Agriculture, Forestry and Food Security (MAFFS) (see section 2.4). This project will build on these on-going initiatives to ensure that climate change dimensions are taken into account in the deployment of short-, medium- and long-term weather and climate services.

5. The LDCF project is focused on strengthening the capacity of national and sub-national entities to monitor climate change, generate reliable hydro-meteorological information (including forecasts) and to be able to combine this information with other environmental and socio-economic data to improve evidence-based decision-making for early warning and adaptation responses as well as planning. This includes coordinating with donor-supported water resource management and meteorological services baseline projects, community-based EWS and disaster risk reduction efforts in the country and strengthening the national framework for EWS implementation.

6. See detailed descriptions of baseline projects – including the linkages with the LDCF project – in sections 2.3.1 and 2.4 in the LDCF project document. A summary per baseline project is presented below:

i. **UNDP Project** – “*Environment and Natural Disaster Management*”. A core UNDP Environmental Programme that has been running since 2008 with annualised budget of **\$1,347,310** (2013) supporting natural resource governance in the key areas of adapting to the impacts of climate change and other man-made and natural disasters among others. It provides the core around which the UN's work on environmental and natural resource issues and coalesces to support the implementation of the Government of Sierra Leone's identified priorities. The main expected Outputs are:

- Policies, legal and institutional framework for managing land tenure reform improved;
- Increased resilience and enhanced national and local capacities for disaster risk management, environmental governance, climate change adaptation and mitigation for effective early warning system;
- Improved Waste Management in Bo and Makeni cities and relevant lessons learned shared with other Local Councils.

ii. **European Union Funded Project:** “*African Monitoring of the Environment for Sustainable Development (AMESD)*”. The European Union funded project Preparation for the Use of MSG in Africa (PUMA) made available data and products from EUMETSAT's latest satellites, promoting African National Meteorological and Hydrological Services to provide accurate weather forecasts, monitor extreme weather phenomena, and improve disaster management. The African Monitoring of the Environment for Sustainable Development (AMESD) initiative takes PUMA a stage further by significantly extending the

use of remote sensing data to environmental and climate monitoring applications. For West Africa, ECOWAS adopted the theme of water resource management and the management of crops and pastures. The project was entrusted to the Niamey-based Regional Centre for Training and Application of Agrometeorology and Operational Hydrology (AGRHYMET). This represents a baseline investment of approx. \$27,000,000. Of this, **\$2,000,000** will count as baseline for this project;

iii. **European Union Funded** *“The Environmental governance and mainstreaming project. (Financial scope: \$5,700,000 of which **\$5,000,000** is considered as co-finance for this LDCF):* The EU is supporting the Sierra Leone Environmental Protection Agency (SLEPA) to be fully operational and ensures that its core functions at the central and district level are implemented. LDCF resources will be able to use this project as a platform and framework to review and update EWS policies. The partnership built under the UN Joint Vision will serve as a cooperation platform between UNDP and the EU to join their efforts and realize Public Sector Reform;

iv. **DFID Funded project:** *“Supporting the Government of Sierra Leone to implement its National Water Supply and Sanitation Strategy.”* (\$15,000,000 fund of which **\$12,000,000** is considered as co-finance for this LDCF). It includes components for the management of water sector policy and water resources conservation.⁵ This baseline project seeks to strengthen the water and sanitation sector in Sierra Leone and enable rural and urban communities (and within those the most vulnerable members such as women and children) to adopt safe hygiene and sanitation practices and consume safe water. With funding by the UK government and UNDP as implementing partner, the project is supporting the development of water and sanitation facilities, promotion of household hygiene, and the training of water supply maintenance in Yele, Kono, Kambia, and Kabala.

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 the Sierra Leone Meteorological Department of (SLMD) and Directorate for Water Resource (DWR) to monitor extreme weather and produce sector tailored weather forecasting climate change.

7. Despite of these associated baseline projects and opportunity for synergies, SLMD has not been able to take much advantage due to absence of an infrastructure and human capacity to implement of modern weather, climate and hydrological forecasting is still required. This situation is yet worsened by the nonexistence of an institutional and stable coordination mechanism between SLMD and DWR that is crucial, especially with reference to flood and drought monitoring, forecasting and early warning. The development of appropriate structures for improved data exchange as a condition for successful DWR and climate change adaptation is recommended but still not covered by the existing projects.

8. Through Outcome 1, LDCF resources will be used, in conjunction with other ongoing initiatives to assist the Government of Sierra Leone (GoSL) to address some of the fundamental barriers to the deployment of an operational and modernised (automated) weather, climate and hydrological monitoring system and forecasting extreme weather and longer-term climate variability. This will be achieved by increasing the coverage and automating the national weather and hydrological monitoring system and upgrading weather and climate forecasting facilities (see further details in Section 2.4, Outcome 1 of the project document). The baseline situation (without the LDCF project) and adaptation alternative (with the LDCF project) are detailed below for Outcome 1 (see Section 2.4, Outcome 1, Baseline situation and adaptation alternative in the LDCF project document for further details including indicative activities).

⁵<http://projects.dfid.gov.uk/project.aspx?Project=201139>
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9. The overall budget for this outcome under the LDCF project is US\$ 14,560,000. This includes US\$ 2,560,000 LDCF project grant requested and US\$ 12,000,000 indicative co-financing.

With LDCF Intervention (adaptation alternative)

10. Under this LDCF project component, the Government of Sierra Leone 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. This component will build on the earlier work undertaken through the UNDP support and on the initiatives that are underway or planned to take place shortly. This objective will be achieved by: Build the hydromet and weather monitoring networks, strengthening the development of human capacity and forecasting support facilities.

i) Building of the hydromet monitoring network

11. This will be carried out essentially in close collaboration with on-going projects (The UNDP_GEF Guma Valley Project, The WASH Facility Bumbuna Watershed Project, IFAD-LDCF project and The Ministry of Water Resources (MWR)) by re-assessing the needs for hydrological monitoring to support EWS and make complementary provision of equipment and materials. In addition to the above the project will work closely with the GVWC to complement the existing hydrological monitoring network made up of seven rainfall gauges, placed at each of the seven tributaries of the Guma Valley Watershed Lake. However due to the long distance covered by each of the tributaries and the complex terrain underlining the watershed these seven rainfall gauges do not reproduce the probable variability of rainfall around the basin. Therefore the project will complement with seven more rainfall gauges so that each tributary will be monitored by two rainfall gauges placed one upstream and the second downstream in the vicinity of the lake.

12. This LDCF will also work in close collaboration with Bumbuna Watershed Management Authority (BWMA) in assessing the number of river flow measuring equipment required to be installed for facilitating the development of a hydromet model which will strengthen the existing Emergency Preparedness Plan (EPP) at Bumbuna, therefore allowing a better forecasting of extreme rainfall events and critical changes in river flow. The recently created Directorate for Water Resources is currently developing identification of equipment needs to develop a new hydrological monitoring network. The intention is to reinstall monitoring hydrometric network that once existed with staff gauge stations and water level recorders in major rivers. This set up would allow the minimum monitoring of significant areas of low-lying coast areas which frequently floods at high tide resulting in vast areas of mangrove swamp and also flat lands are which are subject to extensive riverine flooding in the major river basin of Great Scarcies Basin, Little scarcies Basin, Moa Basin, Mano Basin, Lokko Basin, Rockel Basin, Gbangbaia Basin, Jong Basin and Sewa Basin.

13. In order to assess and monitor changes in water supply in the Sierra Leone main Watersheds (given the climate change projections), at a given time, the project will facilitate the development of a Hydrological Modeling Unit of water resources so to be able to timely forecast watershed components (rainfall, evaporation, run-off and deep drainage) and the potential of drought or flood occurrence. At present, there is no baseline activity addressing the above issues. Therefore, an international hydrologist will be contracted to assist the SLMD and the Ministry of Water Resources in developing and operationalise the modeling component, working in collaboration with local institutions and national consultants.

ii) Building of the weather monitoring network

14. Activities to be carried out under this component have been designed to alleviate a number of infrastructural constraints related to the weather monitoring network and refurbishment of premises where the equipment should be installed and forecasting capacity developed. The project will re-assess installation sites for AWS based on PPG planning and will make necessary arrangements (equipment housing, fence and security, personnel) to carry out installation of remotely transmitting Automatic Weather Stations (AWS). After this assessment, procurements will be carried out for acquisition and installation of a number of Synoptic AWS (Bo, Makeni, Bonthe, Sefadu, Daru (upper Air), Yele, Mamama (Proposed new airport) and

Shenge) equipped with WMO standard sensors plus soil and surface temperature thermometry complete with remote transmission & faulty diagnosis facilities, solar power, central data collection, computer storage (with capacity for up to 50 AWS) and display system at the SLMD Freetown & Lungi Airport. The installation of these stations will be such to create a monitoring network (+4 spares) which can interface with other existing AWS and central data collection & storage system. The installation of the AWS should follow a calendar so that procurement of equipment will coincide with initial trainings of Meteo Technicians. The actual installation (by phases) will take place approximately 18 months after the capacity development had been initiated and SLMD has enough human capacity to handle the data management. Security arrangements should be put in place beforehand at each location to guarantee the safety of the AWS. All AWS should also be provided with a lightning rod or a lightning conductor engineered to protect the AWS in the event of lightning strike so to avoid constant malfunction at the time meteorological information is most required.

15. During the PPG process the minimum number of Agroclimatological and rainfall stations necessary to cover the majority of the country territory was identified. The agroclimatological automatic weather station will be installed at Njala, Rokpur, Kabala, Daru, Tormabum, Newton, Ogufarm and Kenema. The 38 rainfall network will be installed (Daru, Kailahun, Bunumbu, Dodo, Panguma, Segbwema, Sefadu (7-East); Moyamba, Sulima, Pujehun, Mattru Jong, Sumbuya, Rutile, Zimi (8-South); Madina, Mange, Bafodia, Magburaka, Yonibana, Bunbuna, Mosaia, Pepel, Lokomasama, Kukuna (10-North); Mamama, Regent, Songo, Waterloo, Guma, York, Tombo, Goderich (8+5 West) and managed in partnership with schools, farms, cooperatives and NGO's. The installation plan will pay particular attention to the distribution of past station locations according to districts of the country. The coordination of these rainfall stations across the districts will be carried out by four regional Met Supervisors (Meteorologists WMO Class III) to be capacitated under this project. Each of these will be equipped with a motorcycle to be able to have a permanent control of the state of the equipment and data handling within their particular district.

16. This project will support the SLMD in providing each AWS with automatic data transmission devices via mobile communications. In some cases, and after proper assessment, the project will make provision of SSB/VHF radios and/or mobile phone sets for transmission of data and meteorological information. Attention should be paid however to the cost of data transmission that can be cumbersome for a large AWS network if data transmission frequency is relatively high. Therefore, when installing the AWS there should be an assessment of how frequent the data for each meteorological variable should be read and transferred (e.g. every 60 sec rather than every 10 sec) so to minimize costs but maintaining data quality and representativeness. In addition, a partnership should be established beforehand between the SLMD and the mobile communication provider so that the final cost of meteorological data transmission will be shared based on mutual interest. This LDCF will support SLMD to establish a reliable and fast communications channel between SLMD and DMC members to guarantee real time dispatch of forecast products.

iii) Strengthening the development human capacity and forecast supporting facilities

17. There has been inadequate financing to rapidly alleviate the crippling infra-structural and human resource constraints. This LDCF project will bring additional resources to tackle this fundamental weakness of the system and allow it to function so as to be effective in providing the required climate information and warnings. Amongst this new equipment that the project will finance will be the provision of Supporting Forecasting Tools such as SADIS 2G⁶ and SYNERGIE System⁷. These two forecasting support facilities will operate as proxy to the Upper Air Sounding and Radar both extremely costly systems to acquire, run and maintain with the budget of this LDCF project and the available human resources.

18. This component will also strengthen the development of human resources capacities required for using the equipment and instruments and the interpretation of collected and processed data to support the

⁶SADIS is an operational system dedicated to primarily to aeronautical meteorological information in line with ICAO (International Civil Aviation Organization) worldwide provision. It provides a point to multipoint service on a 24-hrs basis via satellite. The products received by SADIS are: 1. Upper air wind /temperature, tropopause and maximum wind forecast in GRIB code; 2. Coded digital facsimile charts for upper wind/temperature at selected flight level and SIGWX forecasts; 3. OPMET (operational meteorological) information like METER, TAFS, SIGMET, AIREPs, Volcanic ash and tropical cyclone advisory messages.

⁷This system can show areas of active convection and also to identify lightning risks, particularly for nowcasting and safety applications, both marine and on land. Lightning activity is a proxy for strong convection so provides an indication of possible gust and heavy rain activity.

forecasting undertaking. Therefore, the capacity development will include the training of a significant number of Forecasting Superintendent Officers (WMO Class III) to supervise the meteorological observers and Specialist Superintendent Officers for compilation of Synoptic, Agro Meteorological, Hydro-Meteorological and Climatological data. Under this component's capacity development programme there will be also specific training of a number of Meteorologists (WMO Class II) and Meteorologists (WMO Class I) to be technically skilled to develop weather forecasting. For that, a gender sensitive national screening exercise will be developed for the selection of a number of pupils and make procurements/arrangements for a capacity development programme at national or international level.

19. Given the number of electronic equipment and sophisticated hardware and software that SLMD will have to handle and manage routinely, there will be also within the capacity development programme provision for the training of IT & Electronics Met Equipment Maintenance & Repair Technicians from relevant sectors (2-Agromet, 2-Hydrology and 2-Meteorology). Similarly, a number of Information Technology /GIS Specialists will be capacitated to deal with the GIS platform of the SADIS & SYNERGIE systems.

Outcome 2: Efficient and effective use of hydro-meteorological information for generating early warnings and support long-term development plans.

20. Through outcome 2, LDCF funding will be used to develop six Outputs to build human technical capacity to use data collected from the strengthened and modernised weather and hydrological monitoring system and increasing the proportion of the local population that has access to adequate climate information, both for early warning purposes and for long-term planning. This will be achieved by training SLMD and DWR in up-to-date forecasting methodologies and meteorological workstation software. SOPs for disseminating and responding to weather and climate forecasts – including warnings for floods, droughts and severe weather – will be developed and demonstrated in the Community based EWS (CBEWS) to be established at Bumbuna Watershed, Guma Valley and IVS Farms in Eastern Districts.

21. National systems will be linked to existing community-based systems and decentralised observation networks. It is expected that this will show the socio-economic benefits of adequate climate services that will support the up-scaling, operation and maintenance of the system in the long term. The baseline situation (without the LDCF project) and adaptation alternative (with the LDCF project) are detailed below for Outcome 2 (see Section 2.4, Outcome 2, Baseline situation and adaptation alternative in the LDCF project document for further details including indicative activities).

22. The overall budget for this outcome under the LDCF project is US\$ 8,650,310. This includes US\$ 1,250,000 LDCF project grant requested and US\$ 7,400,310 indicative co-financing.

Without LDCF/SCCF Intervention (baseline):

i) Tailored products

23. SLMD currently produces: aeronautical forecasts (advance 30hours forecast validated every 6hours); and tendency forecast for aviation purposes (advance 2hours forecast) for both domestic and international air traffic requirements. The SLMD also participate in their Regional Forum (Regional Forum PRESAO 11) for seasonal forecasts (3-6 months). To produce these forecasts SLMD counts on the EUMETSAT-Satellite imagery (PUMA off spring e-station) via AMESD (African Monitoring of the Environment for Sustainable Development) e-station (which is currently not functioning); and Internet access to forecast products from regional (Dakar) and international (UK Met Office, Meteo France, USA) centres. The daily forecast for aviation is also used for forecasts distributed to the wider public, and therefore warnings of an extreme event are given based on the tendency forecast for aeronautical purposes (every 2 hours) with little or no notification to be used to plan preventive measures. Therefore, Early Warning in Sierra Leone is embryonic and *ad hoc*, as there is not such tailored forecasting capacity in the country. Adding to this difficult lies the acute shortage of human capacity with skills to develop accurate sector tailored forecasts to be the basis for warning issue.

ii) Climate Change and disaster management databases

24. Climate and environmental data and information that can facilitate the development of detailed risk and vulnerability assessments is dispersed across various ministries and institutions and has not yet been comprehensively assembled or analysed as a whole or shared and disseminated. Therefore, there is no detailed risk and vulnerability mapping of the country, taking into account each of the identified hazards. This makes difficult for the decision makers and Goal departments to prepare Climate change sensitive disaster management plans for vulnerable districts and communities. Consequently, specific climate change disaster risk response for vulnerable districts and communities have not yet been developed and integrated into GoSL existing plans and strategies. These risk response plans and strategies are the basis for the overall response capacity of a EWS. There is a dearth of baseline information on this issue and the only activity that was recently undertaken was the training⁸ that the Office of National Security (ONS) have benefited in 2011 from the Red Cross Organisation and the USA (Defence Institute for Medical Operations (DIMO) via USAID) particularly in the use of GIS and GPS systems in risk mapping and disaster management. Most recently (December, 2012) the project “Building GIS Capacity and Development of a Spatial Data Infrastructure for the Sierra Leone Environmental Protection Agency was initiated in cooperation with The Earth Institute at Columbia University. This projects aims at establishing the Center for International Earth Science Information Networks (CIESIN) is responding to a direct request from the Sierra Leone Environmental Protection Agency (EPA) for training and capacity building in the field of Geographic Information Systems (GIS) and Spatial Data Infrastructures (SDI). This LDCF will build on the activities already in place through this initiative to further develop a climate and environmental data and information system that can facilitate the institutional sharing of data and also develop detailed risk and vulnerability assessments to feed the future EWS.

iii) Disaster Management coordination committees

25. Disaster management in the country is overseen by the Office of National Security (ONS) created in 2002 as the primary coordination point for the management of national disasters, both natural and man-made. There is a Disaster Management Department, established within the Office of National Security. This Department, supported by the Red Cross, has developed Disaster Management Committees (ONS-Sectoral Task Forces (STFs)) in each of the country’s 12 districts, scheduled to meet on monthly basis. A DRR framework has been prepared, with Draft Disaster Management Plan and National Disaster Management Policy developed with input from government ministries, international NGOs, UN agencies, CBOs and others. The Disaster Management Plan covers disaster prevention, preparedness, and response and sets out roles and responsibilities in preparedness, mitigation and response. However, the Government has yet to formally endorse these documents⁹. There is a need for updating both the Disaster Management Plan and National Disaster Management Policy to include a Climate Change vision and strategies to deal with increasing occurrence of extreme weather events.

iv) Communication and dissemination mechanisms

26. The Sierra Leone Meteorological Department (SLMD) issues a daily weather forecast for aviation purposes and one daily weather forecast for the public. Currently these forecasts are not updated as the day progresses and are of poor spatial resolution covering only some of the provinces. These weather forecasts are released to a standard email list – including agriculture, civil aviation, water resources and disaster risk reduction authorities – and are disseminated primarily by radio and television stations, and print media at a national level. In case of an extreme weather warning the aviation authorities are informed via internal aeronautical communication systems and press release. Radio and TV are the two major vehicles for dissemination of warnings for the public and communities. Seasonal forecasts are issued twice a year, based on seasonal precipitation forecasts generated for PRESAO 11 regional forum which meetings are conducted

⁸In August 2011, DIMO executed a disaster planning course in Freetown, Sierra Leone. The Office of National Security (ONS) hosted the course in the Ministry of Defense (MOD) main conference room. Fifty participants from 14 military, governmental, and non-governmental organizations with responsibilities to emergency/disaster preparedness and response participated.

⁹Inventory of National Coordination Mechanisms, Legal Frameworks and National Plans for Disaster Risk Reduction in Africa, UNISDR Regional Office for Africa. 2010.

twice a year by representatives of several West African states. However, the lack of a reliable rainfall network does make this seasonal forecast undependable and of a very limited use. There are no other initiatives addressing the communication and dissemination of warnings in the country.

27. Of critical importance is the development of capacity to collect and transmit near real time weather data so to feed SLMD with sufficient information to produce timely warnings. This meteorological information needs to be relayed in almost real time based on an assessment of its usefulness, and after being vetted a warning should be issued and disseminated to target communities. It was identified during the PPG phase that there is currently very limited communication between the SLDM and other institutions concerned with EWS in Sierra Leone. Therefore, there is a need for the structuring of a fast and reliable communication network, which will be the basis of the EWS. This revolves around the need to have: i) communication facilities from the AWS monitoring network to the SLMD forecasting Centre; ii) direct channels of communication for relaying forecast products and meteorological information to Disaster Management Committee (DMC); iii) communication mechanisms for dissemination of warnings to target sectors and communities. The GoSL has been investing on some of these issues by directing inputs and efforts to establish good reliable communication facilities in the country including fiber optics and a number of mobile telephone providers around the country.

v) Community based early warning dissemination mechanisms

28. Even with the provision of improved weather and climate information data, any alert generated will not be of value unless effectively disseminated to targeted end-users. For example, communities in Bombali, Tonkolili and Koinadugu need to establish a network for permanent monitoring of the river flow upstream and downstream the Dam plan to protect their livelihoods established on approximately 96 farm plots in 117 ha of cultivated lands that can be partially or fully inundated, affecting about 150,000 people. Community farmers in Eastern Sierra Leone (Kono, Koinadugu, Kailahun and Kenema) are particularly vulnerable to climate impacts are in need of drought early warnings as well as tailored weather and climate forecasts for farmers. At present, donor- and NGO-supported initiatives in this region are funded by private funds or in the context of The Ministry of Agriculture, Forestry & Food Security project activities such as the “MRU/FAO Hub of Food Security and Nutrition Vulnerability” and IFAD led LDCF project “*Sierra Leone: Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone*” and aims to reduce the impact climate variability. Currently there is no dedicated warning service focussed on these communities provides drought and flood warning information to communities. Information dissemination mechanisms back to the communities are also not developed. The primary means of broadcasting forecast issued by SLMD presently in use (TV, National Radio) do not reach most of these vulnerable communities. The high national illiteracy rates (62%) does not favour remote vulnerable communities (particularly women >75% illiteracy rate) to learn on impending hazard through the current media channels broadcasting in English language. Furthermore, there is a limited practical capacity at the community level regarding appropriate responses to weather and climate forecasts including early warnings. There is currently no networking or coordination body for NGOs and CSOs working on environment and natural resources issues and climate change. Therefore a national framework for disaster response and effective dissemination of forecast and warnings to remote vulnerable communities is a necessity within the context of an Early Warning System (EWS) with a national coverage and impact.

29. Projects (underway or planned) relevant to this project and with which the project will seek linkages during the implementation phase to effectively establish a EWS are included below (see details in Section 2.3.1):

- The Project: “*African Monitoring of the Environment for Sustainable Development (AMESD)*”;
- The UNDP project: “*Preventive Development*”;
- DFID project: “*Supporting the Government of Sierra Leone to implement its National Water Supply and Sanitation Strategy*”;
- The EU funded project: “*Environmental governance and mainstreaming*”;
- UNDP Project: “*Community Empowerment and Development Project (CEDP)*”.

30. Despite the achievements of the GoSL and the support of the baseline projects outlined previously, additional support is required to: i) increase the accuracy, timeliness and applicability of weather and climate forecasts; ii) enhance awareness at all levels on the impacts of climate change on socio-economic development and the importance of weather and climate information to assist local communities and sectors to adapt to these impacts; and iii) strengthen coordination procedures and communication channels for sharing and disseminating weather and climate information to decision-makers in government, private sector, civil society, development partners and local communities. This will make the work of SLMD, DWR and ONS-DMD more visible and better appreciated by other government ministries and local communities.

With LDCF/SCCF Intervention (adaptation alternative)

31. The six outputs under Outcome 2 (see Section 2.4, Outcome 2, Adaptation alternative in the LDCF project document for indicative activities per project output) will build on the existing investments being made in the sector by the GoSL (baseline operation annual costs by SLMD, DWR and ONS-DMD described above), including projects supported by UNDP, IFAD, DFID, UE, WB and WASH Facility programme described in Section 2.3.1.

32. As part of this component the additional strengthening of the current EWS will be enacted through six main steps: i) strengthening the capacity of SLMD to use weather and climate information to develop timely and accurate weather forecast; ii) strengthening the capacity of SLMD to develop new tailored products to serve Early Warning System; iii) Developing a strategy for using climate and early warnings in CC risk assessment, adaptation planning and mainstreaming CCA into existing plans/strategies; iv) strengthening the existing dissemination and response mechanisms/systems under the Disaster Management Department (DMD); v) supporting SLMD to establish a framework for EWS sustainability; and vi) establishing community based EWS pilot sites to test its effectiveness.

33. This LDCF will support the GoSL to establish appropriate regional and international partnerships to carry out a capacity development programme for all SLMD meteorologists and hydrologists so to develop their competence to usefully generate and use data from climate and hydrometeorological models run elsewhere in the region or at international centres. This will allow SLMD forecasters to acquire the necessary skills to carry out downscaling of regional/international forecasting products and adapt for local conditions using diverse techniques and facilities such as the SYNERGIE, SADIS software. This will facilitate the production of nowcast, short range, medium range and seasonal rainfall forecast.

34. This project will also work in collaboration with the Ministry of Water Resources (MWR), to establish Regional and/or international partnerships to develop and deliver training in hydrological modelling to all hydromet officers to use net hydrometeorological data to generate quantitative precipitation/run-off forecasts for flood warnings and also mitigate flood losses. The regional PRESAO (11) partnership will be used to strengthen SLMD Forecasting Centre to provide sector specific seasonal forecast to support watershed management in particular at Gumma Valley, Bumbuna Dam and Inland Valley Swamps.

35. Given the current developmental stage of SLMD this LDCF will support the Goal to establish a multidisciplinary and Inter-institutional Technical Committee (EWS-MITEC) to assess the existing situation against international best practice, leading to development of the tailored products. EWS-MITEC will support SLMD in strengthening the structure of the establish legal framework for standardizing processes, mandates, roles and responsibilities of the National Disaster Management Department and all organizations involved in generating and issuing warnings in Sierra Leone. EWS-MITEC will assess the need for strengthening the existing dissemination/response mechanisms/systems under the ONS-Disaster Management Department (DMD) focusing particularly on remote vulnerable communities and women community based associations. In addition the EWS-MITEC will also establish and/or strengthen an institutional mechanism for collection of feedback from the community end-users (mining companies, farmers and fishing communities) on the usefulness of the messages and advice, so to enhance efficiency of EWS. However the EWS-MITEC will benefit from a capacity development programme to be enlightened on Climate Change EWS, information

packaging, dissemination and response approaches as well as the role they must play in the development of the EWS.

36. This LDCF will also support the Office of National Security (ONS) in collaboration with SL Red Cross Society, to capacitate warning analysts to understand tailored warning generation/response according to international standards and protocols as well as ONS-Sectoral Task Forces (STFs) in the Provinces/Districts to harmonise agreements and interagency protocols to ensure consistency of EWS management (language and communication channels where different hazards are handled by different agencies).

37. To develop climate change risk assessment, adaptation planning and mainstreaming CCA into existing plans/strategies this LDCF will support the on-going efforts being undertaken by bilateral cooperation and GoSL¹⁰ to integrate climate change risk into national policies and plans, particularly in mining, tourism and land management which are three key government priority areas with a significant impact on economic growth and environmental risk reduction. The project will support and operationalize CC-DAMAS to work in partnership with Center for International Earth Science Information Networks (CIESIN) and engage in using EWS generated extreme weather data and information to produce vulnerability and risk maps that will contribute to bridge the gap between science and policy and boost capacity to integrate climate risks into national plans and sectoral policies; ii) systematic streamlining of digital information (climate hazard maps, sectoral risk and vulnerability maps including relevant socio-economic data) to identify gaps and shortfalls to support revision of current land use planning guidelines and processes and strengthen legislation and regulations especially in flood prone areas of Sierra Leone.

38. The project will strengthen information communication to end users to stimulate and encourage appropriate responses to climate variability and change. This will be achieved by establishing how best to package warning information, based on the tailored forecasts, targeting the sensitization of end users including communities, government and the private sector. For example this project will encourage and support the ONS-DMD in investing on language of communication used for warnings to specific communities and a better communication of the EWS messages for the farmers coupled with awareness campaigns. The project will support the adoption of innovative means of warning dissemination including simple and user-friendly messages, "sms" text and "sms" pictorial messages for target communities and sectors.

39. A comprehensive needs assessment for climate services will be carried out (how needs are currently met, opportunities for private partnerships and gaps in the current services), as well as the willingness and ability to pay for such services across a range of a range of stakeholders, both private and public. Moreover, the GoSL has expressed the wish to transform the SLMD into a semi-autonomous Agency (Sierra Leone Meteorological Agency). This will further strengthen the sustainability of EWS.

40. Early warning systems (EWS) are an essential component to Community-Based Disaster Risk Management (CBDRM). Early warning systems provide communities with relevant, topical information on environmental conditions so that communities can assess levels of risk and make informed decisions to protect their safety. This LDCF will support the establishment of Community Based EWS (CBEWS) in three pilot sites. The support given to these CBEWS will be focused in three main aspects: i) provision of community controlled river gauging systems and simple rain gauges to complement the existing network; ii) strengthening the capacity of local community radios to disseminate warnings in real time; iii) development of innovative dissemination methods and tools; and iv) developing sector tailored warnings based on nowcasts and forecasts. The majority of the population is in remote, illiterate communities without access to electricity. Apart from mobile phone networks, their only source of connectedness and information from the outside world is radio. The majority of the rural population has access to a radio receiver and regularly listens to Community Radio. With the aim to ensure that the LDCF alternative will support dissemination of early warnings, weather forecasts and climate change information to the rural population, community radio stations will be targeted for capacity development and technical support. Other innovative tools for dissemination will

¹⁰The Republic of Sierra Leone. An Agenda for Change. Second Poverty Reduction Strategy (PRSP II) 2008-2012
GEF5 CEO Endorsement Template-December 2012.doc

be adopted according with the needs including “sms” text messages and “sms” pictorial coded messages, Loudspeakers, Drums etc...

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:

41. Risks, mitigation/reduction measures and assumptions to the LDCF project are summarised below, and assigned to indicators in the Project Results Framework (see Section 3 of the LDCF project). The risks are further detailed in the Risk Log in section 2.5 and annex 3 of the project document.

| # | Risk | Mitigation/reduction measure | Assumption |
|----------|---|--|---|
| 1 | Delayed implementation of baseline projects by the government and donors negatively affects LDCF project outcomes. | Continuous lobbying and sensitization of the policy makers based on evidence from the pilot sites to secure cooperation and commitment. | Baseline projects are implemented according to the timeline identified in the design phase of the LDCF project, and achieve the desired outcomes and objectives. |
| 2 | Installed hydro-meteorological equipment fails because it is vandalised or not maintained. | Awareness raising activities will be undertaken in target communities to highlight the importance of the installed equipment. In addition, the equipment will be housed within a secure fence. | Communities living in proximity to installed hydro-meteorological equipment commit to taking active measures to prevent the equipment from being vandalised; and the equipment is adequately maintained by the responsible institution. |
| 3 | Climate shocks occurring during the design and implementation phase of the LDCF project result in disruptions to installed equipment and severely affect communities, prior to the EWSs being established. | Disaster mitigation and response activities will be prioritized at the target communities whilst the EWS is being established. | Any climate shocks occurring whilst the EWSs are being established will not be so severe as to result in a relocation of the communities where the effectiveness of the EWSs will be tested, or to irreparably damage hydro-meteorological equipment. |
| 4 | Local information technology and telecommunications infrastructure restricts the transfer of data from installed equipment to necessary recipients, and restricts communication amongst key role players and end-users. | The LDCF project has been designed in accordance with local conditions, taking, where applicable, the latest available international technology into account. | Information technologies and telecommunications systems implemented or used through the LDCF project are best suited to the local context and do not restrict the transfer and communication of information. |
| 5 | 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. | Effective administrative planning will be undertaken, with support from UNDP CO, which will include procuring equipment at an early stage in the project implementation phase. | UNDP CO and HQ will co-ordinate with the IP to ensure effective administrative planning and the timely procurement and installation of equipment. |
| 6 | Lack of commitment from communities where EWS are established undermines the effectiveness of the LDCF project demonstrations. | The LDCF project will avoid a ‘top down’ approach and seek to create community ownership of the EWSs through community training and encouraging participation in project activities. | Awareness-raising activities and the demonstration of the advantages of responding to the information provided through the established EWS will ensure the commitment of the communities participating in the LDCF project. |
| 7 | Alerts and warnings required by communities are not feasible to produce due to | The LDCF project will ensure that the training provided is based on the most up to date scientific and technical | The most up to date technology and scientific approaches and advances are feasible and appropriate for meeting the |

| # | Risk | Mitigation/reduction measure | Assumption |
|---|--------------------------------------|--|--|
| | scientific or technological failure. | advances in the fields of hydrology and meteorology. A regional team of experts will be available on a full-time basis to provide support to work towards ensuring state-of-the-art technology and scientific methodology – suitable to the local context – is used. | LDCF project needs. The level of error for forecasting is within the minimum thresholds appropriate for the LDCF project activities. |

A.7. Coordination with other relevant GEF financed initiatives

42. To ensure that the LDCF funds are used in a strategic manner, the LDCF project aims to coordinate with the climate change GEF LDCF financed project: i) “*Building Adaptive Capacity to Catalyze Active Public and Private Sector Participation to manage the Exposure and Sensitivity of Water Supply Services to Climate Change*” (\$2,940,000) whose objective is to enhance the adaptive capacity of decision-makers in the public and private sector involved in water provision to plan for and respond to climate change risks on water resources. The project specifically aims at supporting infrastructure and capacity building in the urban setting (Freetown and Guma Valley Reservoir) and in the rural setting (Southern, Northern and Eastern regions).

43. The project will also strategically support: (1) the strengthening of SLMD with an improved network of rainfall stations and increased human resource capacities to provide climate change related information and (2) the establishment of a Climate and Hydrological Monitoring System for Guma Valley Dam, to help build an Early Warning System for the main water supply to Freetown; ii) “*Sierra Leone: Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone*” (\$2,664,800), The intervention of this LDCF will be articulated around four components: (a) sustainable development of climate resilient inland valley swamp; (b) integrated water and natural resource management for adaptation; (c) capacity building and awareness raising on climate change and (d) project management and M&E. It will target specific sectors such as the Agriculture Sector: 1) Develop irrigation and land drainage system for agriculture; 2) Develop and implement agricultural land-use and land cover management; 3) Promote swamp land farming and the Meteorology Sector: 1) Improve research and weather forecasting capabilities and rehabilitate national weather stations as well as educate meteorological department personnel to forecast and inform about particular dangerous or extreme events; 2) Raise public awareness and mainstream gender perspectives into climate change issues.

44. 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.

45. All projects under this programme are dedicated to weather and climate monitoring, identification and assessment of vulnerability and risks to climate change hazards and impacts, improvement of national forecasting capacities and best ways of disseminating warnings. Therefore, monitoring equipment to be used by individual countries, though from different manufacturers, should follow WMO standards. The same applies for training and capacity development activities at regional level or partnering with other countries.

46. The particular case of Sierra Leone with neighbouring Liberia (also benefiting from a similar LDCF project) can provide specific synergies. Both countries have been suffering from a lack of trained and experienced Meteorologists and Technicians. Both countries are also planning to carry out intensive in-house training to create sufficient human technical capacity to handle weather observation and forecasting activities. These capacity development programmes can be jointly developed making best use of the sparse and experienced human resources that exist

47. Training and capacity building for operations and maintenance of the hydromet infrastructure and for modeling and forecasting (Outputs 1.1, 1.4 and 2.1) can also be done at a 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.

B. ADDITIONAL INFORMATION NOT ADDRESSED AT PIF STAGE:

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

48. The lead institution for all project outputs is the Ministry of Water and Environment. The implementation strategy for the project is dependent on comprehensive stakeholder participation. Participating stakeholders and their key responsibilities are detailed in Table 6 below.

Table 6. Relevant partners and stakeholders identified for engagement by project outcome/output.

| Outcome | Outputs | Lead institution | Key Partner | Key Responsibilities |
|---|--|-------------------------|---|--|
| OUTCOME 1. Enhanced capacity of national hydro-meteorological institutions to monitor extreme weather and produce sector tailored weather forecasting. | Output 1.1: Hydrological and rainfall monitoring network of 38 rainfall stations and 4 river gauges are installed to complementing SLMD, Guma Valley, Bumbuna Watershed and The Ministry of Water Resources (MWR) network. | MWR (DRW) | Sierra Leone Meteorological Department (SLMD). | For coordination, system integration, capacity building and rainfall monitoring network management. Undertake systematic analysis. Procure and install AWLSs. Undertake repairs. Procure spare parts. Integrate HASs into existing DWR network. |
| | Output 1.2: An integrated weather monitoring network of 12 synoptic automatic weather stations, WMO standard, is installed to support the establishment of an Early Warning System (EWS). | MTA (SLMD) | DRW, MAFFS SLCAA, NATCOM | For coordination, system integration, capacity building and rainfall monitoring network management. Undertake systematic analysis. Procure and install AWSs. Undertake repairs. Procure spare parts. Integrate AWSs into existing SLMD network. |
| | Output 1.3: Forecasting meteorological tools, software, infrastructure facilities and specialised training are made available to run SYNERGY, SADIS & AMESD systems to strengthen the capacity of SLMD to produce improved and sector tailored weather forecasting. | MTA (SLMD) | SLCAA (Sierra Leone Civil Airport Authority) & SLAA (Sierra Leone Airport Authority) for technical cooperation. | For coordination, system integration, capacity building and rainfall monitoring network management. |

| | | | | |
|--|---|-----------------------------------|---|---|
| | <p>Output 1.4: A total of 6 Meteorologists, 16 Meteorological Technicians, 4 Forecasting Superintendent Officers 20 Specialist Superintendent Officers are trained to support EWS data handling and forecasting operations.</p> | MTA (SLMD) | <p>University of Sierra Leone (USL) -Fourah Bay College.(FBC)</p> <p>WMO Regional Meteorological Centers (Dakar, Lagos)</p> | <p>Training of meteorological personnel. Establish operation and maintenance training facilities.</p> <p>Assist trained meteorologists and hydrologists to conduct training workshops.</p> <p>Assist trainers to conduct training of weather observers.</p> |
| | <p>Output 1.5: A Communications network is established for SLMD and ONS-Disaster Management Department to support EWS warning and dissemination mechanism.</p> | MTA (SLMD), | DWR, NATCOM), ONS-DMD | Develop communication network, data transmission & communication coordination. |
| <p>OUTCOME 2. Efficient and effective use of hydro-meteorological information for generating early warnings and support long-term development plans</p> | <p>Output 2.1.:13 Meteorologists are trained in EWS sector tailored weather forecasting techniques and information Packaging</p> | MTA (SLMD), | DWR, WMO Regional Center | For training and technical support, capacity development and system integration; |
| | <p>Output 2.2.:A multidisciplinary and Inter-institutional Technical Committee (EWS-MITEC) is established to study/plan/propose integration/delivery of EWS products to the various identified national end users including community sectors.</p> | The President's Office (ONS-DMD) | SLMD, DWR, ONS-DMD | <p>Identify, review and propose revisions to sectoral policies, strategies, investment plans and annual budgets.</p> <p>Develop the capacity of Sub-County and District DMCs.</p> <p>Develop a national weather and climate information and early warning system communication and coordination strategy.</p> |
| | <p>Output 2.3.:A CC-Data Management System (CC-DAMAS) is established to allow systematic storage and streamlining of digital information to support decision making in sector planning.</p> | MLCPE (SLEPA) | SLMD, (CIESIN, MAFFS, ONS-DMD | <p>Identify, review and propose revisions to sectoral policies, strategies, investment plans and annual budgets.</p> <p>Develop the capacity of Sub-County and District DMCs.</p> <p>Develop a national weather and climate information and early warning system communication and coordination strategy.</p> |
| | <p>Output 2.4.:The existing dissemination/response system under the ONS-Disaster Management</p> | The President's Office ONS- | SLMD, DWR, | <p>Develop SoPs.</p> <p>Develop an early warning system dissemination national and local toolbox.</p> |

| | | | | |
|--|--|------------|---|--|
| | Department (DMD) is strengthened to support EWS. | DMD | | Equip and facilitate DMD and ONS-Sectoral Task Forces (STFs) to support the dissemination of weather and climate information. Develop a SMS-based alert system. |
| | Output 2.5.: A framework for financial sustainability based on cost-recovery service provision is established at the National Meteorological Agency (NMA) to support EWS operation. | MTA (SMLD) | DWR, ONS_DMD, Sierra Leone Airport Authority, Flight Information Region (Roberts FIR), Sierra Leone Maritime Administration, Sierra Leone Civil Aviation Authority for partnership and cooperation. | Conduct a comprehensive study to establish the viability of different sources of revenues – rated as mixed good/commercial as well as public good. Develop and implement sector-specific marketing strategy and program. Review and propose revisions to the current cost recovery arrangements/government reimbursements. Develop service-level agreements for government organizations and private companies requiring specific customized meteorological services. |
| | Output 2.6: Community based EWS (CB-EWS) network is developed in pilot sites to enhance and test its impact on risk reduction in sectors and population. | MTA (SLMD) | DWR, MAFFS, ONS_DMD | Establish CB-EWS. Equip and facilitate activities of CB-EWS and STFs to support the dissemination of weather and climate information. Develop a SMS-based alert system. |

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):

49. The project is expected to deliver benefits at both the national and local levels. The installation of weather observation network and computer infrastructure will benefit the NHMS staff (through training and technological advancement). Other national institutions that will benefit from this endeavour will be Ministries of Agriculture, Water, Energy, and Disaster Management, through strengthening of their computer databases, access to information and ability to communicate with other regions. One important benefit will be the improved coordination between government departments and the sharing of information, which can lead to improved products and services. In the private sector the Mining, Aviation and Transport sector will benefit from more reliable and accurate nowcast information reducing their current risks. It is then possible that these institutions can start marketing such information and products (satellite monitoring and climate forecast products in particular) to private entities that will pay for the services.

50. At the local level early warnings and climate hazard mapping, disseminated correctly and acted on appropriately, can provide economic benefits through reducing losses of agricultural produce, infrastructure (roads and bridges) and disruption to peoples livelihoods. This has further knock-on effects on people's health and wellbeing and thus affects communities and social structures. Communities will immediately benefit through warnings related to agriculture, coastal management, water and flood management, wildfires etc. This total population benefiting from these developments has the potential to grow hugely if warnings extend to a reasonable percentage of the total population e.g. through a mobile phone relay or similar system. Many of the beneficiaries will be women, especially within the agriculture sector where they often make up the majority of smallholder farmers, yet are most vulnerable to food insecurity. There may also be other benefits to developing the communication systems associated with early warnings - for instance radios can also be used for arranging medical evacuations.

51. A global survey of early warning system carried out in 2006 by the UN-ISDR identified a number of weaknesses in the early warning systems of many sub-Saharan African countries including Sierra Leone. Two critical ones are: weak scientific and data foundations and poor information communication and response capabilities. This LDCF project as indicated above will contribute significantly to alleviating these two weaknesses. The current situation with regards to the latter, poor information communication to end users to stimulate and encourage appropriate adaptation responses is still as weak as was diagnosed 4 years ago. Forecasts and early warning messages are still not packaged and delivered in a targeted manner to sensitize end users including communities, government and the private sector.

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

- *MDG 1: Eradicate extreme poverty and hunger* – This project aims to improve EWS nationally, providing useful climate information such as seasonal forecasts to two-thirds of the population who are dependent on the agricultural value chain (NAPA, 2007). Seasonal forecasts can enable the rural population to take adaptive farming measures to ensure productivity;
- *MDG 3: Promote gender equality and empower women* – EWS will be tailored to end-user needs, in particular the needs of women who have little access to farming, particularly on fertile land. Women focused NGOs have been implicated in the project (Coalition of Civil Society and Human Right Activists an Umbrella Organization for the NGO's).
- *MDG 6: Combat HIV/AIDS, malaria and other diseases* – Malaria and other vector-borne diseases are heavily linked with climate variables such as temperature. This project will provide open-access data for institutions such as the Ministry of Health to use climate/weather forecasts to be able to predict the spread of such diseases;
- *MDG 7: Ensure environmental sustainability* – The foundation of this project is to ensure environmental sustainability by integrating EWS initiative into national policies, planning and decision-making. Such endeavors can assist in the sustainable use of natural resources through good water management practices.

53. The LDCF project will introduce new infrastructure – including weather stations and forecasting facilities – while building upon, and being integrated into, the existing SLMD and DWR infrastructure and capacity. LDCF project activities will complement existing meteorological and hydrological support programmes being funded by WASH Facility, by IFAD/GEF_LDCF project and by UNDP Spanish Funds with collaboration of WMO/UKMO. This will benefit national hydro-meteorological infrastructure for the effective and efficient use of information for making early warnings and long-term development plans.

54. The LDCF project will also benefit the SLMD and DWR by developing human technical capacity in order to maintain and operate meteorological and hydrological observation networks and systems. Education and training will be provided to 6 Meteorologists, 16 Meteorological Technicians, 4 Forecasting Superintendent Officers 20 Specialist Superintendent Officers of SLMD and capacity development 13 Meteorologists and 6 hydrologists for DWR, thereby building technical capacity in weather and climate

forecasting as well as hydro-meteorological data handling. This will directly benefit these Government departments with associated benefits filtering down to community end-users at the local level.

55. At a national level, all regions will benefit from the placement of Automatic Weather Stations (AWSs) and Hydromet Automatic Station (HAS) which will extend the geographical coverage of Sierra Leone's weather, climate and hydrological observation network. This will particularly address gaps in the observation network in the Western and Southern Regions of the country as well as build on activities in the Eastern Region of Sierra Leone supported by IFAD.

56. Tailored weather and climate information will be made accessible to decision-makers in government, private sector, civil society, development partners and local communities. This information will be mainstreamed into national policies as well as work and development plans. Government and non-government communication alert channels, including advisories, watches and warnings will be strengthened at the local and national levels.

57. Perhaps the largest economic benefits are associated with improved transport planning, especially shipping which will take advantage of improved forecasts of winds and waves, and aviation which can take advantage of improved local forecasts. These and commercial agriculture likely represent some of the largest private clients for early warning services and tailored forecasts. Together with satellite imagery used for land-use planning and monitoring these can provide environmental benefits, including monitoring of illegal logging which has global consequences in terms of deforestation and the global carbon budget.

Criteria for project site selection

58. The criteria used to determine high priority regions – developed by key stakeholders in-country, included regions: i) where there were vulnerable communities in flood prone areas; ii) identified as key for Water Management intervention in drought prone areas; and iii) key water related infrastructure requiring customized early warning. Full description of the project pilot sites in Section 2.3.2.

59. Based on a simple multi criteria analysis of stakeholder feedback, which involved scoring sub-regions based on a ranked score the following sites scored the highest for the implementation of community-based weather/climate information and early warning system outputs and activities:

- i) The Guma Valley Watershed feeding the Lake key infrastructure for The Guma Valley Water Company (GVWC) which need a dedicated and customized early warning using accurate seasonal forecasts to support assessment of water quantity/quality and the needs for more or less inputs for water treatment with great impact on the daily water quality for the community being served (1.1 million people) as well as the economics of the company. This LDCF will complement the UNDP_GEF “*Building Adaptive Capacity to Catalyze Active Public and Private Sector Participation to manage the Exposure and Sensitivity of Water Supply Services to Climate Change*”; The objective of this project is to enhance the adaptive capacity of decision-makers in the public and private sector involved in water provision to plan for and respond to climate change risks on water resources;
- ii) The Bumbuna Watershed around Bunbuna Dam where currently the Bumbuna Watershed Management Authority (BWMA) runs an Emergency Preparedness Plan (EPP) to assist surrounding communities to take precautionary measures against flood emergency and overflow or excessive discharge of water affecting the downstream river flow. This LDCF would complement this initiative being currently supported by the WASH Facility – Sierra Leone project on: “*Sierra Leone Water Security Project*” contributing to the establishment of the Sierra Leone Country Water Partnership (SLCWP) implemented by the Directorate for Water Resources (DWR) with the technical assistance of Adam Smith International (ASI), by providing an accurate seasonal forecast for the Bumbuna Dam Management Team and also a “nowcast” based warning to protect the livelihoods of vulnerable communities around three

priority districts of Bombali, Tonkolili and Koinadugu (about 150,000 people) affected by flooding events upstream and downstream of the Dam; and

- iii) The drought prone Inland Valley Swamps (IVS) of four districts in Eastern Sierra Leone (Kono, Koinadugu, Kailahun and Kenema) involving more than 110,000 farmers¹¹ requiring a customized Agromet seasonal forecast and warning farmers to assist increasingly vulnerable farming communities to ameliorate the system against the impact of climate change induced seasonal droughts and unpredictable extreme rainfall events. This LDCF will complement the work initiated by the IFAD led LDCF project “*Sierra Leone: Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone*” currently working in this area is involved in improving irrigation and drainage systems, and facilitate the identification and implementation of locally appropriate Water Management (SLWM) practices to help land users adapt to climate change.

¹¹Sierra Leone: Household Food Security Survey in Rural Areas November, 2008. World Food Programme, Vulnerability Analysis and Mapping Branch (ODAV). 64p. www.wfp.org/sierra-leone

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

60. Quantifying the cost effectiveness of improved climate information and early warning system investments is acknowledged to be difficult, and is therefore not regularly undertaken¹². Cost-benefit analyses of investments in improved climate monitoring and effective early warning systems are scarce. However, evidence suggests that investment in prevention is more cost-effective than spending on relief¹³. In developed countries in general, the benefits of improved weather services to inform severe weather warnings exceed costs by an average of more than 10 times (taken from Tsirkunov and Rogers, 2010)¹⁴. There is potential for similar cost-benefits to be realised through investing in improved climate monitoring and early warnings systems in developing countries. These benefits are expected to be proportional to the: i) population of the country; ii) level of climate-related risk; and iii) exposure to weather due to the state of infrastructure. It is estimated that, for all developing countries, the benefits of improved hydro-meteorological information, production of early warnings and associated capacity building/development will be¹⁵. The total benefits are estimated to be between US\$ 4 and US\$ 36 billion per year. The cost of improving hydro-meteorological services and producing the required warnings is estimated to be lower than US\$ 1 billion. The benefit-cost ratio is thus, on average for developing countries, between 4 and 36.

61. 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.

62. Surveying the technical support needs for each country 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. 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.

63. Training and capacity building for operations and maintenance of the hydromet infrastructure and for modeling and forecasting (Outputs 1.1, 1.4 and 2.1) can also be done at a 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, ICPAC etc.

64. Regional support will also be used to help strengthen the development of standard operating procedures (both the procedures themselves and their legal basis), for the issuing and communication of warnings/advisories, where possible incorporating warnings issued by neighbouring countries e.g. in the case

¹²Tsirkunov, V. and Rogers, D. 2010. Costs and benefits of early warning systems. Global Assessment report on Disaster Risk Reduction. The World Bank.

¹³Healy, A. and Malhotra, N. 2009. Myopic Voters and Natural Disaster Policy. *The American Political Science Review* 103(3): 387-406.

¹⁴Tsirkunov, V. and Rogers, D. 2010. Costs and benefits of early warning systems. Global Assessment report on Disaster Risk Reduction. The World Bank.

¹⁵Hallegatte, S. 2012. A Cost Effective Solution to Reduce Disaster Losses in Developing Countries: Hydro-Meteorological Services, Early Warning, and Evacuation. Policy Research Working paper 6058. The World Bank.

of shared watersheds (Output 2.2). Where private sector engagement (Output 2.5) includes multi-national corporations, regional support will assist engaging head offices in multiple countries, increasing the total effective services being offered and hence bargaining position of each government. 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 negotiations for data services, as well as engaging with corporate social responsibility programmes to enhance services where possible.

65. In addition, this initiative being part of a GEF funded multi-country programme means there is significant scope for many activities to be coordinated at the regional level thereby enabling economies of scale, which reduce costs and increase effectiveness (especially in terms of knowledge generation and training). In particular activities under Output 1.1 and 1.2, which will procure hydrological and meteorological equipment, will benefit from the core technical staff who will help design and identify appropriate cost-effective observing networks. Activity 1.4.5 and 1.4.6 of output 1.4 (as well as activities under outputs 2.1) can also be implemented in collaboration with other countries to provide training on infrastructure operations and maintenance, weather and climate forecasts and development of tailored warnings/advisories e.g. activity 2.1.3 and 2.1.4 which focuses on training of forecasters and modellers.

66. The approach taken to ensure cost-effectiveness of the LDCF project's outcomes is detailed further below.

Outcome 1: Enhanced capacity of the Sierra Leone Meteorological Department of (SLMD) and Directorate for Water Resource (DWR) to monitor extreme weather and produce sector tailored weather forecasting climate change.

67. LDCF project activities will build on existing networks, achievements and planned actions by SLMD and DWR. This will allow institutional capacity to be built cost-effectively, ultimately assisting in planning and implementing the early warning system. This approach of complementing existing, related projects is more cost-effective than the implementation of a separate initiative, as it will allow the LDCF project to be managed within the existing institutional and management frameworks rather than creating new systems, which would result in additional start-up and opportunity costs. Additionally this approach builds local capacity and maximises the baseline EWS on which future investments can build. The LDCF project will also work closely with existing SLMD and DWR projects to co-produce outputs. This will promote cost-sharing with these other projects, reducing overheads and enhancing cost-effectiveness. The LDCF project will develop sustainable financing mechanisms to support the operation and maintenance of the improved hydro-meteorological network. In particular, there is potential for improved early warning services and tailored forecasts to generate revenue from the aviation and commercial agriculture sectors. Income generation will greatly enhance the cost-effectiveness of the project as costs will be partially offset through increased revenue.

68. Equipment purchases and repairs to existing infrastructure were evaluated for cost-effectiveness. In order to maximise the geographic coverage of the hydro-meteorological network, a large proportion of existing infrastructure will be rehabilitated in addition to the procurement of new AWSs. Rehabilitating existing equipment is more cost-effective than procuring new equipment, as there is a lower unit cost. Stakeholders within the SLMD and DWR were consulted extensively on the likely extent of training that would be required for personnel to operate various equipment types in order to ensure that training was included in cost-effectiveness considerations.

Outcome 2: Efficient and effective use of hydro-meteorological and environmental information for making early warnings and long-term development plans.

69. Lessons learned from on-the-ground climate monitoring and early warning interventions will be captured and disseminated through *inter alia*: i) in-house training for meteorologists; ii) internships in national meteorological hydrological services; iii) a weather and climate information online platform; and iv) a toolbox that will include courses, handbooks and manuals. This integrated approach provides a cost-effective manner of informing and increasing the capacity of an extensive range of stakeholders, which include government

technical staff, policy-makers, restoration practitioners, scientists, university students, school children and the general public.

70. Furthermore, this project is also designed with several strong baseline projects and investments in place two of which are described in Section A7 of this CEO Endorsement and others in Section 2.3 of Project document. Building on such strong baseline projects provides a unique opportunity for cost-effective planning of key interventions. Consequently, from the perspective of further cost effectiveness, the design of this LDCF has been based on a complementarity approach to all investment and capacity development programmes currently underway through the identified baseline projects. Specifically all investments planned by this LDCF in terms of Automatic Weather Stations (AWSs) were considered taking into account the investments already made or to be made during the lifetime of the project (2013-2017). As such, the number of AWSs outlined in Output 1.2 will complement those six already installed by both the UNDP/WMO/UKMO and UNDP project “*Capacity Building of the Sierra Leone Meteorological Office*” and four (4) AWS to be installed during 2013 by the IFAD/GEF_LDCF project: “*Sierra Leone: Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone*” and up to fifteen (15) AWSs in four districts by the end of the project.

Similarly, the planning of the capacity development programme outlined in Output 1.4 and Output 2.1 was carried out based on the potential synergies identified during the PPG phase. The number of technicians to be trained by this LDCF will also complement (i) the three (3) meteorologists trained under UNDP/WMO/UKMO project currently supporting the SLMD; (ii) the 3 Agrometeorologists and 6 Agromet technicians to be trained under the capacity development programme being implemented by IFAD led GEF_LDCF project and; (iii) the 50 officers from the Water Policy Planning Coordinating Unit (WPPCU) and the Sierra Leone Environmental Protection Agency (EPA), Water Societies, regional extension services, national and international NGOs and other trained by the UNDP_GEF “*Building Adaptive Capacity to Catalyze Active Public and Private Sector Participation to manage the Exposure and Sensitivity of Water Supply Services to Climate Change*” to generate, analyze and integrate climate risk information, including on climate induced disasters, into water policies and investment plans.

71. At international level, coordination amongst the various countries targeted by this EWS programme will be enhanced by:

- A dedicated highly specialised technical assistance that will be delivered to support the Implementing Partner in the various countries of this EWS programme using common resources from a pool of project based chief technical advisors (hydrological and meteorological specialists assisting weather, climate and hydrological observation systems and forecasting, communication systems, knowledge sharing, SOPs and fund mobilization) under a regional based coordination. This approach will lower the global costs required to procure and assist countries at individual level.
- Regional level linkage to Weather/Climate Centres/Institutions such as ACMAD, AGRHYMET, WMO, Regional Climate Outlook *Fora* (PRESAO, SARCOF, GHACOF, etc.) facilitating the integrating of systems and coordination of training/capacitance, forecast product access, etc.
- The up-scaling capacity of lesson learnt from each individual country and replication opportunity of good practices across all countries that this regional support facility will benefit to all EWS Projects in the region, helping to smoothly overcome similar constraints and problems that will be encountered during project’s implementation.

72. Moreover all projects under this EWS programme are dedicated to weather and climate monitoring, identification and assessment of vulnerability and risks to climate change hazards and impacts, improvement of national forecasting capacities and best ways of disseminating warnings as well as response. Therefore, monitoring equipment to be used by individual countries, though of different manufacturers and makes they should follow WMO standards. The same applies for training and capacity development activities that can be

developed at regional level or under countries partnerships. Though delivered by different training organizations and institutions they should obey WMO specifications and standards.

73. The particular case of Sierra Leone with neighboring Liberia (also benefiting from a similar EWS LDCF project) is specific and more can be done for synergies. Both countries have been suffering from a lack of trained and experienced Meteorologists and Meteorologist Technicians. Both countries are also planning to carry out intensive in-house training to create sufficient human technical capacity to handle weather observation and forecasting activities. These capacity development programmes can be jointly developed making best use of the sparse experienced human resources that still exists and building synergies at technical level.

74. Additionally, to ensure a consistent and systematic up-scaling of lesson learnt and replication opportunity of good practices across all countries, yearly regional technical conference can be organised to joint all Project's Management Units (PMU) so to assess countries' achievements and shortfalls and discuss new approaches, methodologies and techniques to overcome possible identified constraints particularly after project's mid-term review.

75. Finally, a baseline self-capacity assessment was conducted during the project preparation phase in order to guide the identification and prioritisation of stakeholder needs. Equipment and capacity-building investments were selected based on identified priorities as well as the available budget and focal areas of the LDCF project. Proposed outputs and procurements were reviewed in a representative validation workshop and revised to reflect considerations of sustainability and cost-effectiveness. Proposed outputs are considered cost-effective relative to the alternative approaches considered to address project barriers, as shown in the table 7 below.

Table 7. Alternatives considered for the project.

| OUTPUTS | Barrier Addressed | Alternatives Considered |
|---|---|---|
| <p>Output 1.1: 12 river gauges, 2 water level (limnimetric scale), 6 groundwater data logger, 2 signal counter rotations for hydrological monitoring are installed in partnership with SLMD to complement watershed management networks of Guma Valley, Bumbuna Watershed and The Ministry of Water Resources (MWR).</p> | <p>Insufficient hydromet and climate monitoring infrastructure</p> <p>Limited knowledge and capacity to effectively predict future climate events</p> | <p>1. 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.</p> <p>2. Alternative 2: Different equipment manufacturers can be used; however, Capacitance will be given to technical personnel in using hydrological modeling.</p> |
| <p>Output 1.2: 38 rainfall gauges, 8 synoptic, 8 climatological automatic weather stations, WMO standard, are installed to support the establishment of an integrated weather monitoring network.</p> | <p>Insufficient hydromet and climate monitoring infrastructure</p> <p>Limited knowledge and capacity to effectively predict future climate events</p> | <p>3. Alternative 1: Only use manual stations and incorporate SMS communication services; SLMD have already six automatic stations. These automatic stations and manual stations will allow 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.</p> <p>4. 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.</p> <p>5. 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 SLMD (Output 1.4 & 2.1). This will ensure the sustainability of continued monitoring and the use of tailored EWS/CI into long-term development plans.</p> <p>6. Alternative 4: Lighting detection systems; these technologies do not enable sufficient warning lead-time for resource mobilization (e.g., getting people to move from coastlines at risk). They also cannot provide seasonal forecasts which are essential for Sierra Leone and its economic dependence on agriculture. SADIS equipment will work as proxy of a radar and will allow nowcast products.</p> |
| <p>Output 1.3:Forecasting meteorological tools, software, infrastructure facilities and specialised training are made</p> | <p>Weak capacity for issuing warnings and dissemination</p> | <p>7. Alternative 1: Do not acquire the SYNERGIE system, a private satellite data integration system which acts as a forecasting interface; SLMD has very limited forecasting capacity and will gain limited capacity and current forecasts are specific to aviation and do not consider multi-risks. As such, the initial cost of SYNERGIE (approximately \$140,000 for installation) and annual</p> |

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| <p>available to run SYNERGIE, SADIS & AMESD systems to strengthen the capacity of SLMD to produce improved and sector tailored weather forecasts.</p> | | <p>license renewal costs throughout the duration of the project have been accounted for. An external expert is mandated to build SLMD's capacity to include forecasting training costs in future budget lines.</p> <p>8. Alternative 2: 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 SLMD has too limited capacity to consider this option.</p> <p>9. Alternative 3: 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..</p> |
| <p>Output 1.4: A total of 6 Meteorologists, 16 Meteorological Technicians, 4 Forecasting Superintendent Officers 20 Specialist Superintendent Officers are trained to support EWS data handling and forecasting operations.</p> | <p>Weak capacity for issuing warnings and dissemination</p> <p>Limited knowledge and capacity to effectively predict future climate events</p> | <p>10. Alternative 1: SLMD 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 currently existing and the complementarity with other ongoing initiatives in capacity building (UKMO support through The WASH Facility Programme).</p> <p>11. Alternative 2: SLMD would benefit from the capacity development programmes currently under way (IFAD led LDCF project and UKMO support through The WASH Facility Programme) to strengthen the human resources capacity for forecasting.</p> <p>12. 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 Sierra Leone to develop national forecasting by translating open-source climate monitoring and forecasts into flooding and drought/food security information.</p> |
| <p>2 Output 1.5: A Communications network is established for SLMD and ONS-Disaster Management Department to support EWS warning and dissemination mechanism.</p> | <p>Weak capacity for issuing warnings and dissemination</p> | <p>13. Alternative 1: Rely on additional infrastructure to improve EWS/CI, however, delivery of hardware is easy while service delivery is the current hurdle 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</p> |
| <p>Output 2.1.: At least 13 Meteorologists and 6 hydrologists are trained in EWS sector tailored weather and hydrological forecasting techniques and information Packaging.</p> | <p>Weak capacity for issuing warnings and dissemination</p> <p>Limited knowledge and capacity to effectively predict future climate events</p> | <p>14. Alternative 1: 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.</p> <p>15. 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, MoWR, SLMD already has experience with learning-by-doing and has received training for many of the specific monitoring</p> |

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| | | instruments they have requested to be acquired/rehabilitated. |
| Output 2.2.: A multidisciplinary and Inter-institutional Technical Committee (EWS-MITEC) is established to develop SOPs (standard operation procedures) and study/plan/propose integration/delivery of EWS products to the various identified national end users including community sectors. | Absence of a national framework and environmental databases to assess and integrate climate change risks into sectoral and development policies | 16. 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. 17. 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 with other on-going projects. |
| Output 2.3.: A CC-Data Management System (CC-DAMAS) is established to allow systematic storage and mainstreaming of digital information to support decision making in sector planning. | Absence of a national framework and environmental databases to assess and integrate climate change risks into sectoral and development policies | 18. 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 |
| Output 2.4.: The existing dissemination/response system under the ONS-Disaster Management Department (DMD) is strengthened to support EWS. | Weak capacity for issuing warnings and dissemination | 19. Alternative 1: Enable each information dissemination agency to disseminate alerts directly: With this option, there is no central focal point for all NGOs/CBOs 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. |
| Output 2.5.: A framework for financial sustainability based on cost-recovery service provision is established at SLMD to support future EWS operations. | Absence of Long-term sustainability plan for observational infrastructure and technically skilled human resources | 20. 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. |
| Output 2.6: Community based EWS (CBEWS) network is developed in 3 pilot sites to enhance and test its impact on risk reduction in sectors and population. | Weak capacity for issuing warnings and dissemination | 21. 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 2.6 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:

76. The project will be monitored through the following M& E activities. The M&E budget is provided in Table 8 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.

77. **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.

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

- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and RCU staff vis-à-vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
- Based on the project results framework and the LDCF related AMAT set out in the Project Results Framework in Section 3 of this project document, and finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
- Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- Plan and schedule PB meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first PB meeting should be held within the first 12 months following the inception workshop.

79. 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.

80. **Quarterly:**

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

81. **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.

82. 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

83. **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.

84. **Mid-term of project cycle:** The project will undergo an independent Mid-Term Review at the mid-point of project implementation. 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 and UNDP-GEF. The LD/SCCF AMAT as set out in the Project Results Framework in Section 3 of this project document) will also be completed during the mid-term evaluation cycle.

85. **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 LD/SCCF AMAT as set out in the Project Results Framework in Section 3 of this project document) will also be completed during the terminal evaluation cycle. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response, which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Center (ERC).

86. **Learning and knowledge sharing:** Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects. There will be a two-way flow of information between this project and other projects of a similar focus.

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

Table 81. Project Monitoring and Evaluation

| Type of M&E activity | Responsible Parties | Budget US\$ <i>Excluding project team staff time</i> | Time frame |
|--|--|---|---|
| Inception Workshop and Report | <ul style="list-style-type: none"> ▪ Project Manager (MEE) ▪ PIU ▪ UNDP CO, UNDP GEF | Indicative cost: 10,000 | Within first two months of project start up |
| Measurement of Means of Verification of project results. | <ul style="list-style-type: none"> ▪ 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 <i>output and</i> | <ul style="list-style-type: none"> ▪ Oversight by Project Manager (MEE) ▪ PIU, esp. M&E expert ▪ Implementation teams | To be determined as part of the Annual Work Plan's | Annually prior to ARR/PIR and to the definition of annual work plans |

| Type of M&E activity | Responsible Parties | Budget US\$ <i>Excluding project team staff time</i> | Time frame |
|--|--|--|--|
| <i>implementation</i> | | preparation. Indicative cost is 20,000 | |
| ARR/PIR | <ul style="list-style-type: none"> ▪ Project manager (MEE) ▪ PIU ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG | None | Annually |
| Periodic status/ progress reports | <ul style="list-style-type: none"> ▪ Project manager and team | None | Quarterly |
| Mid-term Review | <ul style="list-style-type: none"> ▪ Project manager (MEE) ▪ PIU ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team) | Indicative cost: 30,000 | At the mid-point of project implementation. |
| Terminal Evaluation | <ul style="list-style-type: none"> ▪ Project manager (MEE) ▪ 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 | <ul style="list-style-type: none"> ▪ UNDP CO ▪ Project manager (MEE) ▪ PIU | Indicative cost per year: 3,000 (12,000 total) | Yearly |
| Visits to field sites | <ul style="list-style-type: none"> ▪ 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 | |


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 the [Operational Focal Point endorsement letter\(s\)](#) with this form. For SGP, use this [OFP endorsement letter](#)).

| NAME | POSITION | MINISTRY | DATE(MM/dd/yyyy) |
|------------------------|--|---------------------------------|------------------|
| DrKollehAlusineBangura | Director Environmental Protection Agency | ENVIRONMENTAL PROTECTION AGENCY | 04/18/2012 |
| | | | |
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B. GEF AGENCY(IES) CERTIFICATION

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| 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. |
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| Agency Coordinator, Agency Name | Signature | Date (Month, day, year) | Project Contact Person | Telephone | Email Address |
|---|---|-------------------------|---|--------------|-----------------------|
| Adriana Dinu, Officer-in-Charge, and Deputy Executive Coordinator, UNDP/GEF |  | July 23, 2013 | Mark Tadross Technical advisor, GLECRDS | +27216502884 | mark.tadross@undp.org |
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ANNEX A: PROJECT RESULTS FRAMEWORK

| This project will contribute to achieving the following Country Programme Outcome as defined in CPAP or CPD: Policy and legal frameworks and institutional arrangements for managing natural resources and addressing climate change, disaster, and environmental management strengthened | | | | | |
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| Country Programme Outcome Indicators: % change in equitable access and land tenure reform using the 2012 baseline; % change in production, utilisation and access to renewable energies as well as job creation; % increase of water supply adaptation to climate change; % change of impacts to natural disasters. | | | | | |
| Primary applicable Key Environment and Sustainable Development Key Result Area: 3. Promote climate change adaptation | | | | | |
| Applicable SOF (e.g. GEF) Strategic Objective and Program: Climate Change Adaptation Objective 2 “Increase adaptive capacity to respond to the impact of climate change, including variability, at local, national, regional and global level” | | | | | |
| Applicable SOF (e.g. 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”; and Outcome 2.2: “Strengthened adaptive capacity to reduce risks to climate-induced economic losses.” | | | | | |
| Applicable SOF (e.g. .GEF) Outcome Indicators: | | | | | |
| <ul style="list-style-type: none"> • Relevant risk information disseminated to stakeholders; • Type and scope of monitoring systems in place; and • % of population covered by climate change risk reduction measures. | | | | | |
| | Indicator | Baseline | Targets End of Project | Source of verification | Risks and Assumptions |
| Project Objective ¹⁶ To strengthen the climate monitoring capabilities, early warning systems and available information for responding to climate | 1.Capacity as per capacity assessment scorecard (BASELINE: 45; TARGET: 161) (see Annex 13) | 1.Limited capacity to generate EWS and CI on a national scale for extreme hydro-meteorological phenomena Limited disaster risk prevention capacity on local levels within ONS-DMD No Standard | 1. Capacity assessment TARGET score 161 for all combined EWS agencies | 1. Capacity assessment scores | There is no political will to invest in monitor extreme weather and climate change. |

¹⁶Objective (Atlas output) monitored quarterlyERBM and annually in APR/PIR
GEF5 CEO Endorsement Template-December 2012.doc

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| shocks and planning adaptation to climate change in Sierra Leone. | | Operating Procedure (SOP) for alert communication by ONS-DMD with the support of NGOs/CSOs Current score: 45 | | | |
| | 2.Domestic finance committed to the relevant institutions to monitor extreme weather and climate change | 2.Existing budget plans do not have sufficient funds to maintain and operate environmental monitoring infrastructure Current budget: \$500,000 | 2. TARGET: 30% increase in domestic financing for equipment operation and maintenance across all institutions | 2. Ministry budget lines for recurring costs | GoSL institutions and other key stakeholders would keep the same level of interest and willingness to support SLMD |
| | Indicator | Baseline | Targets End of Project | Source of verification | Risks and Assumptions |
| Outcome 1 ¹⁷ Enhanced capacity of national hydro-meteorological (NHMS) and environmental institutions to monitor extreme | 1.% national coverage of climate/weather and hydrological monitoring infrastructure | 1.Currently, there is 20 % national coverage for climate/weather monitoring with respect to the optimal arrangements defined in SLMD/DWR feasibility reports and WMO standards. Eighteen synoptic stations, 24 agro- | 1 Increase to 60 % national coverage to take steps in achieving NHMS optimal monitoring arrangements as defined in feasibility studies | 1.Review of budget spent on equipment procurement and rehabilitation and data held on servers to show that new equipment is operational | Procurement and installation of equipment is delayed due to slow release of funds, lengthy processes and deficient data transmission systems locally. |

¹⁷All outcomes monitored annually in the APR/PIR. It is highly recommended not to have more than 4 outcomes.

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| <p>weather and climate change.</p> | <p>2.Frequency and timeliness of climate-related data availability (BASELINE: monthly);</p> | <p>meteorological stations, 13 climate stations, 35 rain gauges, 12 water level meters and 6 manual flow meters are in place.</p> <p>2.Data from manual weather and hydrological stations is collected monthly and transmitted by post.</p> | <p>2. TARGET for data transmission frequency: daily</p> | <p>2.Analysis of data frequency transmission using storage servers within each information production agency</p> | <p>Funds are released on time for speedy procurement processes and technical assistance in place for equipment installation and operationalisation.</p> |
| <p>Outcome 2 Efficient and effective use of hydro-meteorological and environmental information for making early warnings and long-term development plans.</p> | <p>1.% of population with access to improved climate information and flood, drought, strong wind and coastal warnings (disaggregated by gender)</p> | <p>1. There are existing EWS initiatives for regional dam management and famine alerts, however, a national alert system concerned with extreme hydro-meteorological phenomena is not available.</p> <p>There is a limited understanding of technical alert jargon (alerts are not translated into all national languages). No mechanism exists for most vulnerable populations to be</p> | <p>1. 50 % increase in both men and women who have access to improved EWS/CI</p> <p>Target: 50% men; 50% women</p> | <p>1. a) Gender disaggregated survey on receipt of alerts</p> <p>b) Record of debriefings by SLMD post extreme weather events</p> <p>c) SLMD record of end-user feedback</p> | <p>Government is not committed to integrate climate change risk and adaptation needs in these elected sector-specific strategic plans;</p> |

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| | <p>2. GoSL Development Plans and land-use plans at National/District that integrate climate information in their formulation of poverty reduction strategies and links between poverty and the environment at local levels (BASELINE: No integration; TARGET Integration of at least 1 National and 1 district development Plan and land-use Plan incorporates climate change risks into their design into the</p> | <p>involved in the alert process to ensure its sustainability.</p> <p>Current access to warnings: 35% men, 25% women</p> <p>2. Development frameworks do not incorporate any EWS/CI products such as risk maps or climate change predictions into long-term planning</p> <p>Current score: 0</p> | <p>2. At least 2 of the PRSP policy briefs incorporate analyses of risk maps and/or climate change projections influencing long-term planning proposals</p> <p>Target score: 2</p> | <p>2. Review of GoSL Development Plans and land-use plans at National/District to validate incorporation of risk, weather and/or climate information</p> | <p>The partnership between CC-DAMAS and CIESIN for development of systematic streamlining of digital information will help GoSL to address this issue. There will be technical capacity to advise.</p> |
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| | <p>revised in 2015)</p> <p>3.Sector-specific EW products and strategies that integrate climate risks mining, tourism, and land management sectors)</p> | <p>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.</p> <p>Current score: 0</p> | <p>3. Development of at least 2 tailored climate products and presentation of market research plan on how to implement mobile phone based agricultural advisories, both supporting targeted weather/climate service delivery</p> <p>Target score: 2</p> | <p>3.a) Partnerships formed between information producers and the Ministries of Water Resources, SLEPA and Agriculture, private sectors, NGOs and women organizations to support weather/climate service delivery</p> <p>b) Sector specific products delivered by Met and disaster management.</p> | |
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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).

| Council Comment (USG) | UNDP Response |
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| <p>1. Include detailed activities related to production of climate/hydrological information, communications and sustaining this work and retaining expertise, particularly under component 2.</p> | <p>Output 1.1 and 1.2. focus on production of hydrological and meteorological information These two outputs will help the installation and functioning of the monitoring networks with automatic data transmission to main servers located at the Sierra Leone Meteorological Department (SLMD) and the Hydrological Sector-DWR. After the data has been transmitted to both of these institutions it will be object of frequent analysis in a daily routine manner so to produce sector tailored forecasts to the end users which were identified during the PPG phase. Specific “nowcast” information, such heavy rainfall, a squall line will be provided to the media (TV and Radio Broadcasting Companies), Airport Authority, SL Maritime Administration and the Office for National Security - Disaster Management Department (ONS-DMD) and all DM Committee Members including Bumbuna Hydroelectric Company Limited (BHC) and Directorate of Water Resources. Sector tailored seasonal forecast will also be routinely produced particularly for other stakeholders identified during the Consultation process.</p> <p>Detailed activities related to production of hydromet information have been included under Output 2.1. For example Develop, install and operationalise a Nowcast, Medium, Short term and seasonal forecasting system of quantitative rainfall and other extreme weather events for Sierra Leone in close partnership with Regional and International MeteoCentres (including WMO Regional Centers, ACMAD, FAO), developing tailored weather and climate alerts including colour-coded advisories, watches and warnings for flood, drought, severe weather and agricultural stresses by integrating and customising standard forecasts, e.g. daily, ten-day and monthly agro-meteorological bulletins, seasonal forecasts, based on sector specific and end-user needs. In this sense sector oriented seasonal forecast will be developed to support community based EWS for Bumbuna (nowcast), Guma Valley (seasonal), Urban extreme rainfall event and IVS farming communities (agromet);</p> <p>The foreseen activities will include field visits and stakeholder consultations to understand how users of early warning advisories and warnings use the information for managing climate and weather related risks and how their decision frameworks affect the interpretation of advisories and warnings. SOPs for disseminating weather, climate and hydrological information including alerts across all levels will be developed. This will be complemented by an early warning system dissemination toolbox, which will include a trainer manual on the use of a range of national and local gender sensitive media for disseminating alerts to end-users. The ONS-DMD and local Sectoral Task Forces (STFs) will be facilitated and equipped in the outer provinces and in particular in the selected pilot sites to apply SOPs and disseminate warnings.</p> <p>During the implementation phase, efforts will be made to ensure that expertise is retained by signing contracts with trainees binding them to remain in the institution for a specified period after the training program. Public personnel who benefit from training activities will be required to sign an agreement specifying a minimum term of service in order to retain skilled staff and ensure sustained benefits of capacity-building and training investments. A ‘train the trainers’ approach will be used to maximize the impact of LDCF funds. Lessons learned as the equipment is installed will be used to inform future installations, and capacity developed in government staff will be used to build in-house capacity of fellow staff members through a ‘train the trainers’ approach. Additionally agreements will be established with individuals trained to ensure that they remain in the relevant government departments for the minimum period after receiving the training. All capacity that is developed will also be linked to a deliverable, such as the production of maps or</p> |

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| | assessments, which will contribute to the implementation of the LDCF project. |
| 2. 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. | All relevant organizations and in particular the WMO who has the world's mandate for weather monitoring and climate data coordination has been consulted and lessons learned by other partners involved in similar activities have been reviewed and incorporated in the project proposal. A close relationship will be maintained throughout the project implementation process. Project development in terms of equipment acquisition and installation will follow established WMO guidelines and the capacity development of human resources, will be carried out in close partnership with WMO. This LDCF through Activity 2.1.1 aims at promoting and ensures partnerships are developed or strengthened with all concerned Regional and International centers in particular WMO, ACMAD, Africa Climate Policy Center, Eumetsat, FAO and others. SLMD is already a partner of Eumetsat Consortium, WMO, ACMAD and will count on these institutions for the provision of satellite imagery, regional climate data and sharing of knowledge and technology. The project through Activity 1.5.2 also aims at providing the Ministry of Water Resources (MWR), Directorate for Water Resources and SLMD with an updated observations and data communication system suitable for inclusion in the Global Telecommunications System (GTS) for global and regional circulation in close cooperation with GEO (Group on Earth Observations), AfriGEOSS and the WMO regarding the Global Framework for Climate Services. |
| 3. Describe how the project will ensure that the production of information is driven by the needs of the users and delivered through appropriate user-friendly channels | There were 3 missions to the country during which consultations were carried out between the main providers of the information (The Directorate of Water Resources-DWR, SLMD and Ministry of Agriculture Forest and Food Security-MAFFS) and the end users which list has been drawn through consultation and is included in the Project document Table 3. Sector specific forecasts were requested ranging from "nowcast" for Aviation, Marine Operations, ONS-DMD, Mining, Water and Hydroelectric Companies to seasonal forecast for Farming (Activity 2.1.5). Forecasts will be also disseminated through Radios and the project will support the strengthening of Community Radio stations (Activity 2.6.2) in target districts particularly at Bumbuna Watershed, Guma Valley and IVS Farms in Easter Districts. Due to high rate of illiteracy in target vulnerable groups, the problem of packaging the forecast information in local languages to assist fishing communities and farmers will be addressed in Activity 2.6.3. During project implementation, a comprehensive assessment of existing centralised and decentralised early warning systems – including existing weather and climate information exchange mechanisms, communication channels and dissemination mechanisms between SLMD, user agencies and end-users – will be conducted to establish best practices and gaps suitable for implementation for the community based EWS for Bumbuna (nowcast), Guma Valley (seasonal), Urban extreme rainfall event and IVS farming communities (agromet). This will include household surveys of targeted users of climate information to understand the social and economic costs and benefits of using advisories and warnings for <i>ex-ante</i> risk management in agriculture and water management. User-friendly channels for delivery of information such as SMS and Radio have been identified and will be used during project implementation as indicated above. Outputs 1.1 to 1.5 have all been designed in consultation with stakeholders to identify the procurement and rehabilitation needs for the climate and hydrology observation infrastructure. Also Outputs 2.2 and 2.4 have taken specific inputs from stakeholders to ensure they are compliant with local needs. |
| 4. 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. | During the extensive consultations that were undertaken during the PPG phase a gender sensitive approach was adopted with specific consultation to women associations particularly those representing the demonstration sites. In all other national consultation representatives from Women Groups and Associations were present through the Coalition of Civil Society and Human Right Activists an Umbrella Organization for the NGO's working in disaster management in Sierra Leone. With a strong participation of women and youth the project through Activity 2.6.3 aims at establishing a community-based communication and information sharing tool using local languages (community media: TV, radio and newspaper) for climate and hazards predictions. The warning dissemination strategy of the project also counts on strong participation of community groups (farmers, fishermen, youth and women association) particularly in <i>Community based EWS testing sites</i> (Activity 2.6.3, 2.3.4, & 2.6.5). The ONS-Sectoral Task Forces (STFs) in the Provinces are gender |

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| | <p>sensitive CBO which the project aims to strengthen by developing specific training-awareness programmes to harmonize agreements and interagency protocols.</p> <p>To ensure an effective early warning system is developed that includes all vulnerable persons in a community, project activities at demonstration sites will be carried out based on gender-sensitive assessments. This will be used to develop an early warning system dissemination toolbox, which will include a trainer manual on the use of a range of national and local gender sensitive media for disseminating weather and climate information alerts to end-users.</p> |
| <p>5. Activities related to data stewardship should be expanded to include a plan for data sharing throughout the region and globally.</p> | <p>Forecasting activity requires reception and transmission of data through regional and global established channels. SLMD currently is not utilising directly the standard WMO communications System due to lack of infrastructure relaying information via the neighbour country Liberia. The project will strengthen through Activity 2.1.1 the communication capability for data transmission through the Global Telecommunications System (GTS) for global and regional circulation in close cooperation with GEO (Group on Earth Observations), AfriGEOSS and the WMO regarding the Global Framework for Climate Services. The acquisition and operationalisation (Activity 1.3.3) of Aviation Data International Service will strengthen forecasting capacity and also the international communication data sharing through the 2-way VSAT- SADIS System.</p> <p>In addition data sharing is a key feature of this project and efforts during implementation to activate and maintain data sharing channels with regional and global climate institutions will be ensured. This LDCF project is being implemented as a component of a larger regional project which will include the appointment of regional technical advisors, which will strengthen the links between the Sierra Leone LDCF project and related initiatives in other LDCF project countries as well as regional initiatives such as i) African Center of Meteorological Application Development (ACMAD) – including those involving ICPAC and the GHACOF process; ii) Group on Earth Observations’ (GEO) AfriGEOSS initiative – and in particular African Monitoring of the Environment for Sustainable Development (AMESD) and Monitoring of Environment and Security in Africa (MESA); and iii) WMO’s Global Framework Climate Services (GFCS) initiative.</p> |
| <p>6. Clearly articulate the sectors that will benefit from the project, and include considerations of the adaptation priorities and needs of local communities.</p> | <p>Two main sectors that will directly benefit from this initiative are the i) poorer segments of society, which do not necessarily benefit from large protective infrastructure projects; and ii) hydro-meteorological services and other user-agencies with regards to long-term planning and extension services; iii) other sectors such as environment, agriculture, disaster risk management and civil aviation sector. At a local level the project will provide means for more accurate, reliable and frequently updated weather and hydrological forecasts affecting a large rural and coastal population and assisting more directly to around 276,000 people who will benefit from improved weather forecast and warnings. Similarly, the weather and hydrological monitoring networks to be installed in the context of the future EWS will benefit other national institutions that will benefit from this endeavour will be Ministries of Agriculture, Water, Energy, and Disaster Management, through strengthening of their computer databases, access to information and ability to communicate with other regions. One important benefit will be the improved coordination between government departments and the sharing of information, which can lead to improved products and services. In the private sector the Mining, Aviation and Transport sector will benefit from more reliable and accurate nowcast information reducing their current risks.</p> <p>This project also supports national development goals and plans to achieve Millennium Development Goals (MDGs) 1, 3, 6 and 7. The implementation of the project will in one hand introduce new infrastructure – including weather stations and forecasting facilities – while building upon, and being integrated into, the existing SLMD and DWR infrastructure and capacity and on the other will also benefit the SLMD and DWR by developing human technical capacity in order to maintain and operate meteorological and hydrological observation networks and systems. At a national level, all regions will benefit from the placement of Automatic Weather Stations (AWSs) and Hydromet Automatic Station (HAS) which will extend the geographical coverage of Sierra Leone’s weather, climate and</p> |

| | hydrological observation network. Tailored weather and climate information will be made accessible to decision-makers in government, private sector, civil society, development partners and local communities. | | | | | | |
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| <p>7. 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.</p> | <p>The project identification phase organized three missions where three workshops were held to engage in discussions with Government actors, private sector, civil society and development partners. A stakeholder inception meetings (12th September 2012), a stakeholder Consultation meeting (15th January 2013) and a Validation workshop (24th April 2013) were held during which around 150 people attended from (SLMD), Ministry of Transport and Aviation, the Ministry of Water Resources (MoWR), Ministry of Housing, Country Planning and Environment (MoHCPE); Ministry of Agriculture Forestry and Food Security (MAFFS); The Office of National Security (ONS), Disaster Management Department (DMD), Sierra Leone Environment Protection Agency (SL-EPA), SL Red Cross and The of Ministry of Health and Sanitation (MoHS)); The Civil society (Coalition of Civil Society and Human Right Activists an Umbrella Organization for the NGO's and other various NGO's and CBO's); and Private sector companies such as civil aviation, communications and media (Sierra Leone Civil Aviation Authority, Airport Authority, SL Maritime Administration, Guma Valley Water Company (GVWC), Bumbuna Hydroelectric Company Limited (BHC)). The representatives of these institutions were invited to provide input to the project design. Consultations with Government, NGOs, farmers and ongoing projects were pursued during the preparation through the National Consultants, and visits were made to the field where potential pilot sites are located. This approach enabled a better understanding of island realities, proper assessment of the operational constraints and identification of possible synergies. Therefore the design of the outputs for this LDCF project have been tailored to address the gaps and needs for those stakeholders in particular the SLMD, the MoWR and the Disaster management sector, Agriculture, and local communities in Sierra Leone.</p> | | | | | | |
| <p>8. Long term data records require sustainability and therefore need more detail for output 2.5 (sustainable financing) and how it will overcome barriers.</p> | <p>Following the common practice in most Governments the majority of public institutions like SLMD and water sector-DWR are funded through the state budget. Therefore their level of performance has been over the years intrinsically linked to that of the national economy. Being aware of this and following an increasing demand for a better services by all user sectors, in particular the Aviation and Maritime operations, The SLMD Bill was passed by Parliament in 2012 but still awaiting implementation. The anticipated impact of the Bill will be the transformation of the SLMD into a GoSL Agency (an autonomous body). Quality Policy, Quality Objectives, Quality Procedures and other Quality Manuals for Quality Management System (QMS) Certification have not yet been developed. The plan is that once the implementation comes into force the process of attaining ISO 9001:2008 certifications will follow. The major revenue sources for SLMD are government direct billing, the private sector and government reimbursements. To capitalize on these earnings, comprehensive support will be required from the project to help establish a Plan and a financial framework based on cost-recovery service provision for SLMD sustainability in the context of forthcoming transformation into SL Meteorological Agency (Activity 2.5.2). The project also aims at supporting (Activity 2.5.3) the engagement of an in inter-institutional consultation for the establishment of an EWS financial framework for SLMD sustainability in the context of forthcoming transformation into Sierra Leone Meteorological Agency.</p> <p>Table 1. List of stakeholders needing tailored forecastservices and potential sources of revenue identified in SLMD Business Plan prepared by MTA.</p> <table border="1" data-bbox="625 1222 1906 1442"> <thead> <tr> <th data-bbox="625 1222 1255 1255">Potential Source of income (Institutions)</th> <th data-bbox="1255 1222 1906 1255">Potential Source of income (Institutions)</th> </tr> </thead> <tbody> <tr> <td data-bbox="625 1255 1255 1349">1. Sierra Leone Airport Authority- Aviation observation and forecast hourly and daily respectively</td> <td data-bbox="1255 1255 1906 1349">2. Sierra Leone Civil Aviation Authority- Quality Control Observation and Forecast</td> </tr> <tr> <td data-bbox="625 1349 1255 1442">3. Roberts Flight Information Region (Roberts FIR)- Four hourly Termination Aerodrome Forecast and hourly MET Report</td> <td data-bbox="1255 1349 1906 1442">4. Sierra Leone Maritime Administration- Daily Forecast including Tidal Forecast</td> </tr> </tbody> </table> | Potential Source of income (Institutions) | Potential Source of income (Institutions) | 1. Sierra Leone Airport Authority- Aviation observation and forecast hourly and daily respectively | 2. Sierra Leone Civil Aviation Authority- Quality Control Observation and Forecast | 3. Roberts Flight Information Region (Roberts FIR)- Four hourly Termination Aerodrome Forecast and hourly MET Report | 4. Sierra Leone Maritime Administration- Daily Forecast including Tidal Forecast |
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| 1. Sierra Leone Airport Authority- Aviation observation and forecast hourly and daily respectively | 2. Sierra Leone Civil Aviation Authority- Quality Control Observation and Forecast | | | | | | |
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| | 5. Boat Owner/ Fisher Men Union Association- Rainfall, Wind and Tidal Forecast | 6. Ministry of Agriculture, Forestry and Food Security- Onset and withdrawal of rain forecast, Rainfall pattern and forecast |
| | 7. Ministry of Tourism- General forecast | 8. Ministry of Defense- Sierra Leone Navy |
| | 9. Bunbuna(North)/Dodo(East) Hydrodam- Seasonal Forecast and daily weather data, Storm Forecast | 10. GUMA Valley Water Company, Sierra Leone Water Company(SLWACO)- Seasonal and outlook forecast, Daily weather data |
| | 11. Disaster Management- Seasonal, Daily and Now casting | 12. Environment Protection Agency |
| | 13. Ministry of Youth and Sport- General Forecast for recreational functions | 14. Ministry of Health and Sanitation- Seasonal Forecast-Rainfall forecast (for flooding and related diseases such as cholera), Haze Forecast |
| | 15. Mining industry- (African Mineral, London Mining, Sierra Rutile and Kiodu Holdings)- General forecast, Tidal forecast and Storm and Lighting forecast | 16. Mobile Companies- NATCOM, AIRTEL, AFRICEL; COMIUM; SIERRATEL- Storm and Lighting forecast |
| | 17. Civil Society/Community- General Daily Forecast | 18. Ministry of Works, Road Authority/ Construction Companies- General Forecast, Rainfall Data and Forecast |
| | 19. Research instructions/People- Seasonal Forecast and Climatological Data | 20. African Minerals and NATCOM (National Telecommunication Commission) |
| | <p>2.5.2 In collaboration with GoSL establish a Plan and a financial framework for SLMD sustainability in the context of forthcoming transformation into Sierra Leone Meteorological Agency;</p> <p>2.5.3 Engage in consultations with private sector to build partnerships based on cost-recovery service provision;</p> <p>2.5.4 Establish a public-private cost-recovery partnership and service level agreement between the SLMD and DWR and national internet service provider with regards to start-up costs for servers and modems as well as running bandwidth costs for internet connection to collect, analyse, exchange and archive data;</p> <p>2.5.5 Organize bi-annual workshops, seminars and dialogue sessions for senior policy makers to raise awareness of the climate change issues and adjust the needs for EWS.</p> | |

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| <p>9. Ensure that integration of hydro-met system, satellite, gauges and radars is considered. Radars are expensive to install and maintain and can exceed national budgets.</p> | <p>No institution in Sierra Leone currently owns radar. Due to high cost of radar the Output 1.3 focuses on updating weather and climate forecasting facilities. LDCF resources will be used to procure and install the hardware and software for AMESD-SYNERGIE and SADIS (MESSYR) including 10 workstations needed to integrate, display, analyze and provide output of observed and model data as well as other graphical information. These workstations will provide the means to generate calibrated weather forecasts based on inter alia numerical weather prediction model, graphical imagery, surface observations and station-based forecasts. The lack of radar will be minimized by the acquisition of a SADIS¹⁸ system as a supporting facility to nowcast operations which works as proxy to a Radar but at much cheaper costs. In addition the same Output 1.3 aims at installing a LIGHTNING DETECTOR system based on the forthcoming upgrade of SYNERGY system.</p> |
| <p>10. Projects will be challenged by a lack of IT infrastructure (bandwidth, etc.) to collect, analyse, exchange and archive data.</p> | <p>All IT infrastructure including servers, modems and telecommunications infrastructure including computers, computer servers and software, radiotelephones, portable telephones, GSM/GPRS/GSM/GPRS modems and other equipment for internet access have been budgeted for under Output 1.1, 1.2 and 1.3. The SLMD and DWR have been already using Automatic weather stations from previous bilateral programmes (UKMO and IFAD). Therefore there is already some experience in these institutions. However as the cost of transmission through internet bandwidth is expensive in SL, the project will support some concerted actions to minimize the economic impact of utilization of such facility. Output 1.2 focuses in data transmission from AWS to central servers and the Activity 1.2.6 aims at establishing a formal partnership with the National Telecommunication Commission (NATCOM) for the sustainable long term use for data transfer. In addition, Output 2.5 focuses on establishing a public-private partnership and service level agreement between the SLMD/DWR and an internet service provider (Activity 2.5.4) with regards to start-up costs for servers and modems as well as running bandwidth costs for internet connection to collect, analyse, exchange and archive data. The human technical Resources to carry out integration of existing equipment to those to be acquired will be trained under the Output 1.4 (Activity 1.4.7).</p> |
| <p>11. There is a lack of workstations to make forecasts, access global products for downscaling etc.</p> | <p>The upgrading of forecasting facilities (computers, storage and networking) at SLMD and Hydrological Modeling Unit at DWR is centered around Outputs 1.1, 1.2 and 1.3. In particular Output 1.3 specifically includes procuring and installing of 10 meteorological workstations to support AMESD-SYNERGIE and SADIS systems and synoptic stations monitoring network. These forecasting facilities aim to provide the platform for meteorologists to: i) visualize meteorological, environmental, hydrological and oceanographic data from various sources and in various formats; ii) produce standard and customised <1 day severe weather nowcasts, 1-10 weather forecasts, 1-6 month seasonal forecasts and >6 month climate forecasts; and iii) edit and package weather and climate data and information into a suitable format for user-agencies and end-users.</p> <p>aim to provide the platform for meteorologists to : i) visualize meteorological, environmental and oceanographic data from various sources and in various formats¹⁹; ii) produce standard and customised <1 day severe weather nowcasts, 1-10</p> |

¹⁸ SADIS is an operational system dedicated to primarily to aeronautical meteorological information in line with ICAO (International Civil Aviation Organization) worldwide provision. It provides a point to multipoint service on a 24-hrs basis via satellite. The receiving system consists of a 2.4 m diameter-receiving antenna at the receiving unit mounted indoors. A processing displayed system connected to the receiver for generating/viewing/printing the SADIS products. The products received by SADIS are: 1. Upper air wind /temperature, tropopause and maximum wind forecast in GRIB code; 2. Coded digital facsimile charts for upper wind/temperature at selected flight level and SIGWX forecasts; 3. OPMET (operational meteorological) information like METER, TAFS, SIGMET, AIREPs, Volcanic ash and tropical cyclone advisory messages.

¹⁹ E.g. surface observations and station based forecasts, NWP (Numerical Weather Prediction) fields, satellite data and derived synthetic products, radar data and derived products, aviation reports and forecasts, sounding data, sat-sounding data, satwind data, automatic satellite image interpretation data, SCIT (Storm Cell Identification and Tracking) data, lightning data, road weather observations and forecasts, MOS (Model Output Statistics) data, ocean profile data, warnings based on the monitoring of incoming data, trajectories, webcams and geographical information (based on vector and raster data).

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| | weather forecasts, 1-6 month seasonal forecasts and >6 month climate forecasts; and iii) edit and package weather and climate data and information into a suitable format for user-agencies and end-users. |
| 12. There is a lack of private capital to support the large costs of modernisation. | Domestic and international air traffic activities – along with other key sectors – such as Maritime transport in SL are expected to increase substantially due to continued demand and country’s stability, Mining business, Tourism and infrastructure investment. Sierra Leone Civil Aviation Authority, Airport Authority, SL Maritime Administration, The Mining Companies, Hydroelectric Dams, The media and Mobile Communication Operators have already expressed their willingness to pay on cost-recovery basis for an improved service from SLMD. The establishment of the future EWS with all infrastructure and equipment will hopefully lead to an improved service provision to these sectors and could position SLMD to accrue higher private sector revenue streams in the future. In addition, the GoSL is also implementing complementary Plans to support modernization of SLMD as part of the conditions contained in the Bill of transformation of SLMD into a Government Agency. The World Bank Project on Communications will greatly support the operation of the future EWS with the installation of Optical Fiber facility to sustain rapid communications. |
| 13. Specific details on which hazards are important and where should be included. | Recent and past data show that there has been a significant shifting in rainfall patterns in Sierra Leone, which have a considerable impact on the environment, socio-economic development and people’s livelihoods. This shifting in rainfall patterns in Sierra Leone is being expressed through unpredictable extreme rainfall events causing widespread floods and landslides, sea-level rise and coastal erosion; but also in late onset of rains which brings about episodes of drought affecting agriculture. Flood events in Sierra Leone are on the increase according to recent studies. Heavy rainfall has led to unpredictable flooding events carrying down slope and downstream loose debris and rock particles, which significantly augment the erosive capacity of these rivers. Seasonal droughts and food production. Drought spells during the growing season and the prolonged dry season pose serious challenges for water management. |
| 14. More analyses of climate needs to be included in determining where hydromet stations should be located. | For the sake of continuity of data series in the country, the locations proposed for the installation of synoptic and climatological networks (Freetown, Lungi, Bo, Makeni, Bonthe, Njala, Kabala, Sefadu, Daru, Yele and Shenge) followed the regional WMO definition of basic country Synoptic and Climatological network and it was primarily directed at replacing stations that were damaged or became obsolete. The same criterion was used for the Hydromet stations although some new locations with increased vulnerability have been considered for installation. The intention is to reinstall monitoring hydrometric network that once existed with staff gauge stations and water level recorders in major rivers. This set up would allow the minimum monitoring of significant areas of lowlying coast are which frequently floods at high tide resulting in vast areas of mangrove swamp and also flat lands are which are subject to extensive riverine flooding in the major river basin of Great Scarcies Basin, Little scarcies Basin, Moa Basin, Mano Basin, Lokko Basin, Rockel Basin, Gbangbaia Basin, Jong Basin and Sewa Basin |
| 15. To ensure that the appropriate climate observations are recorded and applied, the following considerations should be included: i) clear descriptions of the types of observations that are required and how they will feed into an EWS appropriately; ii) provide data to world climatic data centres; iii) clearly distinguish between weather and climate observations and how they are used; and iv) details should be provided on whether additional funding for procurement of technology can be accessed. | i) The Sierra Leone Meteorological Department currently runs a forecasting Centre at Lungi Airport fed by a network of six AWSs and produces seasonal (3-6 months) forecast based on PRESAO 11 Forum, monthly (30 days) forecast for the Agriculture sector, daily (24 h) forecast for the media and the public, Aeronautical (30 h) forecast for the Aviation sector validate every 6 h and a Tendency forecast also for Aviation purposes which is an update for local conditions at every 2 hours. Therefore the observations (synoptic, climatological, agrometeorological) are already being carried out routinely and according to WMO standard manuals. The information gathered is also disseminated through the AFTN (Aeronautical Communications Network). This link provides access to satellite and model data (UKMO and ECMWF numerical models) as well as observations, analyses and forecasts from Regional and Global meteorological Centers. In addition the forecasting centre has Internet access to forecast products from regional (Dakar) and international (Meteo France) Centers. The current difficulty is the number and type of workstations required for download and downscaling operations and slow internet connections. In the design of this LDCF project – to ensure that this shortfall will not compromise the effectiveness and efficiency of the EWS–specific Outputs and Activities have been considered so to deliver the appropriate Workstations (Activity 1.3.1) and communications systems (Activity 1.2.6& 2.4.5). |

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| | <p>ii) The Sierra Leone Meteorological Department as a full member of the WMO and according to international framework for data exchange all meteo information is systematically transmitted at established UTC time to regional centre in Dakar via AFTN. From there and using the GTS the data is forwarded to International Centers (UKMO and ECMWF numerical models). At present the issue is the reduced number of stations from SL being reported to GTS and also the slow communication links that currently exists. This LDCF will expand the number of stations reporting data through the GTS communication network from the existing 6 to at least 18 AWS (Activity 1.2.2). In addition the project will also improve the communication links (Activity 2.1.1) benefiting from the imminent installation of optical fiber network in the country through a World Bank project.</p> <p>iii) The definitions used in the design of the project document make a clear distinction between climatic and weather observations. Data concerning observation made for short-term forecasts are referred to as weather observations/data and they will be the basis for daily bulletins (observations and forecasts) and will feed into models that can help and produce nowcast or 1-10 day forecasts. All data, information or forecast with a timeline between 1-6 months is considered as seasonal. Climate data/information or forecast refers to anything beyond six months. Climate trend or projection is all information up to 10 years (decadal) or beyond (climate). This LDCF will provide nowcast products to aviation and public sector, in particular to vulnerable communities in pilot sites (Activity 2.6.4) whilst seasonal forecasts will be made available to the agriculture sector (Activity 2.3.7).</p> <p>iv) There are significant baseline projects and initiatives upon which this LDCF will build on and are reported in Section 2.3. of the project document. These are: a. The UNDP Spanish Funds supported project (started in 2010) implemented with collaboration of the WMO/UKMet Office under which six (6) Automatic Weather Station (AWS) were installed in 2012; b. The UNDP_GEF “<i>Building Adaptive Capacity to Catalyze Active Public and Private Sector Participation to manage the Exposure and Sensitivity of Water Supply Services to Climate Change</i>”; c. The IFAD/GEF_LDCF project: “<i>Sierra Leone: Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone</i>”;d. WASH Facility – Sierra Leone project on: “<i>Sierra Leone Water Security Project</i>” Contributing to the establishment of the Sierra Leone Country Water Partnership (SLCWP); and The World Bank-funded project: “<i>Sierra Leone-Rapid Response Growth Pole Community-Based Livelihood and Food Support Program</i>” (2010-2014; \$2.8m); e. <i>African Monitoring of the Environment for Sustainable Development (AMESD) Project</i> and; f. DFID has a \$15m project “<i>Supporting the Government of Sierra Leone to implement its National Water Supply and Sanitation Strategy.</i>”</p> |
| <p>16. Project goals include mitigation of flood/drought losses but have insufficient hydrological modelling described in the PIF.</p> | <p>The situation of the Hydrology Sector-DWR in SL is critical as their network of 12Hydromet station in the past they now have none operational. The service only counts on 2 senior qualified staff members and currently there is no hydrological modeling or flood risk forecast. Outputs 1.1 and 1.2 will strengthen the monitoring capacity of both the Hydrological and meteorological Services with <i>12 river gauges, 2 water level (limnometric scale), 6 groundwater data logger, 2 signal counter rotations</i>. The project also includes a specific Activity (1.1.6) of Output 1.1 which promotes the development of necessary training for the setting up of a Hydrological Modeling Unit for flood forecasting to support Early Warning System. All the infrastructure required for the functioning of this Hydrological Modeling Unit - workstations, IT communications and Renewal/purchase of hydrological modeling licenses (e.g MIKE BASIN) including training for two (2) DWR technicians with modeling software and development of flood risk warning is foreseen in - will be provided through Activity 2.2.2. The project will build on some of these activities to develop a comprehensive water resource information system for Sierra Leone (Activity 1.1.4 & 1.1.5); to build on other initiatives under the MAFFS and develop a drought risk warnings and advisory service (Activity 1.3.6).</p> |
| <p>17. Include considerations of how capacity of hydrological services (and agriculture) can be improved e.g. issue flood and drought monitoring and early warnings.</p> | <p>This LDCF will build on ongoing activities WASH Facility programmeundertaken within important watersheds, such as the SeliRokel basin in supporting the renewal of hydrological monitoring network and the IFAD led LDCF project which have significant resources directed into drought adaptation related activities. The LDCF will support the improvement the capacity of hydrological services through Output 1.1 which will considerably strengthen the monitoring network, data</p> |

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| | <p>transmission and handling capability; Output 2.1 which focuses the capacitance and training of human resources with at least 6 hydrologist Technicians being trained; Output 2.1 also focuses on providing the necessary infrastructure for a Flood Forecast and Modeling (Activity 2.1.4) Unit. In addition the project will support the training of 6 Electronic, IT maintenance and repair Technicians (Activity 1.4.7) to carry out daily maintenance of existing hydromet equipment. The capacity of the Agriculture services will also be supported by this LDCF by strengthening their ability to use the available data on weather, rainfall-hydrology generated information and crop-soils data and satellite based GIS infrastructure to effectively establish an Agrometeorology Monitoring System (Activity 2.3.7) and provide seasonal forecasting for the Agriculture sector in Sierra Leone and ultimately be able to produce agromet sector warnings to support farming management.</p> |
| <p>18. Address links and gaps between representatives of hydromet and agriculture e.g. will the meteorological data work with hydrological/agricultural models, or will it require manipulating?</p> | <p>The current situation in SL is that these institutions (MAFFS and SLMD) are not working in partnership and there is no data exchange mechanism or established framework. Each of these institutions produce seasonal forecasts with does not take into account data and information of each other. This LDCF will primarily strengthen their monitoring capacity and data handling (Outputs 1.1 & 1.2). Secondly the projects aim at strengthening their individual communication capacity (Activity 1.5.2) and then establish a framework of data exchange through bilateral partnerships (1.3.5 & 1.3.6). The project also fosters collaboration of MAFFS in using the Weather, Hydrology data and information to develop sector tailored products for the Agriculture (Activity 1.3.6 & 2.3.7). The manipulation of data and information will be necessary so that models can be run and GIS based information can be produced and used as a crop water management or planning tool. The project also supports this approach via the Output 2.3.</p> |
| <p>19. In Component 2 there is a need to articulate the types of forecasts that will be produced.</p> | <p>The Sierra Leone Meteorological Department currently runs a forecasting Centre at Lungi Airport fed by a network of six AWSs and produces seasonal (3-6 months) forecast based on PRESAO 11 Forum, monthly (30 days) forecast for the Agriculture sector, daily (24 h) forecast for the media and the public, Aeronautical (30 h) forecast for the Aviation sector validate every 6 h and a Tendency forecast also for Aviation purposes which is an update for local conditions at every 2 hours. These existing standard meteorological forecasts will be strengthened with regards to accuracy and timeliness. However, the equipment and supporting forecasting tools & infrastructure that will be provided by the project will enable the Sierra Leone Meteorological Department to have access to regional and international forecast products to carry out downscale operations and produce a nowcast and early warning on short-term scales. In addition the LDCF will support (Output 2.1) the training of 13 Meteorologists and 6 Hydrologists in sector tailored Weather Forecasting, Flood forecasting and Special Warning Packaging. This will enable the production and packaging of hydro-meteorological (flood) and health related forecasts to support the Ministry of Health. With regards to ten-day and monthly agro-meteorological bulletins that are currently issued by the Ministry of Agriculture (MAFFS), these will be strengthened with regards to accuracy and timeliness and tailored to include specific information. (Activity 1.3.6 & 2.3.7).</p> |
| <p>20. 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.</p> | <p>The LDCF project focus on establishing an early warning systems using weather and hydromet monitoring networks (Output 1.1 & 1.2), routinely produced weather and hydrological forecasts and seasonal agromet forecasts as a basis for issuing sector tailored warnings (Activity 2.1.5). Component 2 aims at efficient and effective use of hydro-meteorological information for generating early warnings and support long-term development plans. The Output 2.3 aims through a set of activities to promote National capacity and inter-sectoral framework for mainstreaming weather and climate information into national development planning policies, district disaster preparedness and management, specifically targeting vulnerable communities such as Neves, Santa Catarina, Malanza, RibeiraAfonso and Sundy. Improving monitoring data i.e. improving the ability to detect (monitor) long-term trends/changes in climate will enhance both the development of early warning systems and the integration of climate information in development plans.</p> |
| <p>21. Hydromet products which are sold for a fee will limit uptake by vulnerable populations.</p> | <p>In SL most of the weather, climate and hydrological information and products are freely available to all sectors. However, with the advent of the transformation of SLMD into a GoSL Meteorological Agency will serve to enhance the ability to modernize its meteorological observing, forecasting and warning technology and expand its services, including</p> |

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| | access to higher levels of funding for capital investment, maintenance and staff training. Under these circumstances and following the proposed framework for future funding of the Meteorological Agency service, provision will be based on cost recovery. The project will support the GoSL to develop a financial Plan which will include fee policy to be established (Activity 2.5.2 & 2.5.4). However, the future EWS will freely benefit vulnerable populations through the establishment of an Integrated Community Based EWS (CBEWS) network of 3 pilot sites to be established to reduce vulnerability of local fishing and farming communities to flash flooding, stormy weather and develop resilience to drought episodes (Output 2.6). |
| 22. Include consideration of how the project will benefit women, noting that evidence suggests that women do not receive EW messages via radio. | The project has from the beginning adopted a gender sensitive approach right from the start during the consultation phase where the great majority of the participants were women. The design of the project promotes the participation women and particularly in activities taking place at community level. Output 2.6 carries a set of activities which encourages strong participation of women associations in small scale community based adaptation initiatives on “Cash-for-Work” scheme (Activity 2.6.1). The same Output of the project will further strengthen the partnership with local NGO’s & CBO’s for the development of training-awareness programme for local women communities in assessment of local risk levels and appropriate dissemination of Early Warnings on extreme weather events. |
| 23. ACMAD, GEO and AfriGEOSS are not mentioned despite coordinating earth observations and climate observations. | The stakeholder baseline development (Section 1.4) incorporates most of these international organizations (ACMAD, GEO, AfriGEOSS, HYCOS, WMO and AGRHYMET) particularly those which the project will build on. However the project contemplates specific activities where some of these organizations will be supporting particularly the use of satellite AMESD-PUMA e-station GIS system in developing the Agrometeorology Monitoring System (Activity 1.3.6) and the development of seasonal forecasting to support agriculture (Activity 2.3.7). The capacity development and training programme that the project aims at developing through Output 2.1 will count on the collaboration of WMO, ACMAD regional Centers. The Setup/strengthen the DWR Hydrological Forecasting Centre and of the Modeling Unit will also count on the straight collaboration with WHYCOS (World Hydrological Cycle Observing System) for training, capacity development, technical assistance and data exchange (Activity 2.1.1 & 2.1.7). The development of online agricultural advisory forecasting service to support farming will build on the current ongoing AGRHYMET programmes (Activity 2.3.6).. |
| 24. There is a need to include WMO and the GFCS initiative. | The SLMD is a full Member of World Meteorological Organization (WMO) is the sole international organization with mandate for the data monitoring and quality control, transmission/reception of meteorological data through international standard channels. The entire process of acquisition of equipment, installation, data collection and transmission will follow the WMO rules and standards (Output 1.1 & 1.2). The Capacity development and training of meteorological officers will also follow the guidelines of WMO and it will be carried always under auspices of WMO (Output 1.4 & 2.1). |
| Council Comment (World Bank) | UNDP Response |
| 1. 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. | The design of this project followed all the usual preliminary steps and during the project preparation phase three missions were organized and three workshops were held to engage in discussions with Government actors, private sector, civil society and development partners. A stakeholder inception meetings (12 th September 2012), a stakeholder Consultation meeting (15 th January 2013) and a Validation workshop (24 th April 2013) were held during which approximately 200 people attended from MWR, MAFFS, ONS-DMD, University of Sierra Leone, SLEPA, MoH, and including civil society representatives. Bilateral meetings with key stakeholders such as NGOs, World Bank, farmer’s associations, and women’s-group representatives were also carried out to provide input to the design. Consultations with Government, NGOs, farmers and ongoing projects were pursued during the preparation phase through the National Consultants, and several field visits were made to the pilot sites. This enabled a clearer understanding of realities on the ground, a better assessment of the operational constraints and identification of possible synergies with other projects and sources of information. Therefore the design of the outputs for this LDCF project have been tailored to address the gaps and needs |

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| | of the government of Sierra Leone, including SLMD, the water resources sector-DWR, the Disaster management sector-ONS_DMD, as well as user-sectors such as aviation, maritime operations, agriculture, fisheries and local communities. |
| 2. There is insufficient assessment of current state of hydro-met sector, past failures and their causes. | A painstaking assessment was carried out during the consultation process and the gaps and needs of the hydro-met sector were identified. The situation of the Hydrology Sector-DWR in SL is critical as their network of 12 Hydromet station in the past are now not operational. The service only has 2 senior qualified staff members and currently there is no hydrological modeling or flood risk forecasts being carried out. Outputs 1.1 and 1.2 will strengthen the monitoring capacity of both the Hydrological and meteorological Services with <i>12 river gauges, 2 water level (limnometric scale), 6 groundwater data logger, 2 signal counter rotations</i> . The project also includes a specific Activity (1.1.5) of Output 1.1 which will develop junior staff through training necessary for the setting up of a Hydrological Modeling Unit for flood forecasting to support the EWS. All the infrastructure required for the functioning of this Hydrological Modeling Unit - workstations, IT communications and Renewal/purchase of hydrological modeling licenses (e.g MIKE BASIN), including training for two DWR technicians on modeling software and development of flood risk warnings, will be provided through Activity 1.1.6. The project will build on some of these activities to develop a comprehensive water resource information system for Sierra Leone (Activity 1.1.4 & 1.1.5), as well as to build on other initiatives under the Ministry of Agriculture-MAFFS and develop a drought risk warnings and advisory service (Activity 2.3.7). The approach will be to stagger investments in infrastructure/equipment to match the availability of personnel to operate and maintain it. |
| 3. 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 a thorough assessment of the gaps and needs on current capacities required to implement the project was carried out. The design of the project addresses the lack of technical and operational capacity in the NHMS on equipment operation and maintenance (Activity 1.4.7) and modeling (Activity 1.1.5)/forecasting (Output 1.3& 2.1). It will also build NHMS capacity to become more service-driven and tailor weather/climate products based on user-needs. Furthermore, the project will build capacity at local levels for the Disaster Risk Management Unit and NGOs/CSOs by focusing on operational capacity development to disseminate climate/weather information/alerts. Furthermore, the prospects for long-term sustainability will be improved with the forthcoming transformation into a GoSL Meteorological Agency and associated commitments for funding from the GoSL. |
| 4. Cost estimates are unrealistic and do not include variation between countries and O&M (operations & management) costs. | Costs have been updated based on a cost-effectiveness evaluation. The Sierra Leone Meteorological Department (SLMD) realizes the intensive time and expenses required for training with new equipment. As such, they have proposed a mix of automatic and manual stations. In their budgets they weighed the future running costs and the ease of maintenance. The number, type and placement of stations were debated and considered including an analysis of cost-effectiveness. In cases where stations have been neglected but the site (fences, towers etc.) are still functional, LDCF resources will be used to replace existing sensors. Also, SMS (for manual) and GPRS (for automatic) transmission mechanisms have been budgeted to provide hourly to daily data frequency transmission. Fencing and security costs have been included for each station. 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. The operational costs have been considered and they have been yearly budgeted as part of the GoSL contribution co-financed through the state budget. Costs have been revised and based on existing O & M budgets under the SLMD and DWR as well as cost estimates of preferred models of equipment that are currently being used in the country. See response to comment 1 and 2 above. Activities related to the procurement of spare parts have been included and budgeted for. |
| Council Comment (Germany) | UNDP Response |
| 1. It does not become evident that a robust strategy or plan is already developed and | The Sierra Leone Meteorological Department (SLMD) is entirely funded by the Government. Like many other Government institutions, the Department suffers from a shortage of funds for its operations. A key factor that has |

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| <p>accepted by different partners. Instead, this is stated as a project output (2.1.4. “Plan for sustainable financing for the operation and maintenance of the installed EWS developed and implemented.”) Germany requests that evidence of partner commitment on sustainability as well as an assessment of risks related to the sustainability of investments are provided in the final project document.</p> | <p>inhibited the SLMD from improving its weather system was a lack of adequate funding, which in turn led to less than desirable strategic implementation practices. Baseline government budget lines for operation and maintenance have been committed to the LDCF project as co-financing see Section 2.3 and 2.4. Assessments on climate and environmental observational infrastructure needs and capacity building requirements were undertaken by an international consultant and two national consultants based in country. Risks related to the sustainability of the investments were considered in the design of the LDCF project outputs, in particular Output 1.4, 2.1, 2.2, 2.3 and 2.5. and were included into the Risk Log in Annex 3.</p> <p>The GoSL shows its determination in supporting the activities of SLMD by promoting the reorganization of the SLMD into the GoSL National Meteorological Authority which will serve to enhance the ability to modernize its meteorological observing, forecasting and warning technology and expand its services, including access to higher levels of funding for capital investment, maintenance and staff training. Domestic and international air traffic activities – along with other key sectors – in Sierra Leone are expected to increase appreciably because of continued economic growth. The improvement of forecasting and other services and products provided by SLMD in conjunction with the growth of banks, insurance companies, oil and gas sector, tourism and other elements of the private sector, could position SLMD to accrue higher private sector revenue streams.</p> <p>Output 2.5 focuses on conducting a comprehensive study to establish the viability of different sources of revenues – rated as mixed good/commercial as well as public good – identified in the existing SLMD Business and Modernisation Plan. A sector-specific marketing strategy and programme will be developed and implemented to capitalise on potential income streams. The marketing programme will aim to enhance revenue by demonstrating the value of improved meteorological services and products to the Civil Aviation Authority – which is the primary use of SLMD data – as well as for other key economic sectors, namely banking, insurance, oil and gas exploration and recovery, agriculture and tourism (for further details see response to USG comment 2 and Output 2.5 activities in the PD).</p> <p>By making weather and climate information more useful to various stakeholders, will influence the amount of domestic, private as well as donor finance committed to the SLMD and DWR Monitoring and Assessments to monitor extreme weather and climate change.</p> |
| <p>2. 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</p> | <p>The Sierra Leone Meteorological Department (SLMD) has long standing relations with Regional WMO Centre at Dakar managing the data handling and capacity building, the EUMETSAT, the British Met service (UKMO) has access to experts and technical expertise that will be procured during the project to transfer this knowledge to SLMD and the hydrology sector-DWR staff. Partner's expertise has been harnessed to meet the project requirements. A pool of specialists with specific expertise in meteorology and EWS will be supporting the project implementation as well as local experts, drawing on external technical specialists where necessary. Locally partnerships with other agencies working in this field have been developed and the project will build on this baseline and work in close partnerships with other actors. WMO is a partner and have contributed to the design of this project document and will continue to support and collaborate on this project.</p> |
| <p>3. 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.</p> | <p>The additional cost reasoning is detailed under the adaptation alternative for each Outcome. In Summary: the current climate information (including monitoring) and early warning systems in Sierra Leone are not functioning as optimally as they could for effectively supporting adaptive capacity of local communities and key sectors. This restricts long-term planning, management and early warning activities, as well as climate change impacts, in particular an increase in frequency and intensity of droughts, floods and severe storms. The current status of climate information and early warning systems in Sierra Leone will significantly undermine social and economic development under a changing</p> |

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| <p>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.</p> | <p>climate. This project will be upgrading the weather and hydrological equipment by increasing the frequency of data transmission (via SMS or GPRS) and also by procuring complementary automated equipment to the existing manual equipment (Outputs 1.1 & 1.2). The project will initially provide Capacity building by the equipment manufacturers (generally for 2 weeks after installation). Further training for 6 IT & Electronics Hydromet Equipment Maintenance & Repair Officers to support relevant sectors: 2-Agromet, 2-Hydrology and 2-Meteorology (Activity 1.4.7) will take place as an activity on Output 1.4. Capacity will continue to be built to maintain and operate equipment with support from WMO regional technical training programmes on a biannual basis. Furthermore, equipment has been budgeted to include the cost of spare parts (approximated to be 25% of running costs if not known), relicensing costs for software applications have been included and field trip validation costs to verify equipment operation are considered. This project also supports climate information collection to support the generation of seasonal forecasts and climate predictions. Monitoring climate change, forecasting impacts and using early warning systems to disseminate data to a range of stakeholders, from national to local levels, are important components of successful long-term adaptation measures. Meteorological services provide real-time, short-, long-term and seasonal forecasts as well as other meteorological parameters for planning and management of agricultural production, water resource management, solar energy use, research, disaster and rescue operations, transport, trade and tourism, and environmental-related diseases. Meteorological parameters are particularly important for the design, construction and management of physical infrastructure. Furthermore, they are necessary for understanding weather variability and climate change, as well as climate change impacts on socio-economic development. The more extensive the available information, the better the climate can be understood and future conditions can be assessed at the local, regional, national and global level²⁰. Accurate weather and climate information and forecasting are essential for planning and managing economic production and the provision of social services, under a changing climate.</p> |
| <p>4. 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.</p> | <p>The national implementation fee (also called Project Management Costs) is those cost of running the project within the National Implementing Partner. 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).</p> |

²⁰Zhu, X. 2011. Technologies for Climate Change Adaptation – Agriculture Sector – TNA Guidebook Series. UNEP Risø Centre on Energy, Climate and Sustainable Development Risø DTU National Laboratory for Sustainable Energy, Denmark.

ANNEX C: STATUS OF IMPLEMENTATION OF PROJECT PREPARATION ACTIVITIES AND THE USE OF FUNDS²¹

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

NA

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

| PPG Grant Approved at PIF: 100,000 | | | |
|---|---------------------------------------|-----------------------------|-------------------------|
| <i>Project Preparation Activities Implemented</i> | <i>GEF/LDCF/SCCF/NPIF Amount (\$)</i> | | |
| | <i>Budgeted Amount</i> | <i>Amount Spent To date</i> | <i>Amount Committed</i> |
| 1. Review and technical feasibility study and cost assessment analysis | 46,000 | 40,150 | 5,850 |
| 2. Information collection and stakeholder consultations (including stakeholder workshops) | 34,000 | 33,177 | 823 |
| 3. Identification of co-funding sources and formulation of project documents | 14,000 | 13,070 | 930 |
| 4. Institutional arrangement for implementation | 6,000 | 5,250 | 750 |
| Total | 100,000 | 91,647 | 8,353 |

²¹If 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)

NA