United Nations Development Programme

Country: SIERRA LEONE

PROJECT DOCUMENT[1]

Project Title: Strengthening climate information and early warning systems in Africa for climate resilient development and adaptation to climate change – Country: Sierra Leone

Joint Vision: Inclusive Growth and Management of Natural Resources and Disaster

Expected CP Outcome(s): Policy framework and institutional arrangements for managing natural resources and addressing climate change, disaster, and environmental management strengthened

Expected CPAP Output (s)

(i) Policies, legal and institutional framework for managing land tenure reform improved

(ii) Increased resilience and enhanced national and local capacities for disaster risk management, environmental governance, climate change adaptation and mitigation for effective early warning system

(iii) Improved Waste Management in Bo and Makeni cities and relevant lessons learned shared with other Local Councils

Executing Entity/Implementing Partner:

Ministry of Transport and Aviation

Implementing Entity/Responsible Partners:

The Ministry of Water Resources (MWR)

The Office of National Security – Disaster Management Department (ONS-DMD)

The Sierra Leone Environment Protection Authority (SLEPA)

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

Brief Description

Sierra Leone is particularly vulnerable to the increasing frequency and severity of droughts, floods and severe storms (hail, thunder, lightning and violent winds), and their impacts on sectors such as agriculture, fisheries, as well as infrastructure and hydro-electric power production. Such climate-related hazards are having increasingly adverse effects on the country and future climate change is likely to further exacerbate the situation. A large proportion of the Sierra Leone population has a low capacity to adapt to climate change. Climate change impacts are likely to be particularly negative on Sierra Leone's rural population because of their high dependence on rain-fed agriculture and natural resource-based livelihoods. Sierra Leone's capacity to adapt to climate-related hazards should therefore be developed to limit the negative impacts of climate change and address the country's socio-economic and developmental challenges effectively.

One way to support effective adaptation planning – in particular for an increase in intensity and frequency of droughts, floods and severe storms – is to improve climate monitoring and early warning systems. For Sierra Leone to improve the management of these climate-related hazards it is necessary to: i) enhance the capacity of hydro-meteorological services and networks to predict climatic events and associated risks; ii) develop a more effective and targeted delivery of climate information including early warnings; and iii) support improved and timely responses to forecasted climate-related risks. Barriers that need to be overcome to establish an effective EWS in Sierra Leone include the following: i) Limited knowledge and capacity to effectively predict future climate events; ii) Weak capacity for issuing warnings and dissemination; iii) Absence of a national framework and environmental databases to assess and integrate climate change risks into sectoral and development policies; iv) Absence of Long-term sustainability plan for observational infrastructure and technically skilled human resources. Other stumbling blocks in the path include obsolete and inadequate weather and climate monitoring infrastructure, which limits data collection, analysis and provision of meteorological services; limited knowledge and capacity to effectively predict future climate events, non-existence of systematic processes for packaging, translating and disseminating climate information and warnings, uncertainty in long-term sustainability of observational infrastructure and technically skilled human resources and lastly the poor community level usage of climate information and responses to received warnings.

This LDCF financed project, implemented by the Ministry of Transport and Aviation, will: i) establish a functional network of meteorological and hydrological monitoring stations and associated infrastructure to better understand climatic changes; ii) develop and disseminate tailored weather and climate information (including colour-coded alerts – advisories, watches and warnings – for flood, drought, severe weather and agricultural stresses, integrated cost-benefit analyses and sector-specific risk and vulnerability maps) to decision makers in government, private sector, civil society, development partners and local communities in Bumbuna watershed, Guma Valley watershed and drought prone Eastern districts of Kono, Koinadugu, Kailahun and Kenema; and iii) integrate weather and climate information into national policies, annual workplans and local development including the National Policy for Disaster Preparedness and Management, and district and sub-county development plans in priority districts in the Freetown, Bombali, Tonkolili and Koinadugu sub-regions and Kono, Kailahun and Kenema district areas. The project is expected to be completed by 2017.

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Atlas Award ID:	00074442
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End Date	September 2017
Management Arrangements	NIM
PAC Meeting Date	25th June 2013

Total resources required: USD 22,600,000
Total allocated resources: USD 22,600,000

- Regular (GEF/LDCF) USD 3,600,000
- Other:
  - Government USD 19,000,000

Agreed by (Government):

Date/Month/Year

Agreed by (Executing Entity/Implementing Partner):

Date/Month/Year

Agreed by (UNDP):

Date/Month/Year

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List of Acronyms

ABCs: Agricultural Business Centres
ALM: Adaptation Learning Mechanism
AMAT: Adaptation Monitoring and Assessment Tool
AMESD: African Monitoring of the Environment for Sustainable Development
APR: Annual Project Review
ASI: Adam Smith International
AWS: Automatic Weather Station
BHC: Bumbuna Hydroelectric Company Limited
BSAP: National Biodiversity Strategy and Action Plan
BWMA: Bumbuna Watershed Management Authority
CB_DRM: Community-Based Disaster Risk Management
CBEWS: Community based EWS
CBO's: Community-based organizations
CEDP: Community Empowerment and Development Project
CFR: Case Fatality Ratio
CIESIN: Center for International Earth Science Information Networks
CPAP: Country Programme Action Plan
DFID: Department for International Development
DM: Disaster Management
DMD: Disaster Management Directorate
EA: Environmental assessment
EIA: Environmental Impact Assessment
EIS: Environmental information system
ENSO: El Niño Southern Oscillation
EPAA: Environment Protection Agency Act
EPP: Emergency Preparedness Plan
ESMF: Environmental and Social Management Frameworks
EWS: Early Warning System
FAO: Food and Agriculture Organization
GCOS: Global Climate Observing System
GoSL: Government of Sierra Leone
GVWC: Guma Valley Water Company
HDI: Human Development Index
HIPC: Highly Indebted Poor Countries
ICAO: International Civil Aviation Organization
IDA: International Development Association
IFAD: International Fund for Agricultural Development
IFAT: International Fund for Agricultural Transformation
IFRC: International Federation of Red Cross

ITCZ: Inter-Tropical Convergence Zone
IVS: Inland Valley Swamps
IW: Inception Workshop
LCP&E: Lands Country Planning and the Environment
LDC: Least Developed Country
LDCF: Least Developed Countries Fund
MAFFS: Ministry of Agriculture, Forestry and Food Security
MEA's: Multilateral Environmental Agreements
MWR: Ministry of Energy and Water Resources
MWR: Ministry of Water Resources
MITEC: Multidisciplinary and Inter-institutional Technical Committee
MLCPE: Ministry of Lands, Country Planning and the Environment
MoFED: Ministry of Finance and Economic Development
MoHS: Ministry of Health and Sanitation
MTA: Ministry of Transport and Aviation
MWR: Ministry of Water Resources
NAPA: National Adaptation Programme of Action
NATCOM: National Telecommunication Commission
NEAP:National Environmental Action Plan
NEP: National Environmental Policy
NGO's: Non-governmental organizations
NHMS: National hydro-meteorological services
ONS: Office of National Security
PIR: Project Implementation Reports
PPG: Project Preparation Grant
PPR: Project Progress Reports
PRSP: Poverty Reduction Strategy Paper
PUMA: Preparation for the Use of MSG in Africa
SCW : Stakeholders Consultation Workshop
SHC: Small Holder Commercialisation
SLAA: Sierra Leone Airport Authority
SLCAA : Sierra Leone Civil Airport Authority
SLCWP: Sierra Leone Country Water Partnership
SLEAP: Sierra Leone Environment Action Plan
SLEPA : Sierra Leone Environment Protection Agency
SLIAR: Sierra Leone Institute Agricultural Research
SLMA: Sierra Leone Maritime Administration
SLMD: Sierra Leone Meteorological Department
SLPA: Sierra Leone Ports Authority
STFs: Sectoral Task Forces
UNCBD: United Nations Convention on Biological Diversity

UNCCD: United Nations Convention to Combat Desertification
UNFCCC: United Nations Framework Convention on Climate Change
UNICEF: United Nations International Children's Emergency Fund
USAID: United States Agency for International Development
WFP: World Food Programme
WHO: World Health Organization
WRD: Water Resource Department
WSD: Water Supply Division

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Table 8. Project Monitoring and Evaluation

1. SITUATION ANALYSIS

1.1. Climate change - induced problem

1. Over the past three decade at least Sierra Leone has been experiencing significant climate variability as shown by the analysis of rainfall anomalies from weather records from 1991 to 1990 which show more variable rainfall (NAPA, 2007)[2].Past studies conducted in the entire West African region (Servat et al. 1998)[3] show a decline in rainfall mostly as a result of the reduction of the number of rainy days. These results are in agreement with recent studies as part of the second national communication (GEF-UNDP, 2012)[4] and records of extreme rainfall events, and are also consistent with estimates of regional trends indicated by the IPCC AR4. Climate change is therefore expected to increase rainfall variability and the frequency and intensity of extreme weather events, including heat waves and heavy precipitation events.Rainfall variability (precipitation regime and pattern),is especially noticeable in the northern regions, which adversely impacts water resources and agricultural yields (NAPA, 2007). Recently there have been periods of delays in the rains and associated water shortages particularly in Freetown in recent times. Heavy rainfall accompanying such dry spells often results in extensive flooding throughout the country. The effects of these unusual temperature and rainfall patterns on agriculture, water supply and sanitation are evident in various parts of Sierra Leone.

2. The risks on food security of strictly rain-fed rice cultivation cannot be overlooked. Shifting rainfall patterns have also been observed which have caused disruptions of planting seasons resulting in diminished agricultural production and poverty amongst farmers in particular. It has also created water supply problems resulting in decrease in water supply to consumers, reduced stream flow in rivers and streams and also health related problems associated with the outbreak of water-born disease

3. Report of studies relating to climate change(the country's First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC)[5] and National Adaptation Programme of Action)carried out in recent times as well as NAPA regional workshop reports have revealed that temperature patterns of the country have been also changing. During the dry season, the "harmattan" (dry dusty cool air) causes lowest daily country average temperature of 16 ºC with a range of between 10 ºC and 22 ºC. However, the "harmattan" period in recent times has been warmer than usual. It was also observed that the pre-monsoon period which runs from April to June is now associated with stronger winds and more frequent rain/storms causing greater damage to lives and property. Calmer and dryer weather now appears to be associated with the September/November period which was usually characterized by frequent thunder and lightning and short but heavy rainfall.

4. Climate change models for Sierra Leone predict that temperatures will continue to increase by the year 2100 between7% to 9% above the 1961 – 1990 average temperature (26.7°C). Future projections of

[2]Ministry of Transport and Aviation, 2007.National Adaptation Programme of Action.Final Draft. 108p.

[3]Servat et al. 1998. "Identification, caracterisationetconsequences d'unevariabilitehydrologique en Afrique de l'ouest et central". Water Resources Variability in Africa during the XXth Century (Proceedings of the Abidjan' 98 Conference held a' Abidjan, Cote d'lvoire, November 1998). IAHS Pub. no. 252, 1998.

[4]Global Environment Facility (GEF) and United Nations Development Programme (UNDP). Sierra Leone Second National Communication, December 2012. 245p.

[5]Sierra Leone. Initial National Communications report of Sierra Leone to the United Framework Convention of Climate Change (UNFCCC). 157p. January 2007.Project SIL/02/G32 entitled "Enabling Sierra Leone's capacity to fulfill its obligations to the United Nations Framework Convention on Climate Change (UNFCCC)", February 2003.

rainfall suggest that Sierra Leone will continue to experience an increase in temperature as well as drought/dry spells. According to climate projections Sierra Leone is expected to experience a rise in both average temperatures (of about +1.8ºC to +2.5ºC from the 1961-1990 normal by the year 2100) and rainfall by about 3-10% (NAPA, 2007).

5. According to the published report of the Initial National Communication on climate change,Sierra Leone is vulnerable to climate change and extreme weather events. The Vulnerability and Adaptation Assessment Report and the Climate Variability Report of the NAPA Project have clearly indicated that Sierra Leone is experiencing a variety of climatic hazards which include seasonal drought, strong winds, thunderstorms, landslides, heat waves, floods, intense seasonal rain fall, shifting rainfall patterns amongst others.In some parts of the country, notably the north and South-eastern provinces (Gbondapi,Pujehun), as well as in the Freetown area poor communities have suffered from floods and seasonal drought which have destroyed their crops and hampered their food production capabilities. Strong winds have also destroyed houses, damaged energy transmission lines and obstructed communications to remote areas of the country. Thunderstorms and heavy rain have disrupted flight schedules and caused a number of accidents at sea.

6. Thechanges in rainfall and temperature patterns have been also causing current cropping patterns tobecome unsuitable to emerging climate conditions. Livestock is already experiencing greaterstress due to the above climatic variability and pest and disease outbreaks are becoming morepronounced. These changes have adversely affected the ability of the rural poor to maintaintheir existing livelihoods and have limited the ability of Sierra Leone to maintain export earnings and pay for the importation of food. Inadequate staff and poor facilities for weather forecasting and related activities have undermined the ability of the meteorological department to provide adequate support information to other sectors of the economy so that they can better adapt to the impact of climate change. 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 level[6].

1.2. The problem this project seeks to address

7. Climate change has currently affected and is very likely to further affect the country's development and in particular the development of the coastal zone and the agricultural sector due to increased frequency and intensity of climate hazards such as droughts, episodes of heavy rain fall and flooding. Despite some passive attempts to adapt, the capacity to address climate change impacts in Sierra Leone is still limited.Therefore, the**primary problem** that this project seeks to address is that 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 hampers 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 climate.

[6]Zhu, 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.

8. The main problem facing the country today is its high vulnerability to climate change together with its low capacity to address and adapt to this phenomenon. Relief and rehabilitation (*reactive actions*) have been the focus of climate and disaster management in Sierra Leone. At present, there are limited hard and soft technologies as well as human and technical capacity to utilise these technologies. This has resulted in i) a limited understanding of current and future risks; ii) limited monitoring and forecasting of climate-related hazards; iii) inappropriate communication and packaging of warnings; iv) restricted responses to impending disasters and v) constrained planning for slow-onset changes due to climate change that will require a transformational shift in economic development and risk reduction efforts.

9. Root causes of the problem include institutional weaknesses that do not support Government development plans, (such as weak or inexistent Hydromet and Climate Services for sustainable development), natural constraints (such as the intrinsic physical vulnerability) and structural factors (such as high population pressure, the high level of poverty among rural populations, weak mechanization and intensification of production modes, and limited investment capacities).In synthesis the following root causes make the manifestations of climate change (predominantly droughts and floods) in Sierra Leone particularly destructive. These include *inter alia*:

Weak or inexistent Hydromet and Climate Services for Sustainable Development

10. NAPA indicates that between 80-90% of natural disasters in Sierra Leone are weather related and nearly 60% of most other accidents are aggravated by weather elements. Therefore a fully operational weather service can contribute to the minimization of risks and climate-related impacts.

11. The Sierra Leone Meteorological Department (SLMD) has suffered from many years from no investment in infrastructure and human resources. As a result, there is very little functioning meteorological equipment; staffing levels have dropped significantly from even post conflict levels in 2002 – this is a result of retirement, sickness and deaths. Therefore, the Sierra Leone Meteorological Department does not currently have the capacity currently to meet ICAO standards for aeronautical forecasting and observing. In November 2012, ICAO requested that meteorological services adhere to new guidelines for forecasting and observing – these include the implementation of an audited Quality Management System and training of staff to agreed standards, which are currently not undertaken by SLMD.

12. Sierra Leone does not have an operational hydrometeorological network to allow the monitoring of river flow and contribute to flood forecast. Currently the water sector is undergoing a restructuring reform with the creation of a new ministry, The Ministry of Water Resources (MWR) under which the Directorate of Water Resources (DWR) will be. There is no established framework for hydrological monitoring in the country. The first steps to establish a monitoring network are being now developed with the integration of odd underground water level monitoring equipment installed at Bumbuna watershed under bilateral development programme particularly the WASH Facility – Sierra Leone project on: *"Sierra Leone Water Security Project"*. The human technical capacity of the newly established DWR is reduced to two senior Hydrologists. There are no operation technical personnel although a number of water technicians are expected to be trained under a parallel GEF programme "*Building Adaptive Capacity to Catalyze Active Public and Private Sector Participation to manage the Exposure and Sensitivity of Water Supply Services to Climate Change*";

Reduced coverage of the meteorological and hydrological monitoring networks

13. Currently there is no hydrological monitoring network in the country and the weather monitoring network is reduced to six automatic weather stations (AWS). This situation has contributed for the

inefficient monitoring of hydrological and weather variables in vulnerable regions. As a result no information and data are available for the hydromet services to produce accurate forecast that can protect population and assets, e.g. intense rainfall is not monitored in areas such as Kambia (Mambolo Chiefdom) and Kailahun (Jawie and Nyaluahun chiefdoms) Districts are prone to floods and rapid rises in rivers are not identified as a precursor to flooding. For similar reasons the absence of hydromet monitoring network means that drought conditions for example (rainfall and atmospheric demand) are not being efficiently monitored for agricultural lands and elected crops cultivated in the Inland Valley Swamps (IVS) of four districts in Eastern Sierra Leone (Kono, Koinadugu, Kailahun and Kenema). Therefore many potentially threatening flood hazards are not forewarned because of absence of monitoring stations in key locations of the countries watershed. Some monitoring of hydrological parameters are being carried out in the Bumbuna watershed in the vicinity of the Dam but these are primarily directed to observation of ground water level in few locations under the WASH Facility bilateral programme.

Insufficient human technical capacity

14. Both the weather sector and the hydrological sector do not have sufficient trained personnel who are able of maintaining a monitoring network and handle data to support the necessary forecast operations. Equipment failure and servicing is currently carried out by only one IT technician who has been recently trained in the context of a bilateral programme between SLMD and the UK meteorological Office (UKMO). In addition, no trained personnel at present exists who are capable of managing and run any forecast models and generate information for specific sectors, as well as interpreting the data in ways that non-technical stakeholders can understand.

15. The hydrology sector in Sierra Leone I still embryonic lacking all the necessary infrastructures (monitoring network, data handling systems, workstations and modelling capacity) to produce flood forecast or warnings. There are only 2-properly qualified weather forecasters – one of them being the director of the department and another in a retirement process. There are also very few qualified Meteorological Technicians and support staff. This is reflected on the poor performance of these services and the inability of providing sector tailored forecasts and warnings.

Inadequate forecast supporting facilities

16. The Sierra Leone Meteorological Department (SLMD) does not have any Radio Detection and Ranging Device-RADAR or Upper Air Sounding system to support the forecasting operations. This restricts the capacity of SLMD to accurately forecast the dynamics of thundery storms. The SLMD can receive data from the EUMETSAT-Satellite imagery (PUMA follow-up) via AMESD (African Monitoring of the Environment for Sustainable Development) e-station to support meteorologists in producing daily forecast however the system is currently not in operation due to contractual issues. Forecasting activity requires reception and transmission of data through regional and global established channels. Sierra Leone Meteorological Department is currently not linked to any international standard WMO communications System which limits the access to regional and global information.

Weak Climate information dissemination and communication to end users

17. The Office of National Security (ONS) within which the Disaster Management Department (DMD) is inserted does not have active dedicated channel for effective dissemination of warnings. Currently, both the SLMD and the ONS-DMD use normal media channels (TV, Radio, Newspapers) to disseminated forecast and warnings. In a country with a high level of illiteracy, large proportion of the population is denied the access to climate and weather information. In addition, remote communities do not have means to timely have access to valuable information that can help protect their lives, assets and livelihoods.

18. Currently there is limited packaging of climate information and warnings and inappropriate communication to different sectors and end-users. This is partly because of limited information sharing agreements and operational channels which prevents the vertical and horizontal flow of information and coordination between different agencies (in particular SLMD, ONS-DMD, DWR, Agriculture Forestry and Food Security (AFFS)) and levels, e.g. community, local, state/provincial, national and regional. Additionally, tailored information for specific sectors, as well as interpreting the data in ways that non-technical stakeholders can understand, is generally not undertaken. This restricts interpretation and application by user-agencies and local communities.

1.3. Long-term solution and barriers to achieving the solution

19. It is expected that as climate change unfolds the frequency and intensity of climate related shocks will change, therefore improving EWSs is one way to adapt to a changing climate so to be able to accurately predict impending hazards on communities and society as a whole and avoid loss of lives and unnecessary pressure on communities and infrastructure. As an adaptive measure EWS will allow the monitoring and implementation of anticipatory measures to reduce climate change risks on those sectors, ultimately benefiting the poorer segments of society, those who do not necessarily benefit from large protective infrastructure projects[7]. Furthermore, improving the EWS also provides benefits for long term planning and helps NHMS and other institutions build capacity to service other needs for example by providing long-term datasets for monitoring and trend detection.

20. To augment the capacity of Sierra Leone to manage severe weather-related disasters, ensure food security and agricultural production and make their socioeconomic development process less vulnerable to climate-related risks it is essential to:

❑ ***Enhance the capacity of hydro-meteorological services and networks to monitor and predict weather and climate events and associated risks e.g. floods and droughts.***

21. The strengthening the monitoring capacity of hydro-meteorological services to adequately monitor hydrological data and information as well as weather data can be achieved by installing more hydromet and weather stations to increase the coverage of the network. This should be coupled with the establishment of a reliable data transmission system which can allow the storage of data at central server at the Forecasting Centre at Lungi airport and also at SLMD. Capacity development programme for SLMD staff will allow data handling and analyzes the can enable development of flood and drought forecast in a timely manner. This can also be attained by providing ancillary equipment to SLMD (e.g satellite based systems such as SADIS, SYNERGIE) to aid early identification of convective weather systems so to increase the accuracy of forecasts and warnings. Whilst this situation has been ameliorated by specifically targeted project interventions, this has often benefitted a particular aspect of the early warning system (e.g. African Monitoring of the Environment for Sustainable Development (AMESD)[8] to improve use of satellite data or the "Weather for all" initiative to improve weather station coverage[9]). The technicalskills ofhydro-meteorological personnel (e.g. hydrologists, meteorologists and forecast technicians) to handle, analyze and produce sector-specific tailored forecasts and to package information in clearer and more understandable way can be improved through a dedicated capacity development programmes.

[7]World Bank (2010). Natural hazards, Unnatural disasters: Effective prevention through an economic lens. World Bank and United Nations.231 pp.

[8]http://www.amesd.org/index.php?start=25

[9]http://www.un.org/apps/news/story.asp?NewsID=31193&Cr=weather&Cr1

22. Developing sustainable weather and climate services in Sierra Leone will support national development initiatives by: reducing the impact of natural disasters (development of warning services of hazardous weather), supporting essential services to aviation (developing forecasts and observations required to determine flight routing), contributing to the increase of agricultural yields (provision of relevant meteorological information in a format that is tailored to the needs of farmers), underpinning data for climate change initiatives (climate proofing National Plans and legislation), contributing in the prevention of water and weather related diseases (warning and monitoring heavy rainfall and water/vector borne diseases), and also supporting the national defence forces (the air force and naval wing of the military both strongly depend on the meteorological department for their operations).

❑ ***Develop a more effective, efficient and targeted delivery of climate information including early warnings.***

23.A set of concerted actions should be adopted to developed to a more effective, efficient and targeted delivery of climate information including early warnings: i)enhancement of the capacity of SLMD and the DWR to store and handle climate information that would be collected by the future monitoring networks and transmitted to the forecasting centers; ii) strengthening of the capacity of SLMD to analyze the data and generate accurate forecast to be transmitted to those entities (ONS-DMD) with mandate to issue warnings; iii) develop a communication and institutional framework for warning dissemination to end users including vulnerable communities; and iv) boost the technical capacity of the Sierra Leone Environmental Authority (SLEPA) through training, to systematicallystreamline digital information (e.g. using GIS platform to generate vulnerability and risk maps) to support decision making in sector planning such as mining, tourism and land planning

❑ ***Support improved and timely preparedness and response to forecast climate-related risks and vulnerabilities.***

24. However this information should be appropriately packaged for translation into information that can be easily understood by users in the various sectors with need to take preventive actions. Therefore there is a need to be an official process for generating warnings that include communication between sectoral ministries and with communities where disasters are experienced. Representatives from different ministries should convene, assess the situation and warning messages are conveyed. This allows a wide range of views and evidence to be considered (including information from international and regional sources), though the process needs to be clear and act efficiently if warnings are to be issued in time. Furthermore, the warning should be quickly disseminated to reach a wider audience possible and a response capability should be in place to rapidly assist those in danger or in need of protection and help**.**

❑ ***Strengthening the existing dissemination/response system, building on The Sierra Leone Red Cross who has a strong Disaster Management (DM) network.***

25. These solutions require developing robust weather and climate observation, forecasting, and monitoring infrastructure, which can be rapidly deployed, is relatively easy to maintain, and simple to use. Such a weather and climate monitoring system can provide the country with the capacity to develop: (i) an early warning system for severe weather; (ii) real-time weather and hydrological monitoring; (iii) weather forecasting capabilities (Numerical Weather Prediction); (iv) agro-meteorological information and services (including integrated crop and pest management); (v) applications related to building and management of infrastructure; (vi) land, air and maritime transport management; (vii) integrated water resources management; (viii) coastal zone and land management; and (ix) planning and policy making processes.

26. The Government of Sierra Leone (GoSL) and the communities in general have increasingly become aware of the extreme climate events that have led to disastrous floods and landslides in the country.

Theseconcerns are also implicit in the country's First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC), the National Adaptation Programme of Action (Ministry of Transport and Aviation, 2007) and Second National Communication. However, there are significant policies, institutional, financial, technological and informational barriers that prevent the desired situation, described in the previous section, from emerging. These barriers include:

Insufficienthydromet and climate monitoring infrastructure

27. In Sierra Leone there has been a steady decline in infrastructure dedicated to monitoring the climate, hydrology, environment and severe weather (e.g. meteorological and hydrological observing stations, satellite receivers and weather radar) for the last 20-30 years. Whilst this situation has been ameliorated by specifically targeted project interventions, this has often benefitted a particular aspect of the early warning system (e.g. African Monitoring of the Environment for Sustainable Development (AMESD)[10] to improve use of satellite data or the "Weather for all" initiative to improve weather station coverage[11]). Recently, the need for a systematic improvement of the observing network is recognized by the Global Climate Observing System (GCOS)[12] which in its reports to the UNFCCC notes that "Developing Countries have made only limited progress in filling gaps in their *in situ* observing networks, with some evidence of decline in some regions, and capacity building support remains small in relation to needs". The installation of new infrastructure also requires several practical considerations: i) safety of the equipment; ii) power sources; iii) long term durability; iv) access for maintenance and v) transmission and archiving of data. The SLMD is currently severely understaffed with only two available meteorologists,approx. 15 observing staff and Met technicians and only one maintenance and repair technician. At present the SLMD is also under budgeted and financial resources obtained through Government are not sufficient to undertake training and capacity development to raise the number of technical staff, to keep a credible record of weather and climate data or to expand the monitoring network.

28. The hydrology sector led by the newly created Directorate of Water Resources (DWR) is still developing a national structure for water resources management at watershed level. This being carried out mainly based on the ongoing WASH facility programme ("Sierra Leone Water Security project") in the Tonkolili and Port Loko district which intends tolay the foundations for establishing water resources management activities in Sierra Leone. This is the sole project developing (through capacity building and placement of small number of units), hydrological monitoring in Sierra Leone through measurement of abstraction, groundwater and surface water levels, precipitation and land use. Therefore the DWR currently has no monitoring equipment placed in strategic watershed locations, nor has the capacity to undertake hydrological monitoring at national level or the capacity to handle the data and be able to develop flood forecasts or warnings. A systematic capacity building programme should be put in place to train a minimum number of technical officers to maintain and manage the monitoring network and be able to handle data. In addition efforts should be made to establish ahydrological modelling unit within the DWR and create the necessary technical conditions to develop flood forecast.

Limited knowledge and capacity to effectively predict future climate events

29. The scientific and technical capabilities required to effectively identify hazards and forecast their potential impacts on vulnerable communities in Sierra Leone is still weak. The country has been hit by prolonged war, which has dilapidated the infrastructure at provincial, district and National level. Buildings are in an extremely poor state of repair both at Lungi Airport Forecasting Centre and Provincial/District office. There is a need to rehabilitate stations destroyed during the war to be able to

[10]http://www.amesd.org/index.php?start=25
[11]http://www.un.org/apps/news/story.asp?NewsID=31193&Cr=weather&Cr1
[12]http://www.wmo.int/pages/prog/gcos/index.php

have a functional monitoring network around the country. Staff resources are extremely limited asa result of death and disappearance of a number of staff in the districts during the war, massive departure of meteorological technicians to other sectors with better salaries and working conditions during the post war period and retirement of others particularly senior technical personnel. Therefore forecasting capacity is at its lowest with only two 2-qualified forecasters and no forecasting supporting facilities such as SADIS[13] and SYNERGIE[14] are not currently available, therefore requiring significant investment and training to overturn this situation.

30. Currently, SLMD produces the following forecasts: i) Aviation Forecast to Airport Authority(SLAA) and Roberts International Airport; ii)Outlook forecast after PRESAO Training; iii) Daily Radio Weather Broadcast; and iv) Weather Data requested by various institutions, organisations and individuals. However the accuracy and the details of those forecasts are not satisfactory due to lack enough data from the national grid as well as computers, workstations and a communication system with capacity for accessing Regional or International forecasting products through the Global Telecommunication System (GTS) to allow the downscale operation. In addition, there is no capacity built to package information or to adequately produce tailored forecasts for end user sectors such as mining, tourism, planning, agriculture and marine. There should a significant investment in communications, computers and workstations as well as specialised training to all forecaster is information packaging skills.

Weak capacity for issuing warnings and dissemination

31. Once the weather monitoring network is in place and all meteorological information is available to produce accurate forecasts, there should be a structure set in place with a legal and clear mandate to issue timely warnings. In addition once the warnings are issued there should be a dissemination system to all end users and in particular the remote and vulnerable communities. The ONS-DMD are the institutions with mandate to actively respond to disasters in Sierra Leone together with the SL Red Cross society, NGO's (Oxfam, World Vision, etc.) and other international Institutions (UNICEF, FAO, WFP, etc.). The ONS-DMD has developed Disaster Management Committees 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 documents[15].

32. Notwithstanding the framework developed, there are no warnings *per se* being issued in the country. The limited amount of information generated by the Sierra Leone Meteorological Department is still not shared with end-user in a timely manner thus preventing the necessary response actions to be put in place. There is poor coordination between the information and data providers in particular SLMD and DWR with regards to climate monitoring and early warning information sharing and information flow, as well as the mainstreaming of climate change across governmental sectors. Poor inter-sectoral coordination at a departmental and ministerial level results in the available climate, agriculture and environmental data and information not being adequately combined and/or translated for key messages to be easily understood by

[13]The meteo data acquisition system SADIS(2G)_SAtelliteDIstribution System, the ICAO official system for the distribution of products dedicated to air navigation support, remotely acquires all meteo products for weather forecasting activities collects and standardizes all meteorological data (wind speed, pressure, temperatures, etc.) and charts from several International Forecast Centres and distributes the processed products to both forecast centres and ARO-MET. It allows to manage the warning and special events from atmospheric conditions evaluation and messages advisories, in particular supporting the alert situations related to the airport monitoring and flight planning activities.

[14] SYNERGIE is an Expert's decision making tool for weather forecasting and warnings.

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

users. Furthermore, this results in limited agreements on official processes for sharing climate information and issuing warnings. This includes between sectoral departments and ministries and with communities where climate-hazards are predicted to have significant impacts. There are no established mechanism to disseminate forecast information and warnings to remote and vulnerable communities. Currently the preferred vehicle for SLMD forecast dissemination is the TV and national radio. Though the ONS-DMD has already set up Sectoral Task Forces (STFs) in the Provinces/Districts they require training to harmonize agreements and interagency protocols. The system will need to be well organized and versatile using a variety of communication media, and partners, including the media, and NGOs active at the local community level in recognition of their capacity for public sensitization and education.

Absence of a national framework and environmental databases to assess and integrate climate change risks into sectoral and development policies

33. An effective early warning system must combine scientific and technical capabilities for hazard identification and vulnerability mapping. Calculating risks for known vulnerabilities requires a comprehensive archive of information related to vulnerable communities, infrastructure, roads, shipping, access to markets, flood prone areas, cropping patterns etc. Even though there are some ongoing initiatives to build risk information in some of the sectors (e.g. Center for International Earth Science Information Networks (CIESIN) based at the Sierra Leone Environmental Protection Agency (SLEPA)this information is held in disconnected databases or computers spread across different government departments and ministries. There are no efforts to establish a national framework to systematically mainstream climate change into sectoral and development policies. All the information required to assess vulnerability and calculate risks needs to be accessible, either through a central database/repository, or through distributed networks. There are no appropriate advanced workstations and GIS facilities to allow systematic storage, integration and mainstreaming of climate and weather data to assist Disaster Management and other interested agencies and to facilitate inter-institutional data sharing. A large quantity of weather and climate data is still lying in damp store rooms in need of a recovery plan through digitalisation. There are no specialised technical personnel available to work with GIS facility or use statistical techniques for data handling and climate change vulnerability assessment and risks calculation.

Absence of Long-term sustainability planfor observational infrastructure and technically skilled human resources

34. The maintenance of monitoring equipment, the human capacity to use and repair this equipment, process data and develop early warning packages, all require constant income streams and annual budgets. These are needed beyond the lifetime of this project and therefore require suitable business models and financial mechanisms to be developed. The SLMD often struggles to pay for the maintenance and upgrade of existing equipment which is recognized as a limiting factor[16] and various levels of public private partnership have been suggested, including the use of an intermediary organisation[17]. The DWR has been recently created and there is no indication of the budget available on yearly basis for its functioning. Therefore both SLMD and DWR are vulnerable to funding uncertainty. With the advent of enlargement of the monitoring networks and training of technical staff the question of sustainability beyond the project lifetime becomes pertinent. Currently no partnerships have been established with potential information and forecast end users. The provision of daily forecast by SLMD to the media and other GoSL institutions is regarded as public service mandate and no additional revenue is obtained. The GoSL has expressed the wish to transform the SLMD into a semi-autonomous Agency (Sierra Leone

[16]WMO Global Framework for Climate Services

[17]GFDRR WCIDS: http://www.gfdrr.org/gfdrr/WCIDS

Meteorological Agency) which will guarantee cost recovery management framework. However, there are no established partnerships with potential EWS end users and no established Plan for alternative income streams on cost recovery scheme for covering operation and maintenance costs. There is a need to identify public and private demands for hydro-meteorological services to inform the development of relevant products as well as marketing strategies for these products. Therefore a Plan and a financial framework for SLMD sustainability in the context of forthcoming transformation into Sierra Leone Meteorological Agency should be developed. However and regardless of the business structure it is clear that delivery of targeted services, such as those proposed here, are essential for generating products and revenue that both public and private clients will pay for. This revenue can then support the maintenance of the observational infrastructure and the salaries of skilled staff to use it and generate the early warning products.

1.4 Stakeholder baseline analysis

35. The preparation of this NAPA follow-up project was guided by a comprehensive and extensive participatory process involving all stakeholders, including local communities, a multidisciplinary approach (professionals from different sectors participated); and a complementary approach, building upon existing plans and programmes, including national action plans and national sectoral policies. Therefore, during the consultation process from November 2012 to April 2013, approximately 250 professionals were engaged at national, sub-national, municipal and community level. Key stakeholders with a major direct role in the project were identified and consulted at different stages during the Project Preparation Grant (PPG) phase to obtain their inputs and feedback for designing the project. The stakeholder consultation process was undertaken by running two workshops, a series of bilateral meetings with GoSL and International Institutions, Site visits and interviews to community Members and NGO's and CBO's. The importance of strong engagement by NGOs, community-based organizations and communities in the project was flagged at the first stakeholder consultation workshop, including the need to ensure that future consultations capture the full range of perspectives, including those of minorities, less vocal groups and village residents who may not have been present at the time of the consultation. The importance of gender equity and other gender aspects was emphasized throughout the consultation process.

Inception Workshop (IW)

36. An information and consultation session was undertaken at the Shangri La Conference Room, 92 Kingsley-upon-Hull (Lumley Beach) Road, Aberdeen in Freetown on Wednesday 12th September 2012. This was the first public information and consultation session on the NAPA follow up project that was organized.

37. Outcome: The potential stakeholders that attended the Workshop were informed about the project and its objectives. Initial guidance and useful advice related to project preparation process, stakeholder identification, strategy and approach, technical issues, and site selection was gathered by the team. Forty five representatives attended the workshop, including those from government agencies with key roles to play in formulating and implementing the LDCF project including the Ministries of Transport and Aviation, Agriculture Forestry and Food Security (AFFS), Lands Country Planning and the Environment (LCPE), Energy and Water Resources, Sierra Leone Environment Protection Agency (SLEPA), Disaster Management Directorate (DMD) in the Office of National Security (ONS), UN agencies, representatives of the University of Sierra Leone and Fourah Bay College, local Press and bi-lateral donors were also in attendance and contributed to the discussions, planning and identification of useful EWS interventions in Sierra Leone.

Consultation Meeting (IW) - at Adam Smith International (ASI) Office, Wesley Street, Freetown, Sierra Leoneon 15thJanuary 2013.

38. This Consultation Meeting took place at Adam Smith International (ASI) Office with all representatives of water resources monitoring projects currently in progress in Sierra Leone with the participation of Ministry of Water Resources (MWR). The objective of the meeting was to share information on ongoing and future projects and discuss ways for complementing project deliverables, sharing information to avoid duplication of efforts.

Joint Stakeholders Consultation Meeting - at The Office Of National Security (ONS) 19th January 2013.

39. The Joint Stakeholders Consultation Meeting with all GoSL Ministries and NGO's was undertaken in the Conference Room of the ONS where a number of officials made themselves present to discuss the development of the PPG activities particularly the design of the Outputs/activities of the project components. Amongst others present were the Coalition of Civil Society and Human Right Activists an Umbrella Organization for the NGO's working in disaster management in Sierra Leone¸ The Maritime Administration, the Sierra Leone Aviation Authority, The Airport Authority, The National Directorate of Water Resources, The Sierra Leone Disaster Management Department, Sierra Leone Meteorological Department, The Ministry of Agriculture, Forest and Food Security, Academics and Researchers.

Validation Workshop

40. The Validation Workshop for the UNDP-GEF EWS project took place at the Shangri La Conference Room, 92 Kingsley-upon-Hull (Lumley Beach) Road, Aberdeen, in Freetown on Wednesday 24th April 2013. The purpose of this workshop was to update stakeholders on the Project design, solicit feedback on the information presented, and agree upon any changes to be made to the Project design. The two Project outcomes and their respective indicative activities and indicators were presented at the workshop. These outcomes were endorsed by the sixty participants who attended the workshop, including representatives from government agencies with key roles to play in formulating and implementing the project. Some adjustments were suggested by the participants to be introduced in the project document concerning the implementation of indicative activities so to seek better articulation between all execution partners, particularly the University of Sierra Leone and Fourah Bay College.

Bilateral consultation throughout the project preparation process

41. The project preparation phase (PPG) (September 2012 to April 2013) included a series of bilateral meetings between members of the PPG Team and representatives and resource persons from other projects, GoM agencies, NGOs and other organizations including main Universities. These bilateral meetings targeted key Sierra Leone Government Institutions, International Agencies and donor community in Sierra Leone, Non-Government Organizations and the private sector which are listed in Table 1.

42. All consultations were conducted by an international consultant and/or national consultants with the support from the UNDP Country Office. Details of stakeholder consultations – including reports, programmes and participant lists – are included in Annex 1. Details of stakeholder involvement during the project implementation phase are provided in Section 2.8.

Table 1.Primary and Secondary Stakeholders and their roles in the project.

Stakeholders	Interests/ role in the project

Stakeholders	Interests/ role in the project
EPA-SL (Environment Protection Agency of Sierra Leone)	The Ministry for the Lands Country Planning and the Environment is the Policy Enactment institution for environmental issues management. It created the Environment Protection Agency of Sierra Leone (EPA-SL) in order to enable better coordination of all sectors of environmental activity, and encourage a proper planning and use of natural resources for sustainable environmental development. The Agency is Governed by a board of Directors drawn from various line ministries and other stakeholder institution/organization for endorsement of the Agency's planned activities and budgetary controls. It is managed by a Directorate and various divisional heads located in each region of the country as well as on specific issues such as waste, mining, industry etc. The Environmental Impact Assessment (EIA) license granted to operational projects before operations captures the main element of climate change issue management, and the protection of the environment. .
DMD (Disaster Management Department) of the ONS (Office of National Security	The Disaster Management Unit (DMD) of the Office of National Security (ONS) is a public institution with administrative autonomy directed to the prevention and mitigation of natural disasters. It has three fundamental areas of action: (i) prevention and mitigation; (ii) support to victims of Disasters and (iii) administration and coordination of disaster response and management. Under its institutional mandate DMD is supposed to (i) direct and coordinate disaster management, namely, prevention and mitigation; (ii) reduce people, infrastructure and assets vulnerability and (iii) collaborate with other stakeholders in during each of the above programmes
MAFFS (Ministry of Agriculture, Forestry and Food Security)	The Ministry of Agriculture, Forestry and Food Security is the institution responsible for agricultural issues and Extension Services in the country. Through its Rural Development Strategy, it aims at (i) Increased competitiveness, productivity and rural wealth accumulation- through the Small Holder Commercialisation (SHC); (ii) Productive and sustainable management of natural resources such as the lowland rice/food crop production initiatives; (iii) Growth in human capital, innovation and technology as in the Agricultural Business Centres (ABCs) ; (iv) Diversification in social capital, institutional efficiency and effectiveness; and, (v) Good governance and market planning.
SLMD(Sierra Leone Meteorological Department)	The Sierra Leone Meteorological Department (SLMD) is an institution created to (i) plan, install and ensure the functionality of meteorological stations; (ii) register, record, archive, analyse and publicize the observation results; (iii) promote and ensure the functionality of the Centres of Analysis and Meteorological Forecast; (iv) issue warnings of severe weather events for the protection of life `and property and (v) conduct studies and research in the field of meteorology and climatology.
SLIAR (Sierra Leone Institute Agricultural Research)	The Sierra Leone Institute Agricultural Research under the Ministry of Agriculture responsible for generating knowledge and technological solutions for sustainable development of higher yield in production, agro-business and food and nutritional security. As such, this institution is responsible for implementing research activities that contribute to the development of strategies for sustainable management and land use for agricultural production.
SLMA (Sierra Leone Maritime Administration)	The Sierra Leone Maritime Administration (SLMA)is a public institution under the Ministry Transport and Aviation created to monitor the Sierra Leone coastal waters for safety of users of the resources, develop research programs on the marine and coastal ecosystems, contribute to integrated planning and implementation of good practices in the coastal and marine environments, implement experimental activities and demonstrations on the conservation and sustainable utilization of coastal and marine environments
WRD (Water Resource	The Ministry of Water Resources (MWR) is responsible for the monitoring and sustainable management of fresh water resources of the country. The hydromet

Stakeholders	Interests/ role in the project
Department)**Then but NOW MWR** (Ministry of Water Resources)	component of the project will have to be supported by the Ministry of Water Resources (MWR), where the Hydrology Division of the Water Research Management is established and is the main institution dealing with water in Sierra Leone.
SLAA (Sierra Leone Airport Authority)	The Sierra Leone Airport Authority (SLAA) is charged with responsibility of management of the both the country's international airport and the other seven provincial airports. It works in collaboration with the SLMD through its air traffic control system to transmit weather information for the safe operation of aircrafts. It also manages the security of passengers for the smooth and safe travel in/out of each of the above airport. They coordinate the search and rescue operations of aviation accidents. Thus a highly functional and enhanced meteorological service to the SLAA is essential for the smooth execution of their mandate.
SLCAA (Sierra Leone Civil Airport Authority)	The Sierra Leone Civil Airport Authority (SLCAA) is charged with the responsibility oversight and regulation of the SLAA and the Airlines operating in the country for the safety of life `and property.
GVWC (Guma Valley Water Company)	The Guma Valley Water Company (GVWC), responsible for Freetown's water supply, who will directly benefit from the watershed monitoring system to be improved and put in place through this project; It is located some twelve kilometres from thecentre of Freetown and is driven by gravity flow after treatment at thedam site.
SLPA (Sierra Leone Ports Authority)	SLPA is responsible for supervision and management of ports of SierraLeone and accompanying ships and related vehicles at our ports.

2. STRATEGY

2.1. Project rationale and policy conformity

43. The Government of Sierra Leone (GoSL) has requested the Least Developed Countries Fund (LDCF) to support this Full-Sized Project (FSP) in order to implement Sierra Leone's number 1 priority NAPA intervention: "Develop an Early Warning System in Sierra Leone".

44. The focus of this project is the need to reduce the country's vulnerability and risk to climate change hazards characterized by irregular and unpredictable rainfall associated with increased floods and landslides, as well as, seasonal and prolonged droughts through the development of an Early Warning System (EWS) and enhancing the availability of climate information for long-term planning. These hazards adversely affect the country's development planning, the population's wellbeing, agricultural production and the livelihoods of local communities.

45. The aim of this proposal is to strengthen the EWS of Sierra Leone, largely through improving national capabilities to generate and use climate information in the planning for and management of climate induced hazard risks. It will achieve this by implementing the transfer of appropriate technology, infrastructure and skills.

Enhanced capacity of national hydro-meteorological (NHMS) institutions to monitor extreme weather and produce sector tailored weather forecasting

and

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

46. The Project sets clear priorities for the development of complementary activities such as: i) developing the capacity for generating climate change risk analysis and mainstreaming it into policies, investment plans, sector budgets;ii) strengthening the capacity of the national disaster management structure to disseminate and respond to warnings at national, sub-national e local level; and iii) developing capacity building of the hydro-meteorological institutions.

47. The preparation of this NAPA follow-up project was guided by a comprehensive and extensive participatory process involving all stakeholders at GoSL institutions, Private Sector and NGO's, including local communities organizations, a multidisciplinary approach (professionals from different sectors participated); and a complementary approach, building upon existing plans and programmes, including national action plans and national sectoral policies.

48. The project is well timed to strengthen and support the further roll-out of GoSL and donor activities under the Second Poverty Reduction Strategy Paper (PRSP II) 2008-2012[18]. The proposed LDCF project's focus on early warning system as a tool for climate change adaptation as well as a developmental instrument is consistent with these plans and processes and will contribute knowledge to them.

49. The link between this project strategy and the NAPA is centred on a common goal of informing climate resilient development planning and sector management through improved national systems that generate relevant climate information. This project would build the capacity of the Sierra Leone Meteorological Department in order to enable it to properly monitor weather systems and climate and in particular to be in a position to provide Early Warning of Imminent Hazardous Weather or Climate." In addition, the country's number 20 priority intervention is, "Establishment of a National Sea-Level Observing System for Sierra Leone". The NAPA clearly identifies a priority project on Early Warning Systems (EWS) along with projects associated with Food security, Energy, Water resources and Terrestrial ecosystems. However, the EWS project is not associated with any one particular sector and is expected to be relevant to multiple sectors, including food/agriculture, water management, health, infrastructure, coastal zones and energy.

50. The project is expected to deliver benefits at both the national and local levels. The installation of weather monitoring network and other observation and computer infrastructure will benefit the SLMD staff (through training and technological advancement). Other national institutions that will benefit from this endeavour will be among others The Ministry of Agriculture, Forestry & Food Security (MAFFS), Ministry of Lands, Country Planning and the Environment (MLCPE), Ministry of Transport and Aviation, the Disaster Management Department in the Office of National Security, Ministry of Energy and Water Resources, Environment Protection Agency (EPA).

[18]The Republic of Sierra Leone.An Agenda for Change.Second Poverty Reduction Strategy Paper (PRSP II) 2008-2012. 182p

51. This project will address urgent and immediate climate change adaptation and disaster risk management needs and leverage co-financing resources from bilateral and other multilateral sources. The project is country-driven, cost-effective, and will integrate climate change risk considerations into land-use planning, rural and urban management and disaster risk reduction initiatives, which are priority interventions eligible under the LDCF guidelines. The project focuses on safeguarding Sierra Leone's communities, socio-economic assets against future climate risk by pursuing on the strengthening EWS, in order to reduce vulnerability and, contribute to current national efforts to develop appropriate and effective adaptive capacity of the country.

52. The NAPA follow-up project significantly contributes to sustainable development in Sierra Leone; it was and remains country-driven in further design and final implementation, and will demonstrate sound environmental management while being as cost-effective. Whilst participatory in the coordination arrangements, simplicity of technical delivery actions on the ground is a key feature of the project. The project interventions are expected to generate in the long run, tangible poverty reduction benefits by addressing environmental sustainability aspects, food security and livelihood related issues and will also have a considerable impact on health and sanitation planning.

LDCF conformity

53. Sierra Leone became party to the UNFCCC on 10th November 2006 and is classified among the non-Annex 1 parties. It also is a signatory to the Kyoto Protocol, thus pledging political and practical commitment in the direction of sustainable development, while creating conditions to benefit from opportunities in this framework. Sierra Leone belongs also to the group of the Least Developed Countries (LDC), and participates in the Highly Indebted Poor Countries (HIPC) Iinitiative. Thus, following the example of Least Developed Country (LDC) Parties to this Convention, Sierra Leone has developed and submitted its NAPA, published in 2007 in accordance with the requirements outlined in the UNFCCC COP 7, which listed 24 urgent and immediate adaptation needs out of which the first four were identified as follows (Table 2):

Table 2. Sierra Leone NAPA priority Rank and activities

NAPA Priority Rank	Activity
1	Establishment of National Early Warning System
2	Rehabilitation & Reconstruction of meteorological/climate Monitoring stations throughout the country
3	Capacity building of the Meteorological Department through training of personnel for the country's adaptation to climate change
4	Sensitization and awareness raising campaigns on climate change impacts on women relating to the three conventions of biodiversity, desertification and UNFCCC

54. **Country drivenness and undertaking a participatory approach**: Activities to be undertaken by the project were selected through numerous stakeholder consultations of the PPG (see Section 1.6 Stakeholder baseline analysis for details) and thus are in line with country priorities. See Section 2.1.2 for information on country drivenness. Additionally the project is in line with GEF/LDCF (2006), this project was identified and conceived through the participatory NAPA process in Sierra Leone. Moreover, it was designed to be consistent with, and supportive of, national development strategies, as expressed in the Vision for Sierra Leone 2025, PRSP and related documents.

55. **Implement NAPA priorities**: The project addresses the urgent and immediate activities identified in the NAPA, in particular the project will address NAPA adaptation priorities 1, 2,3, and 4 and is in line

with the priority sectors identified in GEF/LDFC (2006) on a global basis. Notably, this project focuses on urgently needed adaptive capacities in disaster risk reduction.

56. **Supporting a "learning-by-doing" approach**: the project will use the applied interventions to demonstrate how properly packaged early warning messages to help farmers and other stakeholders living in vulnerable areas allow them to better prepare for and adapt to climate change events. In addition the project will use, synthesized lessons learned for replication elsewhere with the ultimate goal of improving EWS performance. It will also generate evidence on the cost effectiveness of building institutional adaptive capacity in order to develop a case for policy and budgetary adjustment to ensure greater sustainability. The project is designed to complement other ongoing and planned projects and programmes without duplicating them and to build on the existing systems in place.

57. **Multi-disciplinary approach**: the project includes two main components and within each the project will undertake a number of activities (see Project Objective, Outcomes and Outputs/activities Section 2.3) to ensure a multi-sector approach to building capacity for adaptation while reducing disaster risk to climate change impacts.

58. **Gender equality**: project outcomes will contribute to an understanding of how adaptation responses can be designed to strengthen gender equality. To achieve this, the project will ensure that women attend workshops and are part of adaptation option interventions on community based EWS, and community management committees.Inaddition, the project will undertake gender sensitive communication to warnings to be disseminated to vulnerable communities.

59. **Complementary approach**: In order to build upon existing plans and avoid the duplication of efforts, the project will be working in conjunction with relevant ongoing projects in Sierra Leone (see Section 2.3 for details).

Overall GEF Conformity

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

- Sustainability: the project has been designed to have a sustainable impact, at village and at national level. See section on sustainability below for more details;
- Monitoring and evaluation: the project is accompanied by an effective and resourced M&E framework, that will enable ongoing adaptive management of the project, ensuring that lessons are learnt, management decisions are taken based on relevant and up-to-date information, and regular progress reports are available for concerned parties;
- Replicability:The pilot approach to establishing a functional early warning system will generate approaches, tools and methods that can be addressed elsewhere in Sierra Leone and finally lead to the establishment of a fully functional national approach. See section onreplicability below for more details;
- Stakeholder involvement:The project was designed in a participatory manner to ensure significant stakeholder inputs, and will be implemented in a way to ensure their full participation in all implementation aspects including monitoring and evaluation.

2.2Country ownership: country eligibility and country drivenness

2.2.1 Country eligibility

61. Countries such as Sierra Leone that have ratified the UNFCCC, and are classified among the non-Annex 1 parties once they have developed and submitted their National Adaptation Plans of Action (NAPA) are entitled to benefit from the LDC Fund for the implementation of priority measures identified in their respective NAPAs. In implementing priority interventions identified in the NAPAs, the project is consistent with the Conference of Parties (COP-9) and also satisfies criteria outlined in UNFCCC Decision 7/CP.7 and GEF/C.28/18.The project focus is aligned with the scope of expected interventions as articulated in the LDCF programming paper and decision 5/CP.9. As climate impacts fall disproportionately on the poor, the project recognizes the links between adaptation and poverty reduction (GEF/C.28/18, 1(b), 29).

62. This project fully reflects the priority measures identified by Sierra Leone's NAPA, and will contribute to the country's development and achievement of critical MDGs. Climate Change Adaptation is a leading priority for the Government of Sierra Leone. The LDCF project, which will address the top 3NAPA priorities, was designed specifically to meet the objectives of Priority Activity 1 of the NAPA ("Establishment of National Early Warning System"). By addressing these urgent priorities, the project will contribute to the long-term planning solutions that the country urgently requires to prepare for the inevitable impacts of climate change in key socio-economic sectors.

2.2.2 Country driveness

63. Sierra Leone has acknowledged that future economic growth continues to rely on the sustainable use of natural resources and on the capacity to reduce the risk of disaster by enhancing the resilience capacity of communities and economical agents to adapt to climate change challenges. The Government of Sierra Leone has drafted and implemented a wide-range of policies that directly or indirectly relate to climate change and community adaptation to climate change. The environmental policy and environmental assessment (EA) legislation and procedures of Sierra Leone which are relevant to the project, are outlined below.

The National Environmental Policy (NEP)

64. As the first national policy concerning the environment the NEP, which was approved in1990 and revised in both 1994 and 2002, is a milestone document for environmental management with enormous implications for climate change. This policy highlights the general principles to be considered by all activities that have potential implications for the environment, in particular outlining the main environmental goals and objectives that underlie Sierra Leone's aspiration for sustainable development. Its relevance to climate change can be viewed in terms of the restraints that it poses to the uncontrolled use of forests, along with their natural resources.

The National Environmental Action Plan (2002)

65. Unlike the NEP, this plan (NEAP) sought to identify the specific activities that needed tobe undertaken in order to protect Sierra Leone's environment. Most of these activities, which were intended to be integrated into any future national development plan for the country, relate to such issues as environmental education and training, environmental information systems (EIS), and the integration of NEAPs into national development plans. Because this plan also ranks and prioritises environmental

actions with a strong emphasis on protecting security of tenure, it arguably has serious implications for climate change.

The National Biodiversity Strategy and Action Plan (2003)

66. Developed in 2003, the BSAP was formulated based on the NEAP. Its relevance to climate change is the highlighting of the state of Sierra Leone's biological and ecological resources and the threats posed to their existence. This plan specifically identifies a range of cross-sectoralactions needed to ensure the effective protection and sustainable use of the country's resources. Several of these priority actions relating mainly to such thematic issues as forest management, land degradation, and soil and water management have also been outlined among the key priority activities of the National Adaptation Plan of Action(NAPA).

The National Land Policy and Land Commission Act (2004)

67. On the other hand, the National Land Policy was formulated in response to the prevalence of land encroachment and haphazard development which has led to the intensification of vulnerability in many areas. Its major influence on climate change is the power to minimise "the social and environmental implications" ofthe various types of land uses in the country (Government of Sierra Leone, 2005).

The Environmental Protection Agency Act (2008)

68. The Sierra Leone Environmental Protection Agency Act (SLEPA Act) is an improved version of the Environmental Protection Act (EPA) (2000) acting as the environmental focal point for the country, to ensure that Sierra Leone complies with the relevant Multilateral Environmental Agreements (MEA's) that it has committed itself to. Prominent among these MEAs are the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, the United Nations Convention to Combat Desertification (UNCCD), and the United Nations Convention on Biological Diversity(UNCBD).

The Environmental Protection Agency Act, 2008 and Environmental Protection Agency (Amendment) Act, 2010

69. The Environmental Protection Agency Act, 2008 established the Sierra Leone Environmental Protection Agency (SLEPA), to provide for the effective protection of the environment and for other related matters. This Act mandates the EPA among others to: Advise the minister on the formulation of policies on all aspects of the environment and in particular make recommendations for the protection of the environment.

The National Security and Central Intelligence Act No. 10 of 2002

70. This Act established the Office of National Security (ONS) which serves as the central coordinating body for the security sector and intelligence organ of the state at the policy level. The Disaster Management Department is one of seven departments within the ONS created by this Act and this department has the mandate to coordinate all issues related to both natural and man-made disasters. It also brings together all stakeholders from governments, NGOs, United Nations specialized agencies, community based organisations, the private sector, media and local communities. In other words, it is the central agency responsible for disaster management.

The National Disaster Management Policy (Draft)

71. The Policy recognizes that disaster management and risk reduction are a multidisciplinary endeavor, and while it indicates the ONS as the lead agency in this process, it stipulates that this Office is to collaborate with the decentralized government institutions, the public and private sector, UN agencies and NGOs. Importantly gives strategic directives to the government on steps to be taken before, during and after disasters. The objectives of the Draft Disaster Management Policy are to:

- Ensure the integration of disaster risk management into sustainable development programmes and policies to ensure a holistic approach to disaster management;
- Ensure priority and requisite institutional capacities for disaster risk reduction at all levels;
- Enhance the use of knowledge, education, training, innovation and information sharing to build safe and resilient societies;
- Improve the identification, assessment, monitoring and early warning of risks.

The Bumbuna Watershed Authority and the Bumbuna Conservation Area Act, 2008 [No. 6 of 2008]

72. ACT to provide for the establishment of the Bumbuna Watershed Management Authority, to coordinate sustainable land use and agriculture programmes in an environmentally compatible manner in the Bumbuna Watershed, to promote environmental management and biodiversity conservation in the Bumbuna Conservation Area, in order to address environmental and social needs associated with the operation of the Bumbuna Hydroelectric Dam, including the physical protection and sustainability of the Bumbuna reservoir and to provide for other related matters

The National Commission for Relief, Rehabilitation and Reconstruction Decree, 1996 [NPRC Decree No. 12]

73. A DECREE to establish a Commission for the planning, co-ordination and implementation of programmes for the relief, rehabilitation and reintegration of persons and communities affected by conflict and natural and man-made disasters and other emergencies.

The Guma Valley Water Act (1961)

74. An Act which established Guma Valley Water Company (GVWC), a company owned by the Government and Freetown City Council that provides water supply services to the city of Freetown.

75. Currently the Government of Sierra Leone is developing efforts to mainstream climate vulnerability and risks into major development and sectoral policies. Examples of these are the Sierra Leone Vision 2025[19] (SLV_2025) that sets out the broad outline of policies to facilitate the realization of the national development and economic goals and the Second Poverty Reduction Strategy Paper (PRSP II) 2008-2012. The mission statement of Vision 2025 is to guarantee a well-balanced ecosystem and a decent standard of living for one and all, under a system of government based on the consent of the citizenry. The long term objective of this mission is to conserve and promote the rational use of the Nation's natural resources consistent with the overall goal of sustainable development. The mission also promotes the i) Sensitization of the public on environmental management and ii) Strengthening the capacity of the government institution responsible for the environment to lead the process of harmonization and enforcement of policies regarding the conservation and utilization of natural resources. The elaboration of an inter-sectoral and community based disaster preparedness plan is one of the principal challenges identified in the National Vision 2025 as requesting urgent attention.

[19]Government of Sierra Leone: National Long Term Perspectives Studies. Sierra Leone Vision 2025: "Sweet-Salone". Strategies for National Transformation. August 2003. 112p

76. The Second Poverty Reduction Strategy Paper (PRSP II) 2008-2012 calls for a Framework for effective Management of Natural Resources therefore focusing on how Sierra Leone will ensure that the framework for development of the tourism, mining and forestry sectors will complement the Government's effort to reduce poverty. In addition promotes the liaison and cooperation with Government agencies, local councils and other bodies and institutions to generally protect the environment. Specific guidelines are given in the document to: i) Promote studies, research, surveys and analyses for the improvement and protection of the environment and the maintenance of a sound ecological system; ii) Establish a data bank on natural resources management and utilization; iii) Coordinate the monitoring and implementation of national environmental policies.

77. The Project is linked to country priorities of the UNDP Country Programme Action Plan (CPAP, 2011-2012) in particular to its contribution to the Sierra Leone's Government National Strategy: The "Agenda for Change" 2008-2012, which is expressed in the United Nations Joint Vision 2009-2012 (UN JV) document. Amongst other the areas that it is entrusted to lead include the support, the implementation of policies, strategies and coordination mechanisms towards:

- Support the Meteorological Directorate;
- Climate Change;
- Disaster Risk Reduction

78. Activities and results that will be developed under this project are also fully consistent with the UNDAF outcome 2.1 "Improved sustainable Natural Resource Utilization and food security", 2.2 "Improved access to sustainable livelihoods opportunities in an innovative and competitive private sector", and UNDAF outcome 2.3 "Improved access to sustainable basic infrastructure".

- The project is also aligned with Sierra Leone's targets for MDG 1 ("Eradicate extreme poverty and hunger") and will contribute towards MDG 7 ("Ensure environmental sustainability") by promoting environmental sustainability. Furthermore, the activities to be developed by the project are in the context of the Government's Plans in the Poverty Reduction Strategy Paper (PRSP) to promote mainstreaming of environmental and disaster management issues.

2.3. Design principles and strategic considerations

2.3.1 Ongoing relevant national and regional initiatives

79. 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. At present, however, there are many projects and programmes – both climate and non-climate related – being implemented in Sierra Leone.

80. A stocktaking exercise conducted during the PPG phase has identified the relevant GEF and non-GEF interventions to the LDCF project. The LDCF project will link up with ongoing project interventions in Sierra Leone in order to avoid duplication of project efforts, andto make sure that LDCF financing is used to provide additional benefits. Of particular importance and relevance are the following projects:

i. 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. This project will also continue to contribute to development capacity of the Sierra Leone Meteorological Department (SLMD) with training and capacitance of three (3) meteorologists.

ii. 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. This 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). The project will also strategically support: (1) the strengthening ofSLMD 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.

iii. The IFAD/GEF_LDCF project*: "Sierra Leone: Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone"*;Theintervention of this LDCF will be articulated around four components: (i) sustainable development of climate resilient inland valley swamp; (ii) integrated water and natural resource management for adaptation; (iii) capacity building and awareness raising on climate change and (iv) 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.
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.

iv. WASH Facility – Sierra Leone project on:*"Sierra Leone Water Security Project"* Contributing to the establishment of the Sierra Leone Country Water Partnership (SLCWP) that will provide guidance, support and training to the WASH sector implemented by the Water Supply Division at Ministry of Energy and Water Resources (MWR) with the technical assistance of Adam Smith International (ASI);

v. The World Bank-funded project: *"Sierra Leone-Rapid Response Growth Pole Community-Based Livelihood and Food Support Program"* (2010-2014; $2.8m). This project aims to improve food security in areas recently affected by drought and flooding disasters. It will focus its activities particularly on the foreseen construction of six (6) Communications Centers for risk management, which will include weather and crop forecasts, disaster risk and prevention information using telecommunications."[20] Construction will be completed by 500 at-risk workers receiving Cash-for-Work (CfW), over a period of two years

[20]http://www.worldbank.org/projects/P122622/sierra-leone-rapid-response-growth-poles-community-based-livelihood-food-support-program?lang=en

vi. *African Monitoring of the Environment for Sustainable Development (AMESD) Project*. 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 Agrometeorologyand Operational Hydrology (AGRHYMET). This represents a baseline investment of approx. $27 million. Of this, $2 million will count as baseline for this project;

vii. DFID has a $15m project "Supporting the Government of Sierra Leone to implement its National Water Supply and Sanitation Strategy." It includes components for the management of water sector policy and water resources conservation.[21]. 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.

viii. *The Environmental governance and mainstreaming project (funded by the EU; financial scope: $5,700,000):* 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 Join Vision will serve as a cooperation platform between UNDP and the EU to join their efforts and realize Public Sector Reform;

81. The project builds also on other existing development baseline, from which will leverage some grant co-financing.Table 3 below indicates each of the specific associated baseline projects and the indicative co-financing amounts upon which this LDCF project will build. This is further elaborated in Section 2.3 for each of the LDCF project's outcomes.

Table 3. Associated baseline projects and the indicative co-financing amounts

Funding source	**Institutions**	**Amount (US$)**
Co-financing sources/Projects		
Environmental Governance and Mainstreaming Project	The Environment Protection Agency Sierra Leone (EPA-SL)	5,000,000
African Monitoring of the Environment for Sustainable Development (AMESD) Project	MAFFS	2,000,000
Supporting the Government of Sierra Leone to implement its National Water Supply and Sanitation Strategy.(Kabala Town	MWR	12,000,000

[21] http://projects.dfid.gov.uk/project.aspx?Project=201139

Water Supply)		
Least Developed Country Fund (LDCF) project grant requested		3,600,000
Total		**22,600,000**

2.3.2 National and local benefits

82. 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.
- 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.
- 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.

83. 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.

84. 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.

2.3.2. Brief Introduction to Project Pilot Sites

85. A strategic partnership will be developed with the above projects in order to complement their activities. Therefore the proposed LDCF will establish pilot sites where will collaborate with above projects to test the effectiveness of Community based EWS (CBEWS) units that will support health and sanitation planning, Agrometeorological and farming activity, seasonal forecasting for watershed and disaster management activities:

Site 1 The Guma Valley Reservoir

86. The Guma Valley Dam supplies approximately 1.1 million people with water, and in 2006 an extended dry season caused severe water shortages in the city. An ineffective monitoring system hinders appropriate planning for climate resilience. The Guma Valley Water Company (GVWC) has a small rainfall monitoring network made up of seven (7) rain gauges placed in each of the seven lake tributary streams which allow GVWC to assess water quantity/quality and the needs for more or less inputs for treatment of water. Whenever the lake's capacity falls below a certain threshold value, GVWC is forced to: i) introduce control measures to ration daily amount of water to supply; and ii) be prepared with enough stocked water purifying chemicals to guarantee the required water quality (due to increased siltation). Therefore, this LDCF would support GVWC by: i) supplying seven (7) additional rain gauges to be placed downstream of each lake's tributary to better control the rainfall on the watershed and; ii) by establishing a customized early warning using accurate seasonal forecasts. This would have a great impact on the daily management and economics of the company and would be one way of testing the effectiveness of the EWS on the impact of seasonal forecasting in water sector.

Site 2 The Bumbuna Watershed around Bunbuna Dam

87. The Bumbuna Dam is located in Makeni district approximately 200 km from Freetown on the Seli River. It was designed to generate 50 MW of electricity, and is connected to Freetown through a 200 km long high voltage (161 kV) transmission line (T-line). An International Development Association (IDA) Grant was awarded and designed to support the implementation of environmental and social safeguard activities which in its Component A – Environmental Management and Social Mitigation: Section 1 (ii)

foresaw the implementation of the Emergency Preparedness Plan (EPP) for the surrounding communities. After the impounding of the dam and as expected, patterns of the river both upstream and downstream keep changing depending on the rainfall pattern. Currently the Bumbuna Watershed Management Authority (BWMA) runs this EEP to assist communities to take precautionary measures against flood emergency and overflow or excessive discharge of water affecting the downstream river flow. The hydrology of the watershed reflects the seasonal rainfall pattern characterized by very wet winters followed by 4-5 months of markedly dry periods. Since 1970, the stages of the Seli River have been recorded at Badela and Bumbuna locations by two gauges installed under a UNDP Program[22]. Mean annual (1970-1979) discharge vary from 122.8 m3/s, with a maximum of 331 m3/s in September and a minimum of 6.1 m3/s in March. The highest peak flows are reached between August and October and normally range between 600 and 1200 m3/s. There are 18 communities downstream as well as the 20 upstream that benefited of this emergency preparedness 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 in 9 wards (each district in Sierra Leone is divided up into a number of wards) in three districts: Bombali, Tonkolili and Koinadugu. Therefore, there is an urgent need to establish a network for permanent monitoring of the river flow upstream and downstream the Dam. This must be coupled with the rainfall monitoring network that this LDCF intends to complement to whatever currently exists in the watershed.

88. During bilateral meetings held in the context of the WASH Facility Project" implemented by the MWR with the technical assistance of Adam Smith International (ASI), the MWR working in collaboration with Bumbuna Watershed Management Authority (BWMA) expressed the wish for assistance and collaboration from this LDCF project to establish a pilot demonstration CBEWS to help and strengthen the EEP. This LDCF will work in partnership with the ONS-Disaster Management Department to strengthen the capacity of local community radios to disseminate warnings in real time. In addition it will provide a small number of community controlled river gauging systems and simple rain gauges to complement the network being delivered by the WASH Facility Project. The resulting hydrological information will allow the development and fine tuning of a hydromet model to strengthen the existing Emergency Preparedness Plan contributing to a better forecasting of extreme rainfall events and dangerous river flow values. The effectiveness of this CBEWS in warning downstream communities of the potential change in water flow and the onset of a flash flood can therefore be assessed by the communities themselves. This will also provide the opportunity for testing the effectiveness of the EWS on "nowcast" weather and hydrological capacity of the national installed EWS.

Site 3 Inland Valley Swamps of Eastern Sierra Leone Districts

89. Rice is one of the elected crops cultivated in the Inland Valley Swamps (IVS) of four districts in Eastern Sierra Leone (Kono, Koinadugu, Kailahun and Kenema) involving more than 110,000 farmers[23]. However, farmers are increasingly vulnerable to the impact of climate change induced seasonal droughts and unpredictable extreme rainfall events. None of the other on-going and planned programmes and projects addresses the effects of changing weather and climate on Sierra Leone's rice-based agriculture. The IFAD led LDCF project 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. At the national level, the IFAD_LDCF alternative will also support and strengthen Sierra Leone's Meteorology Department, with the rehabilitation / construction of fifteen (15) meteorological stations across the country (with a focus on

[22]www.sliip.org/index.php?option=com_docman&task=doc...

[23]Sierra 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

the eastern area) and staff training in Agrometeorology. During the bilateral meetings that took place during the PPG phase, IFAD_LDCF has requested the collaboration of this LDCF project to implement a CBEWS to deliver agriculture tailored forecasts so to strengthen resilience of local farmers against climate change impact. Therefore, this LDCF in partnership with the MAFFS, will provide a number of community controlled simple rainfall gauges would to establish a CBEWS that can strengthen the IFAD_LDCF water management deliverables in IVS, but also to test the efficiency of the EWS to adequately enhance resilience in IVS rice farming in Sierra Leone. This will be a test case for the effectiveness of the EWS on seasonal rainfall forecasting capacity integrated in a Agriculture Water Management.

90. These activities to be developed at community level will concur to strong youth employment/job creation and women empowerment initiatives under the Cash-for-Work (CfW) scheme building on the Co-financing activities of World Bank-funded project: "Sierra Leone-Rapid Response Growth Pole Community-Based Livelihood and Food Support Program" (2010-2014; $2.8m). In total, the Community Based EWS (CBEWS) in four pilot sites will benefit around 1,260,000 people (Table 4) whose vulnerability to climate change and associated variability will be significantly reduced in the long run.

Table 4: Project pilot sites communities and numbers of direct beneficiaries of the Community Based EWS (CBEWS)

Pilot Sites	Districts or Communities	Nº of people
Community 1:	The Guma Valley Watershed & Freetown	1,000,000
Community 2:	Bumbuna Watershed districts communities of Bombali, Tonkolili and Koinadugu	150,000
Community 3:	Rice farmer communities of Inland valley swamps (IVS) in the districts of Koinadugu, Kenema, Kaliahun and Kono	110,000
TOTAL Nº of people		**1,260,000**

2.3.2. UNDP Comparative advantage

91. The proposed project is aligned with UNDP's comparative advantage, as articulated in the GEF Council Paper C.31.5 "Comparative Advantages of GEF Agencies", in the area of capacity building, providing technical and policy support as well as expertise in project design and implementation.UNDP's comparative advantage in designing and supporting this LDCF project is particularly strong because of the technical and capacity building focus that the project has. UNDP has strong mandates and capacities to develop national capacities for integrating climate change risks/opportunities into social equity, economic growth and environmental protection issues at all levels of development decision making. Integrating climate change risks into sustainable management of environment and natural resources and into Poverty Reduction Strategies, key national development frameworks and sector strategies is the key business of UNDP in Sierra Leone as set out in the CPAP.

92. Furthermore, at the national level, UNDP's comparative advantage for the proposed project lies in its strong track record of working with GoSL on complex environmental and disaster management projects. On Climate Change, UNDP has helped Sierra Leone to prepare the Initial and the 2nd National Communication to the UNFCCC and the Country's National Adaptation Programme of Action (NAPA), and is overseeing the implementation of a series of projects namely:

- The UNDP project "Capacity Building of the Sierra Leone MeteorologicalOffice";
- The UNDP project "Preventive Development";
- UNDP/WMO/UKMO support to the Meteorological Department (US$100,000);
- The UNDP_Spanish Funds supported project (started in 2010);
- UNDP/The Community Empowerment and Development Project (CEDP);
- The UNDP_GEF "*Building Adaptive Capacity... of Water Supply Services to Climate Change*";

93. Notably, UNDP supports AfDB in delivering a climate resilient intervention in the water sector, addressing key threats to sustainable water infrastructure development and water provision in Freetown and in the regions of Sierra Leone.

2.4. Project Objective, Outcomes and Outputs/activities

94. The aim of this proposal is:*to strengthen the EWS of Sierra Leone, largely through improving national capabilities to generate and use climate information in the planning for and management of climate induced hazard risks.*

95. This LDCF intervention will be articulated around two components:

Component1: *Transfer of technologies for climate and environmental monitoring infrastructure;*

Component2:*Climate information integrated into development plans and early warning systems.*

96. Project duration is 4 years starting in 2013 with an overall budget of US $ 3,600,000 and the project's outcomes are as follows:

97.

Component 1: Transfer of technologies for climate and environmental monitoring infrastructure

98. This component of the proposed project seeks to establish a functional network of climate (meteorological and hydrological) monitoring stations and associated infrastructure (satellite based forecasting facilities and severe weather monitoring) as a basis for understanding climate change and building an early warning system to increase resilience to climate-related shocks.

OUTCOME 1. Enhanced capacity of national hydro-meteorological (NHMS) institutions to monitor extreme weather and produce sector tailored weather forecasting.

Baseline – without LDCF intervention

99. The national meteorological infrastructure was destroyed during the war, but with support from UNDP Spanish Funds and collaboration of the WMO/UKMet Office the government has been able to install six automatic weather stations recently. The Sierra Leone government is also restructuring the whole meteorological services in the context of a Bill passed through the Parliament proposing the establishment of Sierra Leone Meteorological Agency. The situation diagnosed during the PPG phase indicates the following baseline activities:

Hydrology situation

100. The Sierra Leone NAPA indicates that the major hazards for disaster in the country are: flash floods, offshore storms, flood/rainfall related landslides, flood/rain related epidemics and occasional drought and forest fires in the dry season. EWS forecasts which can predict the intensity and extent of these Climate/Weather related events requires input from the hydrology monitoring network. Hydrological Services in the country are non- existent starting with an absence of the institutional framework which would allow the functioning of a Hydrological Service. The few hydrological measurements are carried out on *ad hoc* basis and data is fragmented between several institutions.

101. The Sierra Leone hydrological monitoring network in the past, well before the war (1972) was made up of 5 gauging stations equipped with staff gauges installed as part of a UNDP project SIL/69/509 directed to Strengthening of Sierra Leone Electricity Corporation. These were the initial efforts to institutionalize hydrological monitoring in Sierra Leone. Later, during the study of hydropower potential and power market potential in Sierra Leonea network of 12 hydrological stations was installed through the project SIL/72/007. This was a Pilot Project for the determination of the surface water resources of Sierra Leone and the principal aim included providing data for the design of the Bumbuna and Dodo Dams. With outbreak of the war these stations were destroyed and currently there is not much baseline activity concerninghydrological monitoring in Sierra Leone. The only active project being currently implemented is the WASH Facility Project: "Sierra Leone Water Security Project implemented by the Water Supply Division at Ministry of Water Resources (MWR) with the technical assistance of Adam Smith International (ASI). This project lays the foundations for establishing water resources management activities in Sierra Leone. Second it will develop (through capacity building and placement of small number of units, hydrological monitoring in Sierra Leone (such as measurement of abstraction, groundwater and surface water levels, precipitation and land use). Third it will support the development of local level water resources management activities. This intended to be practical in nature and will be undertaken within important watersheds, such as the Seli Rokel basin. Currently the Bumbuna Watershed Management Authority (BWMA) runs an Emergency Preparedness Plan (EPP) to assist communities to take precautionary measures against flood emergency and overflow or excessive discharge of water affecting the downstream river flow. No river flow gauging units are to be found anywhere in the country despite the need for flash flood forecasting. However, there are plans for the UNDP_GEF Project: "*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 install a yet unspecified number of rainfall stations for hydrological watershed monitoring.

Meteorology situation

102. The weather monitoring network of SLMD has been also seriously affected by the civil unrest. Out of the eleven (11) Synoptic weather stations that SLMD had before the waronly six Automatic Weather Stations (AWS) are now operational largely due to the UNDP/WMO/UKMO Project. There are plans for additional installation of four (4) AWS during 2013 by the IFAD/GEFLDCF project*: "Sierra Leone: Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone"* and up to fifteen (15) AWS in four districts by the end of the project.The forecast supporting

facilities such as the weather Radar (C-Band) and Upper Air Sounding equipment are now inoperative and beyond repair according to assessment made by local technical advisers to SLMD. In addition the Forecasting Centre and the SLMD Headquarter both are in need of a thorough refurbishment to its structure (walls, doors, windows, painting and communications links) to become operational again.Complementary work financed by the GoSL is planned to be developed to refurbish the Forecasting Centre at Lungi Airport and the Tower Hill Meteorological Building so to accommodate new instrumentation and create the right conditions for the development of Forecasting activity.

103. SLMD rainfall network was completely destroyed during the war. Out of the 35 rainfall stations that the SLMD had in the past, only six are now working integrated in the synoptic network newly installed through *the UNDP/WMO/UKMO Project: "support to the Sierra Leone Meteorological Department"*. However some rainfall measuring stations are spread throughout the country managed by other institutions. This is the case of the Food and Nutrition Early Warning Platform, within the Ministry of Agriculture Forestry and Food Security. Under the *project: "Strengthening Climate Information and Early Warning System for Climate Resilient Development and Adaptation to Climate Change in Sierra Leone"*. The Guma Valley Water Company (GVWC) has a small rainfall monitoring network made up of seven rain gauges placed in each of the seven lake tributary streams which allow GVWC to assess the needs for more or less inputs in the water treatment process. The Bumbuna Hydroelectric Company Limited (BHC) also has a handful of rainfall gauges around the perimeter of the Dam.

Human Capacity

104. The current human resources capacity of National Meteorological and Hydrological Services is minimal. There are only 4 Meteorologists (one of which is now performing managerial responsibilities), 10 Meteorological Superintendents (WMO Class III) and 32 Meteorological Technicians (WMO Class III+V).There has been a contribution in capacity development of SLMD from the UNDP/WMO/UKMO Project with the successfully training of 2 Maintenance and Repair Technicians earlier in 2012. Currently and within the context of the same capacity development programme there is a plan for additional training 2Agrometeorologists and 6 Meteo Technicians by the IFAD/GEFLDCF project in 2013. This will be complemented by a further training of 3 Meteorologists by UKMO, within the WASH Facility programme.

105. Earlier capacity assessment mission to Sierra Leone (Annex 2) carried out by a WMO Technical Mission[24]has identified a shortage of about 10 Meteorologists, 16 Senior Technicians and 36 Technicians. This assessment was carried out considering that:

- There is need to have senior Technicians for each of the three Provincial Headquarter towns of Bo, Makeni and Kenema as well as in Freetown;
- There is also a need for Meteorologist/climatologists/ Hydrologist/Marine Meteorologist/Agrometeorologists to man the Climate, Training, Hydrology, Marine and Agromet Sections respectively;
- Sufficient manpower should be available after the required rehabilitation of a total of 24 existing stations that were destroyed during the war in the following districts: Sefadu (Kono), Kabala, Daru, Njala, Yele and Shenge.
- Sufficient specialized manpower should also exist after the establishment of a total of 24 new MeteoStations(Bakuma, Musaia, Nitty, Sulima, Kenema, Kamakwe, Kailahun and Newton districts) required so that SLMD keeps in line with WMO standard for 50km distance between stations.

[24] T. Butcher and I. Muhammed. World Meteorological Organization Capacity Assessment Mission to Sierra Leone from 09 -13 August 2010. 18p

106. However, the GoSL has recently flagged his intention to support the transition of SLMD into a national Meteorological Agency coupled with a generous package of investment money on capacity development (training of Meteorological Technicians WMO Class IV), rehabilitation of district buildings and guaranteeing salaries of the staff. This will count as GoSL Co-financing in this component.

Projects (underway or planned) which the project seeks to build on

107. Notwithstanding these shortfalls, there has been some improvement, reflecting the ongoing activities within the context of projects such as: The "Capacity Building of the Sierra Leone Meteorological Office" which has furthermore supported the Sierra Leone Meteorological Department with:

- AMESD operational satellite receiving equipment ,
- Integration of six automatic weather stations(AWS) with a central storage unit,
- Staff training in observationprocess and quality control for both real-time weather forecasting and climate applications, and
- The digitisation of existing weather data using the "CLIMSOFT" software package;
- The UNEP-led project, "Programme 21: Environmental Cooperation for Peace building," implemented in conjunction with IFAD, FAO and UNDP, which has a component of "Improved planning in place to respond to climate change"[25]. This project has carried out an assessment of Sierra Leone's meteorological services and it is expected to install eight (8) automatic weather stations in different parts of the country, as well as strengthen the SLMD human resources capacity with training five national staff as weather technicians and five staff as forecasters.[26]

Sierra Leone Government interventions supporting the project

108. Under the GoSL "Agenda for Change" programme and through the Ministry of Transport and Aviation,SLMDis being supported to become the Sierra Leone Meteorological Agency through the formulation of a Draft Bill entitled "Sierra Leone Meteorological Agency Act 2012". This will confer some degree of financial autonomy. Within this "Agenda for Change" programme a series of activities are being developed towards the rehabilitation of some of the SLMD infrastructure destroyed during the armed conflict. In addition, the GoSL has also embarked in supporting the capacity development programme of SLMD with training of a significant number of Met junior technicians. Therefore, on the whole there is a strong political will and a significant investment from the GoSL into the strengthening of the SLMD operational capacity which is not yet specified.

Adaptation alternative – with LDCF intervention

109. 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

110. This will be carried out essentially in close collaboration with ongoing projects (The UNDP_GEFGuma Valley Project, The WASH Facility Bumbuna Watershed Project, IFAD-LDCF project and The Ministry of Water Resources (MWR)) byre-assessing the needs for hydrological

[25] http://www.unep.org/dnc/UNEPsActivities/SierraLeone/tabid/54646/Default.aspx
[26] http://www.unep.org/newscentre/default.aspx?DocumentID=2659&ArticleID=8935&l=en

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 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.

111. 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 as shown in Fig 1.

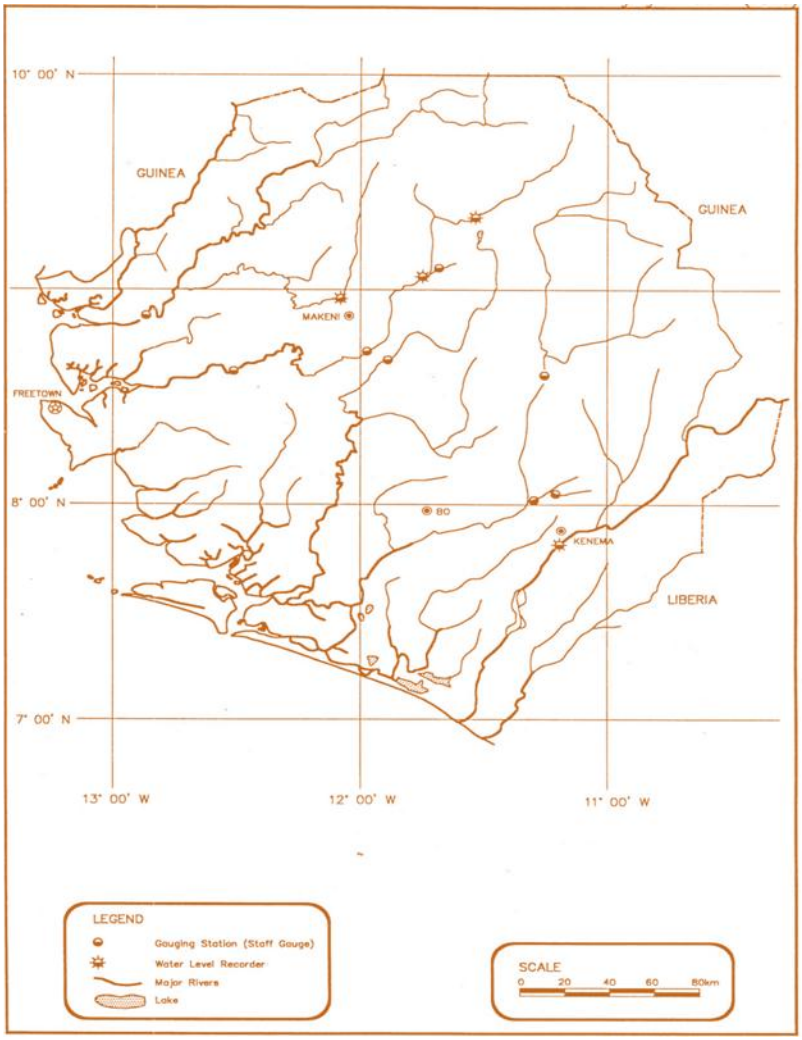

Figure 1.Sierra Leone hydrometric monitoring network with staff gauge stations and water level recorders in major rivers

112. 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.

113. 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 aHydrological ModellingUnit 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

114. 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, procurementswill 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.

115. 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, Rokpurr, 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.

116. 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 developmenthuman capacity and forecast supporting facilities

112. There has been inadequate financing to rapidly alleviate the crippling infra-structural and human resource constraints. This LCDF 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. Amongstthis new equipment that the project will finance will be the provision of Supporting Forecasting Tools such as SADIS 2G[27] and SYNERGIE System[28]. 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.

113. 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 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.

114. 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

[27]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 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.

[28]This 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.

Technology /GIS Specialists will be capacitated to deal with the GIS platform of the SADIS & SYNERGIE systems.

Costs component 1	
Co-financing:	**US$ 12,000,000**
GEF allocation:	**US$ 2,360,000**

Outputs and activities

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). (The Ministry of Water Resources (MWR))*

Indicative activities

1.1.1 Re-assess needs for hydrological monitoring to support warning of flash floods and make complementary provision of equipment (water rulers and gauges and materials (pillars with cement foundation);

1.1.2 Procure and install 12 river gauges, 2 water level (limnimetric scale), 6 groundwater data logger, 2 signal counter rotations for hydrological monitoring establishing the necessary partnerships for the manning of the future hydrological monitoring network;

1.1.3 Procure and operationalise a mobile Hydromet Automatic Station (HAS) for sensor's field calibration, integrating recently installed and existing HAS and interfacing to central data collection & storage system;

1.1.4 Develop a plan and a National Framework for integrating hydrological monitoring of Guma Valley, Bumbuna Watershed, WASH Facilities, AfDB and IFAD-GEF projects into the monitoring network supporting Early Warning System;

1.1.5 Support a programme in operational watershed monitoring and hydrological modeling for hydromet officers;

1.1.6 Renewal and 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.

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)*

Indicative activities

1.2.1 Assess installation sites for AWS and make arrangements (equipment housing, security, personnel) for installation and testing of remote transmission system to SLMD in Freetown & Lungi Airport;

1.2.2 Procure, install and test 38 rainfall gauges, 8 synoptic, 8 climatological AWS with display systems at Tomé Airport Forecasting Centre;

1.2.3 Procure and operationalise a mobile AWS for sensor's field calibration, integrating recently installed and existing AWS and interfacing to central data collection & storage system;

1.2.4 Procure, install and test Synoptic AWS with display systems at SLMD Freetown & Lungi Airport;

1.2.5 Integrate recently installed and existing AWS with central data collection & storage systems;

1.2.6 Establish mobile communications between AWS and central servers through the National Telecommunication Commission (NATCOM) including agreements for the sustainable long term use for data transfers;

1.2.7 Procure technical services for the refurbishment of SLMD premises at SLMD Tower Hill Building to accommodate new forecasting equipment and supporting facilities.

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)*

Indicative activities

1.3.1 Procure and install 10 workstations to support downscale of regional and international forecast products for sector tailored forecasting;

1.3.2 Re-install AMESD-PUMA e-station and carry out procurement for the upgrade of SYNERGY system to support tailored forecasting;

1.3.3 Procure and install Aviation Data International Service (a 2-way VSAT- SADIS System) to strengthen forecasting capacity;

1.3.4 Re-assess the need for acquisition and installation of LIGHTNING DETECTOR system based on the upgrade of SYNERGY system;

1.3.5 Procure, install all standard equipment required to rehabilitate the SLMD Forecasting Centre and provincial outer stations;

1.3.6 Develop partnership between SLMD and the MAFFS (Food and Nutrition Early Warning Platform) for collaboration in AMESD-PUMA e-station Re-installation and establishment of an Agrometeorology Monitoring System at SLMD.

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 Department-SLMD and the University of Sierra Leone - Fourah Bay College)*

Indicative activities

1.4.1 In alignment with GoSL investment plan for SLMD develop in-service and on-the-job capacity development programme for 16 gender sensitive Meteorological Technicians (WMO Class IV);

1.4.2 Establish a formal partnership with the University of Sierra Leone and The Fourah Bay College to develop a national advanced education programme for training Meteorologists.

1.4.3 Carry out selection of potential candidates amongst the most experienced Meteorological Technicians with Maths & Physics advanced studies for a 12 months meteorological training programme.

1.4.4 Establish partnership with WMO Regional Meteorological Centers (Dakar, Lagos) for regional or in-country gender sensitive capacity development of Meteorological Technicians;

1.4.5 Make procurements for the delivery of a regional or in-country education weather forecasting capacity development programme for graduate pupils to become Meteorologists and professional training for all the Superintendent Officers;

1.4.6 Develop a capacity development programme for the training of other technical personnel for SLMD including 2 GIS, 2 AMESD operators, 6 IT & Electronics Met Equipment Maintenance & Repair Technicians;

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)*

Indicative activities

1.5.1 Re-assess the need for strengthening outer Meteorological Stations communications facilities for data collection and transmission including the provision of SSB/VHF radios, mobile phone sets;

1.5.2 Provide The Ministry of Water Resources (MWR)_Directorate of Water Resources, SLMD and ONS_DMD a reliable, direct and fast data and information communication system suitable for transmission and dissemination operations;

1.5.3 Establish a formal partnership with the National Telecommunication Commission (NATCOM) towards the sustainable utilization of mobile communication and internet signal for EWS dissemination/response network;

1.5.4 Develop an efficient communication network between SLMD and the ONS- Disaster Management Department and all DM Committee Members including Directorate of Water Resources*;*

1.5.5 Procure and install a Television and Radio Weather Broadcast equipment for forecast dissemination;

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

Baseline – without LDCF intervention

i) Tailored products

117. 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 theEUMETSAT-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) centers. 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

118. 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 GoSL 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 training[29] 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 Centre 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

119. 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

[29]In 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.

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 documents[30]. 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

120. 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 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.

121. 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.

122. Projects (underway or planned) relevant to this project and with which the project will seek linkages during the implementation phase are included below (see details in Section 2.2.1):

- The Project: *"African Monitoring of the Environment for Sustainable Development (AMESD)*";
- The UNDP project: *"Preventive Development";*
- The World Bank-funded project. *"Sierra Leone-Rapid Response Growth Poles: Community-Based Livelihood and Food Support Program"*.[31]

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

[31]http://www.worldbank.org/projects/P122622/sierra-leone-rapid-response-growth-poles-community-based-livelihood-food-support-program?lang=en

- 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)".*

Adaptation alternative – with LDCF intervention

123. As part of this component the additional strengthening of the currentEWS will be enacted through sixmain 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 CCAinto 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.

i) Strengthening the capacity of SLMD to use weather and climate information to develop timely and accurate weather forecast

124. 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.

125. 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.

126. 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;

ii) Strengthening the capacity of SLMD to develop new tailored products to serve Early Warning System

127. The successful use of the Early Warning System will depend on the capacity of SLMD to deliver timely and accurate forecasts,which can be used by vulnerable sectors and communities. ONS-Disaster Management Department as a key stakeholder (as well as other national institutions), who are responsible for disseminatingwarnings,willrequire improved dissemination and response services to be able to suitably warn affected populations and sectors. Given the current developmental stage of SLMD this LDCF will support the GoSL and the SLMDa scoping study to assess the existing situation against international best practice, leading to development of the tailored products. With the objective of coordinating the implementation of EWS theEWS-MITEC will be set up in the context of the scoping exercise to study/plan/propose integration/delivery of EWS products to the various identified national end users including community sectors. Institutions such as the Water Supply Division (WSD), Agriculture Forestry and Food Security (AFFS), Lands Country Planning and the Environment (LCPE), Energy and Water Resources, Sierra Leone Environment Protection Agency (SLEPA), The SL Red Cross and NGO's will have to be represented in the EWS-MITEC and will complement the SLMD with data and information to support EWS in hazards identification and

forecasting needs. Amongst other tasks this 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.

128. 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).

iii) Developing a strategy for using climate and early warnings in CC risk assessment, adaptation planning and mainstreaming CCAinto existing plans/strategies

129. This initiative will be developed, within the SLMD or other EWS linked institution, by establishing and operationalising a Climate Change Data Management System (CC-DAMAS) to allow systematic storage and integration of climate and weather data to facilitate inter-institutional data sharing. This system should be linked to international databases and centres of excellence (e.g. the Center for International Earth Science Information Networks (CIESIN)), whilst being based at the Sierra Leone Environmental Protection Agency (SLEPA). The final objective will be to support production of climate risk/vulnerability assessments to satisfy EWS requirements and support decision making in sector planning and development activities of the government of Sierra Leone. Therefore, a systematic streamlining of digital information (climate hazard maps, sectoral risk and vulnerability maps including relevant socio-economic data) should be developed using CC-DAMAS assessments and make it available to government planners to identify major data gaps for a EWS climate risk reduction planning process.

130. Therefore, this LDCF will support the ongoing efforts being undertaken by bilateral cooperation and GoSL[32]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 operationalise CC-DAMASto work in partnership with 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;

[32]The Republic of Sierra Leone. An Agenda for Change.Second Poverty Reduction Strategy (PRSP II) 2008-2012

- 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.

i) Strengthening the existing dissemination and response mechanisms/systems under the Disaster Management Department (DMD);

131. A global survey of early warning system carried out in 2006 by the UN-ISDR[33] identified a number of weaknesses in the early warning systems of many sub-Saharan African countries in which Sierra Leone is included. Of these weaknesses, some applies to Sierra Leone current conditions: weak scientific and data foundations, poor information communication and response capabilities due to underdeveloped dissemination infrastructure and systems. The failure to adequately respond to warnings often stems from lack of planning and coordination at the national and local levels, as well as a lack of understanding by people about their risks. 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.

132. The project will also invest on upgrading the communication capacity of ONS-DMD so to establish a fast and reliable communicationnetwork, which will be the basis of the EWS. Primarily the existing structure will be strengthened with provision of adequate communication equipment. Communication systems with SL Met Office Forecasting Centre will also be established, making use of available fibre optics for the rapid dissemination of alerts. The Office of National Security (ONS) who have benefited from some training[34] via the International Federation of Red Cross Organisation and the USA (Defence Institute for Medical Operations (DIMO) through USAID) particularly in the use of GIS and GPS systems in risk mapping and disaster management will benefit of additional capacity in Disaster Risk Reduction.

133. In collaboration with the Office of National Security (ONS) and the Disaster Management Department (DMD) the project will support the establishment and strengthening of warning dissemination channels including the National and community radios, TV broadcasting stations and introduction of "sms-frontline technology"[35] for vulnerable remote communities.

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[33]United Nations. Global Survey of Early Warning Systems.An assessment of capacities, gaps and opportunities towards building a comprehensive global early warning system for all natural hazards. Final Version. A report prepared at the request of the Secretary-General of the United Nations. September 2006. 56p

[34]In 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 Defence (MOD) main conference room. Fifty participants from 14 military, governmental, and non-governmental organizations with responsibilities to emergency/disaster preparedness and response participated.

[35]FrontlineSMS enables users to connect a range of mobile devices to a computer to send and receive SMS text messages. The software works without an internet connection by connecting a device such as a cell phone or GSM modem with a local phone number. FrontlineSMS can send and receive messages, group contacts, respond to messages, and trigger other events. If internet access is available, FrontlineSMS can be connected to online SMS services and set up to feed incoming messages to other web or e-mail services. By leveraging basic tools already available to most NGOs — computers and mobile phones — FrontlineSMS enables instantaneous two-way communication on a large scale. It's easy to implement, simple to operate, and best of all, the software is free; you just pay for the messages you send in the normal way (http://www.frontlinesms.com/).

v) Supporting SLMD to establish a framework for EWS sustainability

134. The sustainability of the EWS,will be assessed by the EWS-MITEC congregating all partners taking cognizance of the current funding mechanisms and allocated budgets. This Committee will assess where funding shortfalls are most acute and where budgets are likely to be reduced in the future. It has been identified during the PPG that there are public and private institutions in Sierra Leone prepared to pay for the services provided by SLMD once the EWS becomes operational. For example, this is the case of Sierra Leone Airport Authority, Flight Information Region (Roberts FIR), Sierra Leone Maritime Administration, Sierra Leone Civil Aviation Authority. 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.

vi) Establishing community based EWS pilot sites to test its effectiveness

135. 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. Furthermore, most, if not all, of these EWS are self-monitored by villagers themselves, which empowers communities and insures that the community itself is a key stakeholder.

136. It is widely accepted that spatial variability of rainfall is much higher than any other meteorological variables. Therefore, in developing a weather monitoring network it is vital to complement rainfall information as much as possible to improve forecasts and warnings. As a result of consultations and bilateral meetings developed during the PPG phase, this LDCF funded project has been requested to establish 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.

137. The project will support communities of some of the selected sites (Bumbuna watershed and eastern districts) by providing a number of river flow gauges to be installed in strategic locations. This equipment will be essentially a large measuring stick that is used to determine water level or cement pillars with markings every 20 cm. They will be installed with a cement foundation in order to prevent erosion from uprooting the gauge. An instructional sign is located nearby to assist villagers in the reading of the gauge. Low, medium or high risk category levels should be placed in the river gauges. Capacitated villagers able to monitor the river gauge EWS, along with adequate evacuation drills can help the community to lessen the impact of disasters.

138. Sector tailored warnings based on nowcasts, weather or seasonal forecasts will be developed to strengthen the capacity of the MAFFS in delivering seasonal forecasting to support farming activities of IVS farming communities in collaboration with the IFAD managed LDCF project. Besides the rainfall monitoring instrumentation that this LDCF will provide, a Technical Specialist in Agrometeorology/Hydrology will be involved in setting up the agrometeorological seasonal forecasting system at SLMD and will work in partnership with the above two institutions. This will also benefit the support to be given to other pilot sites (Bumbuna Watershed, Guma Valley).

139. 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 be adopted according with the needs including "sms" text messages and "sms" pictoral coded messages, Loudspeakers, Drums etc…

Costs component 2	
Co-financing:	**US$ 6,053,000**
GEF allocation:	**US$ 1,060,000**

Outputs and activities

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)*

Indicative activities

2.1.1 In close cooperation with GEO (Group on Earth Observations), AfriGEOSS and the WMO-Global Framework for Climate Services establish a reliable communication system for SLMD to transmit and received regionally and globally information and data enabling forecasting and downscale operations;

2.1.2 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 Meteo Centres (including WMO Regional Centers, ACMAD, FAO);

2.1.3 Develop a capacity programme in sector tailored weather forecasting techniques and information packaging for all SLMD meteorologists;

2.1.4 Develop capacity programme in hydrological modeling and sector tailored hydrological forecasting techniques and information packaging for hydrologists;

2.1.5 Develop sector oriented seasonal forecast to support community based EWS for Bumbuna (nowcast), Guma Valley (seasonal), Urban extreme rainfall event and IVS farming communities (agromet);

2.1.6 Carry out systematic assessment of future climate change scenarios and impacts over Sierra Leone to satisfy adaptation needs;

2.1.7 Create communication and data sharing mechanisms for the integration of weather, hydrological and Disaster management information to feed future Early Warning System;

2.1.8 Household surveys of targeted users of climate information conducted to understand the social and economic costs and benefits of using advisories and warnings for ex-anti risk management in agriculture and water management.

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)*

Indicative activities

2.2.1 Establish a multidisciplinary and Inter-institutional Technical Committee (EWS-MITEC) to study/plan/propose integration/delivery of EWS products;

2.2.2 Carry out a scoping study to assess the existing situation against international best practice, leading to establishment of a National EWS;

2.2.3 EWS-MITEC to review current legal framework supporting EWS to establish which institution with mandate for issuing a Warning& identifying gaps and shortfalls;

2.2.4 Provide training on climate change risk assessment to ONS-Disaster Management Department, SL Disaster Management Committee and community based stakeholders;

2.2.5 Develop capacity of SL Disaster Management Committee to understand tailored warning generation/response according to international standards and protocols;

2.2.6 Convene an interagency (SLMD, ONS-DMD, DWR, EPA) capacity development sessions for exchange of skills and experiences on SOPs (standard operation procedures) for vulnerability/risk assessment, Forecasting/warning dissemination and response.

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.(The Sierra Leone Environment Protection Agency).*

Indicative activities

2.3.1 Establish and operationalise a Climate Change Data Management System (CC-DAMAS) with appropriate advanced workstations and GIS facilities to function as National CC information Portal to allow systematic storage, integration and mainstreaming of climate and weather data to assist Disaster Management and other interested agencies and to facilitate inter-institutional data sharing;

2.3.2 Establish partnership between CC-DAMAS and CIESIN at SLEPA (Sierra Leone Environmental Protection Agency) for systematic streamlining of digital information to develop CC risk/vulnerability GIS based information to support integration CC risks into national policies and plans;

2.3.3 Build on ACMAD data recovery programme by providing CLIMSOFT facilities for data treatment (digitalization) and quality control;

2.3.4 Procure Technical Assistance to carry out integration of climate change risk into national policies and plans, particularly in mining, tourism and land management;

2.3.5 Developed within CC-DAMAS a project Website fordissemination of lessons learned for policy makers and communities throughout the Project life using material for updating regularly the UNDP Adaptation Learning Mechanism (ALM).

2.3.6 Establish Partnership with the University of Sierra Leone and Fourah Bay College to develop capacity for systematic data mainstreaming and development of national Climate Change Vulnerability and Risk Mapping;

2.3.7 Establish Partnership with the MAFFS (Food and Nutrition Early Warning Platform) for exchange of data and development of online agricultural advisory forecasting service.

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)*

Indicative activities

2.4.1 Carry out needs assessment of ONS-Disaster Management Department communication network to strengthen warning dissemination capacity including SMS-based systems;

2.4.2 Develop communication channels between SLMD and ONS-Disaster Management Department for dissemination of forecasting products;

2.4.3 Develop and deliver training programme for gender sensitive ONS-Sectoral Task Forces (STFs) in the Provinces/Districts to harmonise agreements and interagency protocols;

2.4.4 Establish institutional mechanisms for collection feedback from the community end-users on the usefulness of the warning messages to enhance efficiency of EWS.

2.4.5 Develop a communication and awareness raising strategy, pilot application and implementation of local level responses i.e. relating to flood early warning in particularly for vulnerable communities in river valleys with strong participation of Women Farmers Associations;

2.4.6 ONS-Disaster Management Department in partnership with local NGO's and CBO´s Communicate and disseminate response plans and hold targeted training events for vulnerable communities, in particular women groups on adaptation responses;

2.4.7 Make provision for the procurement of 6 "sms-FrontLine" communication system to support emergency dissemination response mechanisms of ONS-DMD;

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

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)*

Indicative activities

2.5.1 EWS-MITEC to support SLMD to carry out a comprehensive needs assessment for climate services;

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;

2.5.3 Engage in consultations with private sector to build partnerships based on cost-recovery service provision;

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;

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.

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)*

Indicative activities

2.6. 1 Establish CBEWS at Bumbuna Watershed, Guma Valley and IVS Farms in Easter Districts by providing and installing the weather monitoring equipment (AWS, River gauge, Community Radio) and community-based small-scale adaptation activities for flood and drought resilience under a "Cash-for-Work" scheme;

2.6.2 Strengthen infrastructure and technical capacity of local community radios for warning dissemination in areas of pilot demonstration sites;

2.6.3 Establish with a strong participation of women and youth a community-based communication and information sharing tool using local languages (community media: TV, radio and newspaper) for climate and hazards predictions;

2.6.4 Partner with local NGO's & CBO's in the development of a training-awareness programme for local communities targeting in particular women and youth associations to assess local risk levels and provide Early Warnings on extreme weather events;

2.6.5 Conduct regular national drills involving all actors of future EWS and in particular women and youth associations to test effectiveness and readiness of the system;

2.6.6 Partner with NGO's, CBO's, local mobile phone provider and other institutions to develop community based warning dissemination systems, including toll-free text and pictorial "sms";

2.5. Key indicators, risks and assumptions

140. The proposed project indicator framework follows the GEF-5 Adaptation Monitoring and Assessment Tool (AMAT) and is aligned with the UNDP M&E Framework for Adaptation. Objective level indicators and outcome level indicators are specified according to the UNDP nomenclature of Results Based Management (RBM). The project design further foresees the development of more specific M&E tools, especially at the local implementation level. Participatory local level M&E can be a powerful management and communication tool, especially tracking and demonstrating project results at the demonstration sites. It is foreseen that a more detailed M&E project framework is developed during the project inception phase for national management purposes.

141. An overall project M&E plan has been devised and is included in the respective section of the project document below. It foresees the regular progress reporting, as well as audits, a mid-term evaluation and an end of project evaluation.

142. The outcome indicators are designed to measure changes in the coverage, impact, sustainability and replicability of the project outcomes. The project indicators are as follows (Table 5):

Table 5. Outcome indicators (This Table will be done when RF is set)

Indicator	Time scale and Measurement
Outcome 1.*Enhanced capacity of national hydro meteorological (NHMS) and environmental institutions to monitor extreme weather and climate change*	
Indicator 1 1.% national coverage of climate/weather and hydrological monitoring infrastructure 1. (BASELINE: 20%; target: >60%)	Time Frame: By end of Project Measured by: Review of budget spent on equipment procurement and rehabilitation and data held on servers to show that new equipment is operational.
Indicator 2 Frequency and timeliness of climate-related data availability (BASELINE: monthly; target: daily);	Time Frame: Mid Term and by end of Project Measured by: Analysis of data frequency transmission using storage servers within each information production agency.
Outcome 2. *Efficient and effective use of hydro-meteorological and environmental information for making early warnings and long-term development plans.*	
Indicator 1 *1.* % of population with access to improved climate information and flood, drought, strong wind and coastal warnings (disaggregated by gender). (BASELINE Current access to warnings: 35% men, 25% women; target: 50% men; 50% women)	Time Frame: Mid Term and by end of Project Measured by: a) Gender disaggregated survey on receipt of alerts; b) Record of debriefings by SLMD post extreme weather events; c) SLMD record of end-user feedback
Indicator 2 *2.*GoSL Development Plans and land-use plans at National/District that integrate climate information in their formulation of proverty reduction strategies and links between poverty and the environment at local levels (BASELINE: 0; TARGET 2)	Time Frame: By end of Project Measured by: Review of GoSL Development Plans and land-use plans at National/District to validate incorporation of risk, weather and/or climate information
Indicator 3 *3.* Sector-specific EW products and strategies that integrate climate risks mining, tourism, and land management sectors. (BASELINE: 0; TARGET 2)	Time Frame: By end of Project Measured by: 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; b) Sector specific products delivered by Met and disaster management.

143. Risks that could potentially affect the success of the project are included with recommended countermeasures in Annex 3.

Table 6. Risks and Assumptions

RISKS	ASSUMPTIONS
Sierra Leone does not have enough government financing to continue monitoring and to cover recurring O&M costs	Sierra Leone has enough government financing to continue monitoring and will consider recurring O&M costs for new infrastructure in government budget lines because of the utility of EWS/CI
Poor co-ordination among implementing and executing agencies	There is sufficient political support and capacity within the EWS agencies for successful execution and implementation of the project
The project cannot resolve the lack of coordination between EWS agencies and with EWS-related initiatives to improve the ability to work cross-sectorally	The project will resolve the lack of inter-agency and inter-project collaboration and their ability to work cross-sectorally
New climate infrastructure is not extensive nor reliable enough to support improved forecasts	Forecasts will be improved by local data assimilation collected from new climate/weather monitoring infrastructure
Telecommunication (SMS) communication systems used for data transmission from manual stations will be robust enough to be able to effectively contribute to EWS/CI	Manual equipment rehabilitated with enhanced SMS communication systems will not limit transmission of hydro-meteo data
Continuity breaks in National Hydro-meteorological services due to the work required with new equipment installation and other project needs	There is and will continue to be sufficient qualified personnel within the NHMS to handle the new equipment, data transmission/storage/treatment
Lack of qualified personnel within the NHMS to operate and maintain new equipment, data transmission/treatment/storage processes and forecasting models	Ministry of Transport and Aviation and The Ministry of Water Resources are able to recruit enough technical personnel for project implementation.
NHMS personnel leave the ministry and are unable to transfer knowledge	TORs mandating that new trained personnel must stay within their agency for 5 years will support knowledge sharing.
Natural disasters damage infrastructure (particularly floods)	Equipment are robust enough or there are sufficient spare parts to handle infrastructure damage caused by natural disasters (e.g., floods)
Data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks)	Data sharing protocols can be agreed upon between information production agencies and the ONS-DMD and data can be presented in a sufficiently utilitarian way for local application. Data sharing will not be hindered by lack of coordination between agencies or by technical constraints such as bandwidth issues or local mobile telecommunication networks
Relevant ministries do not have a vested interest to fully integrate EWS/CI into their disaster risk planning and poverty- reduction strategies	The Ministry of Transport and Aviation; The Ministry of Housing, Country Planning and Environment; Environment Protection Agency (EPA); Ministry of Natural Resources, The Ministry; Ministry of Mines and Mineral Resources; Ministry of Fisheries and Marine Resources; Ministry of Agriculture Forestry and Food Security (MAFFS); Ministry of Health and

	Sanitation; The Ministry of Tourism and Culture; The Ministry of Information, Broadcasting and Communications and the ONS-DMS have a vested interest to fully integrate climate information into their poverty reduction strategies and disaster risk management plans due to the utility of EWS/CI for long-term planning cross-sectorally.
NHMS does not have enough capacity to tailor climate products to suit vulnerable populations and private sector needs by the end of the project	NHMS will acquire enough capacity to tailor climate products by the end of the project
False alarms	False alarms may occur but enough awareness has been provided to end-users to understand the reality of forecasting uncertainty and to inform them how they can get involved to improve early warnings and tailor CI suited to their needs
Procurement and installation of equipment is delayed due to slow release of funds, lengthy administration processes and deficient data transmission systems locally.	UNDP supervision will ensure that funds are released on time for speedy procurement processes and international and national technical assistance will be in place for equipment installation, testing and operationalisation.
There are not enough AWS transmitting data by the end of the project; and no SADIS/SYNERGIE systems to support forecasting; and not enough trained forecasters capable of producing accurate forecasts.	The technical assistance foreseen by the project will ensure that by the end of the project at least 12 AWS will be transmitting daily weather data and that there will be sufficient supporting facilities (SADIS/SYNERGY) and sufficient number of forecasters properly trained.
Early Warnings do to not reach local radios in the communities and local Radios are not capacitated to receive and broadcast early warnings.	The project foresees capacitance and support to local radios and the identified community radios are willing to be capacitated and cooperate.

RISKS	ASSUMPTIONS
Sierra Leone does not have enough government financing to continue monitoring and to cover recurring O&M costs	Sierra Leone has enough government financing to continue monitoring and will consider recurring O&M costs for new infrastructure in government budget lines because of the utility of EWS/CI
Poor co-ordination among implementing and executing agencies	There is sufficient political support and capacity within the EWS agencies for successful execution and implementation of the project
The project cannot resolve the lack of coordination between EWS agencies and with EWS-related initiatives to improve the ability to work cross-sectorally	The project will resolve the lack of inter-agency and inter-project collaboration and their ability to work cross-sectorally
New climate infrastructure is not extensive nor reliable enough to support improved forecasts	Forecasts will be improved by local data assimilation collected from new climate/weather monitoring infrastructure
Telecommunication (SMS) communication systems used for data transmission from manual stations will be robust enough to be able to effectively contribute to EWS/CI	Manual equipment rehabilitated with enhanced SMS communication systems will not limit transmission of hydro-meteo data
Continuity breaks in National Hydro-meteorological services due to the work required with new equipment	There is and will continue to be sufficient qualified personnel within the NHMS to handle the new

installation and other project needs	equipment, data transmission/storage/treatment
Lack of qualified personnel within the NHMS to operate and maintain new equipment, data transmission/treatment/storage processes and forecasting models	Ministry of Transport and Aviation and The Ministry of Water Resources are able to recruit enough technical personnel for project implementation.
NHMS personnel leave the ministry and are unable to transfer knowledge	TORs mandating that new trained personnel must stay within their agency for 5 years will support knowledge sharing.
Natural disasters damage infrastructure (particularly floods)	Equipment are robust enough or there are sufficient spare parts to handle infrastructure damage caused by natural disasters (e.g., floods)
Data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks)	Data sharing protocols can be agreed upon between information production agencies and the ONS-DMD and data can be presented in a sufficiently utilitarian way for local application. Data sharing will not be hindered by lack of coordination between agencies or by technical constraints such as bandwidth issues or local mobile telecommunication networks
Relevant ministries do not have a vested interest to fully integrate EWS/CI into their disaster risk planning and poverty- reduction strategies	The Ministry of Transport and Aviation; The Ministry of Housing, Country Planning and Environment; Environment Protection Agency (EPA); Ministry of Natural Resources, The Ministry; Ministry of Mines and Mineral Resources; Ministry of Fisheries and Marine Resources; Ministry of Agriculture Forestry and Food Security (MAFFS); Ministry of Health and Sanitation; The Ministry of Tourism and Culture; The Ministry of Information, Broadcasting and Communications and the ONS-DMS have a vested interest to fully integrate climate information into their poverty reduction strategies and disaster risk management plans due to the utility of EWS/CI for long-term planning cross-sectorally.
NHMS does not have enough capacity to tailor climate products to suit vulnerable populations and private sector needs by the end of the project	NHMS will acquire enough capacity to tailor climate products by the end of the project
False alarms	False alarms may occur but enough awareness has been provided to end-users to understand the reality of forecasting uncertainty and to inform them how they can get involved to improve early warnings and tailor CI suited to their needs
Procurement and installation of equipment is delayed due to slow release of funds, lengthy administration processes and deficient data transmission systems locally.	UNDP supervision will ensure that funds are released on time for speedy procurement processes and international and national technical assistance will be in place for equipment installation, testing and operationalisation.
There are not enough AWS transmitting data by the end of the project; and no SADIS/SYNERGIE systems to support forecasting; and not enough trained forecasters capable of producing accurate forecasts.	The technical assistance foreseen by the project will ensure that by the end of the project at least 12 AWS will be transmitting daily weather data and that there will be sufficient supporting facilities (SADIS/SYNERGY) and sufficient number of forecasters properly trained.

Early Warnings do to not reach local radios in the communities and local Radios are not capacitated to receive and broadcast early warnings.	The project foresees capacitance and support to local radios and the identified community radios are willing to be capacitated and cooperate.

2.5. Cost-effectiveness

144. In order to fully monitor and contribute to the adaptive capability of the country to climate change, a good network of meteorological stations fully equipped to adequately monitor the parameters responsible for initiating and propagating the change is therefore very imperative.Strengthening the adaptive capability of the country to climate change impacts was identified in the NAPA as an urgent and immediate adaptation priority, with the highest immediate cost-benefit ratio. The project is fulfilling NAPA's four out of twenty four identified urgent and immediate priority adaptation options that require urgent attention. Additionally, the project has been designed to complement and build on the on-going work of line agencies including other major donor-assisted projects as described in detail in Section 2.2, thereby increasing its efficiency, cost-effectiveness and sustainability.

145. All costs for inputs, human resources, supplies are meant to be competitive, both in national and international context. The project aims to reach a total of direct and indirect beneficiaries benefiting from community livelihood enhancement brought about by the Community based EWS, of approximately1,260,000 people(with exception of Freetown) with an average investment of USD 100 per household (total LCDF budget, including management cost). The tangible benefits coming from this investment per household will be far outweighing the cost.

146. Finally with regard to procurement of project inputs, standard procedures of the GoSL and UNDP will be carefully applied to ensure value for money in all purchases of goods and procurement of services for the project, and the project will use strict internal and external audit controls that meet international standards.

Table 7: Demonstration of Cost-effectiveness for each proposed Output indicating the project barrier addressed by each Output

OUTPUTS	Barrier Addressed	Alternatives Considered
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).*	Insufficient hydromet and climate monitoring infrastructure Limited knowledge and capacity to effectively predict future climate events	**Alternative 1:** Expand the hydrological monitoring network based on a cross-border watershed approach; however, this requires cross-border data sharing and more financial resources. This project lays a foundation for future initiatives to model hydrology in river basins by establishing good monitoring networks to build off of. **Alternative 2:** Different equipment manufacturers can be used; however, Capacitance will be given to technical personnel in using hydrological modeling.
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.*	Insufficient hydromet and climate monitoring infrastructure Limited knowledge and capacity to effectively predict future climate events	**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. **Alternative 2:** Use stations with cheaper sensors to decrease the cost of spare parts; if sensors do not adhere to WMO standards, WMO will not consider the station data in regional and global models. As a result, the country's data would not be assimilated to improve the regional and international forecasting models the country will exploit and downscale. **Alternative 3:** Acquiring more equipment to improve national coverage; this option was considered as per the feasibility studies and development plans which demanded more monitoring equipment. However, this project is focusing on capacity development for service delivery (which is lacking in Africa) rather than excessive procurement. Good and targeted service delivery of EWS/CI is more likely if funds are focused on building capacity with 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. **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.
Output 1.3:*Forecasting meteorological tools, software,*	Weak capacity for issuing warnings and	**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

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.	dissemination	limited capacity and current forecasts are specific to aviation and do not consider mulit-risks. As such, the initial cost of SYNERGIE (approximately $140,000 for installation) and annual 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. **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. **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..
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.*	Weak capacity for issuing warnings and dissemination Limited knowledge and capacity to effectively predict future climate events	**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). **Alternative 2:** SLMD would benefit from othet 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. **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.
2 ***Output 1.5:*** *A Communications network is established for SLMD and ONS-Disaster Management Department to support EWS warning and dissemination mechanism.*	Weak capacity for issuing warnings and dissemination	**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
Output 2.1.:*At least 13 Meteorologists and 6 hydrologists are trained in EWS sector tailored weather and hydrological forecasting techniques and information Packaging.*	Weak capacity for issuing warnings and dissemination Limited knowledge and capacity to effectively	**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. **Alternative 1:** All operation and maintenance can be outsourced to a private company through a

	predict future climate events	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 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	**Alternative 1:** If nothing is done, the current EWS initiatives will continue to work independently (for localized famine and flood management) and little national capacity will be built. **Alternative 2:** No platform to formalize synergy: this is currently the case in all other EWS and CC-related projects which has led to delays in project implementation and a lack of coordination 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	**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	**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	**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*	Weak capacity for issuing warnings and dissemination	**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

risk reduction in sectors and population.		populations about the potential of EWS/CI to assist them in building resilience to climate/weather extremes

2.6. Sustainability

147. The project addresses key national development priorities highlighted in the Sierra Leone Vision 2025, in the Second Poverty Reduction Strategy Paper (PRSP II) 2008-2012 and GoSL National Programme: "An Agenda for Change" as well as climate change-related priorities identified and specified through the participatory and bottom-up NAPA process. The project has strong government support as well as buy-in at the district level. Consequently, a high commitment to carry out project activities and to internalize them in long-term government actions and budgets is ensured. In addition, other key stakeholders including private sector consulted during the PPG phase have expressed their full support as it addresses urgent and immediate adaptation priorities identified through the NAPA.

148. Moreover, the GoSL has expressed the wish to transform the SLMD into a semi-autonomous Agency (Sierra Leone Meteorological Agency) which will guarantee cost recovery management framework. The ONS-Disaster Management Department (DMD), due to its nature, is also one of the institutions that the GoSL has pledged to commit significant amounts of funding in the next few years. This will further to strengthen the sustainability of the project as whole.

149. The project is designed with a strong capacity building focus as well as broad stakeholder participation and consultation so that project activities can be continued beyond the period of LDCFsupport.As per the monitoring network, once the data transmission costs with mobile phone communications providers is addressed, their maintenance will not be too costly and can be integrated into the future Sierra Leone Meteorological Agencyassociated budgets.

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

- The development of a multi-agency platform (Inter-institutional Technical Committee_EWS-MITEC) for synergy building;
- Use of existing ONS-Sectoral Task Forces (STFs) in the Provinces/Districts to support alert dissemination;
- Staggered approach to equipment procurement and training;
- Station placement based on meetings with local representatives and the private sector;
- Development of Standard Operating Procedures (SOPs) for equipment operation and maintenance and data storage and collection;
- Knowledge sharing with international and regional training centers;
- Development of an open-access data portal to share data across country boundaries and with other ministries;
- Building capacity for local focal points and NGO/CSO representatives at the village level to better communicate and understand alerts;
- Training and capacity building strategies (Outputs 1.4 and 2.1) for civil servants who are required to remain within their ministries beyond project duration as per their contract or TORs;
- Capacity building to incorporate recurring costs into government budget lines;
- Collaboration of SLMD with DWR, ONS-DMD, SLEPA, NGOs and the MAFFS will ensure forecast bulletin or alert information is provided in useful quantitative units (e.g., crop yield, area of flood plain, wind velocity) for the economic sectors (e.g., agricultural) and the rural populations who are most vulnerable;

- Leverage of revenue-generating tailored EWS and CI products to ensure long-term financial sustainability
- Making EWS/CI more useful to various sectors in the country, this pushes the Government to include stable, core budget lines for climate/weather services due to their cross-sectoral importance

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

152. **Output 1.4** has been developed to address the difficulty the agencies currently have in determining operation and maintenance costs. Training will be used to ensure that they can accurately plan for costs in the future. **Output 2.2** will develop the capacity of information producers to tailor climate products based on public/private needs. Sectors such as the tourism, environment and mining sectors have already showed interest and evidence from other African initiatives has indicated that 'pay for weather/climate information' systems can be profitable. Funds have also been allocated to launch a pilot project to test the viability tailored weather/climate products and mobile-phone based platforms to distribute agricultural advisories to a wide, '*cost-recovery service provision*' audience.

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

2.7. Replicability

154. The project will demonstrate how investments in weather monitoring integrated into an Early Warning System can help the communities to be climate-resilient in terms of their well being and also livelihoods options. With increased awareness of the advantages of the EWS will promote the desire for replication of such monitoring units strengthening the network around the country. In the process of achieving this political awareness will build up on the need for preparedness and adaptation to extreme weather events promoting dialogue among policy- makers of the various sectors.

155. Climate risk information will be integrated 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. This can help the establishment of regulations and development plans that can be replicated at provincial and community levels.

156. The project'swork on capacity development and capacity building of GoSL staff at Sierra Leone Meteorological Department, Hydrological Services and ONS-Disaster Management Department can be replicated comparatively easythrough the government's own workplan, if funds are made available through the nationalbudget.

157. Sharing of methodologies, results and lessons learned will be compiled and disseminated toother Communities, Districts and Provinces through the project's web-based platform CC-DAMAS and associate CIESIN and through range of communication media via the ALM and other knowledge networks. A public awareness campaign and field demonstrations to project sites will also be organized.

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

159. Furthermore, specific attention has been given to the limitations of local agencies to disseminate information. A national SOP for communication will be developed as a result which will include an important mechanism to share lessons learned will be the feedback mechanism developed in **Output 2.2**. The feedback mechanism can enable end-users to give direct comments and suggestions on the efficacy and utility of CI/EWS to the focal points for alert generation and dissemination (SLMD/DWR and ONS-DMD respectively). For instance, the alert generation and dissemination focal points can be contacted via SMS.

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

- SLMD, DWR, and ONS-DMD technicians/engineers for operation and maintenance
- SLMD forecasters for regional and international training
- ANPC disaster risk personnel and communication support nationally
- ONS-DMDcommunication teams nationally
- Local ONS-Sectoral Task Forces (STFs) in the Provinces/Districtsfocal points and NGOs representatives at the village level to better communicate alerts and inform the general population how provide feedback to designated focal points for EWS/CI
- Training for technicians on how to properly define O&M costs to ensure government support in the long-run
- Training for information producers on how to develop public private partnerships (PPPs) and develop a suite of revenue-generating tailored climate products

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

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

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

2.8 Stakeholder involvement plan

164. All major stakeholders have been consulted in the project conceptualization and design phase before and during the project preparatory phase, as part of their mandates as key governmental counterparts of the process.

165. The draft proposal was presented to a wide range of stakeholders at a National workshop in (March 2013) and their inputs were used to further develop the project design and the core of the Project Document. Two additional missions were carried out to the country to establish the baseline of Communities' and stakeholders vulnerability, Inception workshop) towards climate change induced extreme weather events (September 2012) and to find out about community and stakeholders priorities for Early Warning/adaptation measures (January 2013). SeeAnnex 3 for the full list of project stakeholder analysis and consultations.

International Agencies and donor community in Sierra Leone

166. United Nations (UNDP, UNICEF, WFP, FAO, IFAD) agencies and multilateral donors including the World Bank, EC, USAID, DFID and others maintain an active presence in Sierra Leone and play influential roles in determining national priorities and mechanisms for their implementation in Sierra Leone's post war reconstruction. The issue of climate change and particularly Early Warning Systems (EWS) is now high on the international agenda. There is intense pressure on western governments to tackle climate change by reducing the current vulnerability of the country and specifically of the communities and infrastructure. But weak institutional capacity faced by Sierra Leone is making funding for the implementation of the NAPA difficult. In addition, programmes funded by the World Bank, EC, USAID, DFID and United Nations agencies have emphasized environmental impact assessments. Therefore these multilateral donors' institutions including the World Bank, EC, USAID and DFID have been contacted to ascertain the current activities they are undertaking and how they may be built on through this LDCF-funded project.

Non-Government Organizations

167. There are a number of international NGOs (Concern International, Oxfam GB, Save the Children UK and International Federation of Red Cross (IFRC)) present in Sierra Leone of the Coalition of Civil d Society and Human Right Activists is an Umbrella Organization for the NGO's working in disaster management in Sierra Leone.

Parastate and Private Sector

168. The establishment of the EWS in the country will also benefit all private sectors whose assets and socio-economic activities are currently vulnerable or under a threat of the risks posed by the climate change extreme weather events. As stated in the above, mining industry is an important activity for the economy of the country and represents the major hard currency earner. This sector is particularly interested in early warning against extreme rainfall events which can disrupt their normal activities. Bilateral meetings have been established with stakeholders of this sector and tailored warning products could be developed to reduce the risk that heavy convective rainfall represents to them. Another private sector that has been in contact with the SLMD seeking support for the activities is the mobile phone providers in the country which requires customized warnings for storm weather and lightning.

169. The transport and aviation sector would like to receive aeronautical forecast from international and regional centres and subsequent downscale to local conditions allowing for an improved safety in aerial/maritime transport. These actors (Sierra Leone Civil Aviation Authority-SLCAA, Airport Authority-SLAA, SL Maritime Administration-SLMA) and others have attended the consultation meetings and there has been bilateral discussions to ascertain how best SLMD can satisfy their needs.

170. The Agriculture sector is also anxious to have the assistance of the SLMD in the GoSL attempt to revive the small scale and commercial farming that the nation has embarked on to reduce the risks of food insecurity due to climate change induced variability. Although the IFAD led LDCF project: "Sierra Leone: Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone" will be developing agro-meteorological information and services, the sector will require a long term framework to assist farmers with personalized seasonal forecasts that can allow the adoption of more resilient production techniques.

171. Finally the water sector has manifested the desire to have dedicated assistance in reducing the risk of disruption of their capacity of supplying enough quality water to major towns and to produce sufficient energy to their customers. Both the Guma Valley Water Company (GVWC), and Bumbuna Hydroelectric Company Limited (BHC) have been involved in the PPG consultations via the 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 Guma Valley Water Company (GVWC), responsible for Freetown's water supply, would like to see a water quality monitoring system put in place; and the WASH Facility – Sierra Leone project on:"Sierra Leone Water Security Project" implemented by the Water Supply Division at Ministry of Water Resources (MWR) with the technical assistance of Adam Smith International (ASI) whose activities will be concentrated around the Bumbuna Hydroelectric area. Both Companies have expressed the wish to collaborate with this LDCF project as they could potentially benefit from tailored seasonal forecasts for the water sector.

3. 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

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 (same as that on the cover page, circle one):3. Promote climate change adaptation

Applicable SOF (e..gGEF) 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:

- 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[36] To strengthen the climate monitoring capabilities, early warning systems and available information for responding to climate shocks and planning adaptation to climate change in Sierra Leone.	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 Operating Procedure (SOP) for alert communication by ONS-	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.

[36]*Objective (Atlas output) monitored quarterlyERBM and annually in APR/PIR*

	2.Domestic finance committed to the relevant institutions to monitor extreme weather and climate change	DMD with the support of NGOs/CSOs Current score: 45 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 137 Enhanced capacity of national hydro-meteorological (NHMS) and environmental institutions to monitor extreme weather and climate change.	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-meteorological stations, 13 climate stations, 35 rain gauges, 12 water level meters and 6 manual flow meters are in place.	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.
	2.Frequency and timeliness of climate-related data availability (BASELINE: monthly);	2.Data from manual weather and hydrological stations is collected monthly and transmitted by post.	2. TARGET for data transmission frequency: daily	2.Analysis of data frequency transmission using storage servers within each information production agency	Funds are released on time for speedy procurement processes and technical assistance in place for equipment installation and

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

					operationalisation.
Outcome 2 Efficient and effective use of hydro-meteorological and environmental information for making early warnings and long-term development plans.	1.% of population with access to improved climate information and flood, drought, strong wind and coastal warnings (disaggregated by gender) 2. GoSL Development Plans and land-use plans at National/District that integrate climate information in their formulation of proverty 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	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. 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 involved in the alert process to ensure its sustainability. Current access to warnings: 35% men, 25% women 2.Development frameworks do not incorporate any EWS/CI products such as risk maps or climate change predictions into long-term planning Current score: 0	1. Increase to 50% in both men and women who have access to improved EWS/CI Target: 50% men; 50% women 2. At least 2 of the PRSP policy briefs incorporate analyses of risk maps and/or climate change projections influencing long-term planning proposals Target score: 2	1. a) Gender disaggregated survey on receipt of alerts b) Record of debriefings by SLMD post extreme weather events c) SLMD record of end-user feedback 2. Review of GoSL Development Plans and land-use plans at National/District to validate incorporation of risk, weather and/or climate information	Government is not committed to integrate climate change risk and adaptation needs in these elected sector-specific strategic plans; 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.

	Plan and land-use Plan incorporates climate change risks into their design.into the revised in 2015) 3.Sector-specific EW products and strategies that integrate climate risks mining, tourism, and land management sectors)	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. Current score: 0	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 Target score: 2	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 b) Sector specific products delivered by Met and disaster management.	

4. TOTAL BUDGET AND WORKPLAN

Award ID:	00074442	Project ID(s):	00086856
Award Title:	Climate information and early warning systems		
Business Unit:	SLE10		
Project Title:	Strengthening Climate Information and Early Warning Systems in Africa for Climate Resilient Development and Adaptation to Climate Change - Sierra Leone		
PIMS no.	5107		
Implementing Partner (Executing Agency)	Ministry of transport and aviation		

SOF (e.g. GEF) Outcome/Atlas Activity	Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	See Budget Note:
OUTCOME 1:	**Ministry of Transport and Aviation**	**62160**	**GEF LDCF**	71400	Contractual Services - Individual	50,000	50,000	50,000	50,000	200,000	a
				72100	Contractual Services - Companies	19,450	29,390	15,500	5,500	69,840	b
				71300	Local Consultants	50,000	50,000	50,000	50,000	200,000	c
				72300	Materials and Goods	45,000	778,190	745,470	38,500	1,607,160	d
				74200	Audio Visual and Print Production Costs	5,500	500	0	0	6,000	e
				75700	Training, Workshops and Conferences	8,000	102,000	46,000	39,000	195,000	f
				71300	Local consultants	10,500	10,500	10,500	10,500	42,000	g
				72200	Equipment and Furniture	40,000	0	0	0	40,000	h
					Total Outcome 1	**228,450**	**1,020,580**	**917,470**	**193,500**	**2,360,000**	
OUTCOME 2:	**Ministry of Transport and Aviation**	**62160**	**GEF LDCF**	71400	Contractual Services	12,500	37,950	21,000	36,500	107,950	i
				71300	Local Consultants	8,400	11,225	33,400	35,125	88,150	j
				71200	Inernational consultants	18,750	18,750	18,750	18,750	75,000	k
				72100	Contractual Services - Companies	10,000	58,500	106,810	165,000	340,310	l

				74200	Audio Visual and Print Production Costs	500	3,000	1,030	2,500	7,030	m
				75700	Training, Workshops and Conferences	116,500	79,000	30,000	108,560	334,060	n
				71300	Local consultants	15,000	15,000	15,000	15,000	60,000	o
				72800	Computers	3000	0	2000	0	50000	p
				71600	Travel	9,500	10,000	11,000	12,000	42,500	r
				Total Outcome 2		**194,150**	**233,425**	**238,990**	**393,435**	**1,060,000**	
PROJECT MANAGEMENT COSTS/UNIT	**Ministry of Transport and Aviation**	**62160**	**GEF LDCF**	71300	Local consultants	28,000	28,000	28,000	28,000	112,000	q
				71600	Travel	9,500	9,500	9,500	9,500	38,000	r
				74500	Miscellaneous Expenses	0	10,000	10,000	10,000	30,000	s
				Total Project Management Costs		**37,500**	**47,500**	**47,500**	**47,500**	**180,000**	
					PROJECT TOTAL	**460,100**	**1,301,505**	**1,203,960**	**634,435**	**3,600,000**	

Summary of Funds:[38]

	Amount Year 1	Amount Year 2	Amount Year 3	Amount Year 4	Total
GEF	460,100	1,301,505	1,203,960	634,435	**3,600,000**
Environmental Governance and Mainstreaming Project	1,250,000	1,250,000	1,250,000	1,250,000	5,000,000
African Monitoring of the Environment for Sustainable Development (AMESD) Project	500,000	500,000	500,000	500,000	2,000,000

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

Supporting the Government of Sierra Leone to implement its National Water Supply and Sanitation Strategy (Kabala Town Water Supply).	3,000,000	3,000,000	3,000,000	3,000,000	12,000,000
TOTAL	5,210,100	6,051,505	5,953,960	5,384,435	**22,600,000**

Budget Note	**Description of cost item**
a	Contract an International M&E expert (16 days @ $550/day +1 flight @ $2,000 +5days DSA @ $200/day). Conduct 2 Budget/Project audits (2 @ $3000/ea). Technical support on meteorology, hydrology, Disaster risk management, training and capacity development, reporting and communications
b	National hydrological specialist (approximately 80 days @ $200/day +2 flights @ $200 +6days DSA @ $100/day). National meteorological specialist (approximately 90 days @ $200/day +3 flights @ $200 +10days DSA @ $100/day). National training and workshop facilitator (15 days @ $200/day). National Communications and ICT specialist (approximately 56 days @ $200/day +1 flight @ $200 +3days DSA @ $100/day). National GIS and Data handling and Recovery specialist
c	Development, implementation and maintenance of coordination protocols and agreements Support a programme in operational watershed monitoring and hydrological modelling. Technical support for the refurbishment of SLMD premises at SLMD Tower Hill Building. Develop an efficient communication network between SLMD and the ONS- Disaster Management Department. Technical support for Rehabilitation of the SLMD Forecasting Centre and provincial outer stations. Conduct an Independent Mid-term evaluation (1 ea @ $30000/ea). Conduct an Independent Terminal evaluation (1 ea @ $45000/ea).
d	Install 38 rainfall gauges ((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)) , 8 synoptic ((Bo, Makeni, Bonthe, Sefadu, Daru (upper Air), Yele, Mamama (Proposed new airport) and Shenge) , 8 climatological automatic weather stations (Njala, Rokpurr, Kabala, Daru, Tormabum, Newton, Ogufarm and Kenema) , WMO standard at Jinja, Tororo, Gulu, Arua, Masindi, Kasese, Mbarara and Kabal synoptic stations @$11000ea. Install 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 in Great Scarcies Basin, Little scarcies Basin, Moa Basin, Mano Basin, Lokko Basin, Rockel Basin, Gbangbaia Basin, Jong Basin and Sewa Basin @$11000ea.

	Installation and construction costs (including weather fencing @ $3500) for 16 AWSs @$5500ea. Installation and construction costs for 12 river gauges, 2 water level (limnimetric scale). @$10000ea. Rehabilitation of 40 manual Hydrometeorological stations including procuring and replacing gauge plates, installation and civil works @$700ea. Rehabilitation of 6 manual weather stations @$1000ea Procure AWLSs spare parts and equipment. Telecommunications infrastructure including computers, computer servers and software, radiotelephones, portable telephones, GSM/GPRSGSM/GPRS modems and other equipment for internet access. Upgrade 32 manual stations - including thermometers, stevenson screens, manual wind and solar sensors with digital sensors and calibrate thermometers and barometers @$5260ea. Installation and construction costs for 32 manual stations, including stabilizing power supply with solar panels, batteries and inverters and upgrading weather fences @$5000ea. Replace barometers in 12 manual stations @$700ea. Upgrade 6 AWSs - replacing the unit @$4000ea. Upgrade 6 AWSs - replacing sensors on units @$1500ea. Upgrade 6 AWSs - replacing data loggers on units @$800ea. Relocate 6 AWS stations, including installation of new weather fencing @$5500ea. Stabilise power at 32 AWSs through the provision of dry cells, upgrading solar panels, and batteries @$2300ea. Calibration and installation costs for 32 AWS upgrades including fieldtrips to sites @$3000ea. Procure equipment (hardware and software) and ensure connectivity (internet modems and access) for 16 modern forecasting workstations to support NMC at Entebbe and synoptic stations @$4000ea. Buy data rescue and digitization equipment for SLMD and DWR archives. Development, hosting and maintenance of an integrated hydro-meteorological database and information management system. Development, hosting and maintenance of online platforms including websites and databases.
e	Editing, printing and publishing protocols, handbooks, policy and information briefs, and/or guidelines on climate change adaptation, hydro-meteorological data and early warning systems.
f	Provide in-country national technical hydrometeorological operation and maintenance training (2 weeks). Facilitate regional training workshops at synoptic stations and water management offices (refresher training at the regional level conducted by individuals trained at a national level). Facilitate 5 trainers to conduct training (5 days) of 40 weather observers at Freetown, Bo, Makeni, Bonthe, Sefadu, Daru (upper Air), Yele, Mamama (Proposed new airport) and Shenge regional training sites @$800ea Cost of 4 training sessions (5 days) for 40 weather observers at Freetown, Bo, Makeni, Bonthe, Sefadu, Daru (upper Air), Yele, Mamama (Proposed new airport) and Shenge regional training sites @$2404ea

	Host an Inception workshop Equip 4 training facilities with reference quality sensors and demonstration equipment at Freetown, Bo, Makeni, Bonthe, Sefadu, Daru (upper Air), Yele, Mamama (Proposed new airport) and Shenge stations (1 ea @ $15000/ea) Developing and promoting 'toolboxes', protocols, handbooks, policy and information briefs and/or guidelines on climate change adaptation, hydro-meteorological and early warning systems.
g	Local consultants support for organising and conducting equipment surveys/reports, identifying and liaising on procurement of equipment with line ministries and facilitating NHMS etc. training programs
h	Vehicles for technical hydro-meteorological staff and disaster management offices for field visits and other project activities related to ensuring the effective operation and maintenance of all equipment installed.
i	Data collection and/or VRA for informing early warning systems established at Freetown, Bumbuna Watershed, Guma Valley and Kono, Koinadugu, Kailahun and Kenema provinces and training undertaken in Kono, Koinadugu, Kailahun and Kenema. A study on the costs and benefits of accurate, timely and accessible weather and climate forecasts (including tailored forecasts and alerts) Costs of data collection and/or VRA for informing early warning systems established for target regions. International economist (27 days @ $550/day +1 flight @ $2,000 +5days DSA @ $200/day) International M&E expert (16 days @ $550/day +1 flight @ $2,000 +5days DSA @ $200/day) Budget/Project audits (2 @ $3000/ea)
j	National meteorological specialist (13 days @ $200/day) National policy and strategy advisor (48 days @ $200/day +1 flight @ $200 +2days DSA @ $100/day) National climate change modeller/risk and vulnerability assessment and mapping (28 days @ $200/day +1 flight @ $200 +4days DSA @ $100/day) National adaptation, early warning system and disaster management consultant (85 days @ $200/day +3 flights @ $200 +7days DSA @ $100/day) National training and workshop facilitator (20 days @ $200/day +1 flight @ $200 +10days DSA @ $100/day) National economist (16 days @ $200/day +1 flight @ $200 +3days DSA @ $100/day) National Communications and ICT specialist (28 days @ $200/day +1 flight @ $200 +3days DSA @ $100/day) 2 Bumbuna, Guma Valley, Kono, Koinadugu, Kailahun and Kenema Regional Focal Pointss (365 days ea @ $50/day)
k	Independent Mid-term evaluation (1 ea @ $30000/ea) Independent Terminal evaluation (1 ea @ $45000/ea)
l	Develop a national weather and climate information Climate Change Data Management System (CC-DAMAS) with appropriate advanced workstations and GIS facilities and early warning system communication and coordination strategy Developing, implementing and maintaining coordination protocols and agreements. Develop 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 Develop and implement protocols for integrating weather and climate information into disaster policy and downscaling in the Freetown, Bumbuna, Guma

	Valley, Kono, Koinadugu, Kailahun and Kenema sub-regions Two-way SMS-based alert and feedback system for floods, droughts, severe weather and other agricultural advisories for local farmers and vulnerable communities in Bumbuna, Guma Valley, Kono, Koinadugu, Kailahun and Kenema sub-regions 6 Satellite "sms" FrontLine system phones @$2500ea 4 hotlines/call centre established @$1250ea 30 Smart phones for DDCMs and/or community champions @$1250ea Material for colour coded signs for alerts - advisories, watches and warnings. Communcation Facility Radio Tranciever and supporting two way radios Airtime, TV, radio spot messages Development, hosting and maintenance of online platforms including websites and databases.
m	Editing, printing and publishing protocols, handbooks, policy and information briefs and/or guidelines on climate change adaptation, hydro-meteorological and early warning systems.
n	National training of 6 senior hydro/meteorologists on state-of-the-art region-specific weather and climate forecasting and in-house capacity building. National training of 13 hydro/meteorologists on state-of-the-art region-specific weather, EWS sector tailored weather and hydrological forecasting techniques and information Packaging and climate forecasting and in-house capacity building. 2 NMHS internships (6 months) @$45000ea ONS-DMD and SLEPA personel trained to produce climate risk and vulnerability sector-specific maps Inter-institutional Technical Committee (EWS-MITEC) and National early warning committee training SLEPA officers trained via CESIN to integrate weather and climate information into annual workplans. ONS-Sectoral Task Forces (STFs) trained in the Bumbuna, Guma Valley, Kono, Koinadugu, Kailahun and Kenema sub-regions to integrate weather and climate information into development plans at a district and/or sub-country level Inception workshop Promote commercial operations related to hydro-meteorological services Development training packages and toolkits for assisting trained meteorologists and hydrologists build in-house forecasting and capacity and enhance collaboration in the DWR and SLMD. Developing and promoting 'toolboxes', protocols, handbooks, policy and information briefs and/or guidelines on climate change adaptation, hydro-meteorological and early warning systems. Develop and implement a community awareness campaign in the CBEWS at Bumbuna, Guma Valley, Kono, Koinadugu, Kailahun and Kenema sub-region
o	Local consultants costs to monitor the utility of forecasts/predictions for end-users and the efficacy of the Standard Operation Procedure for alert communication. Organise workshops, meetings and feedback sessions from users of forecasts and SOPs
p	Vehicles for technical hydro-meteorological staff and disaster management offices for field visits and other project activities related to ensuring the effective operation and maintenance of all equipment installed.

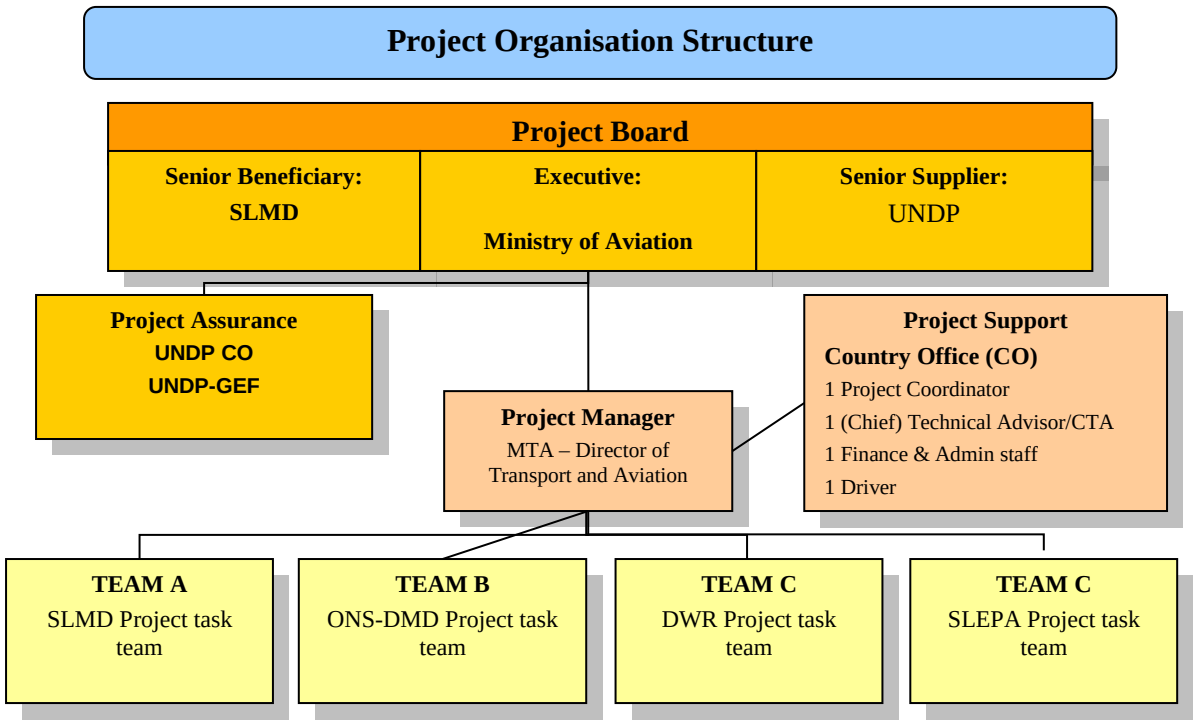
	Computer workstations/laptops (including internet connection)
q	Financial/administrative officer (48 months @ $1500/month) National level Project Manager located within SLMD
r	Vehicles for technical hydro-meteorological staff and disaster management offices for field visits and other project activities related to ensuring the effective operation and maintenance of all equipment installed. Project team travel and local transport around regions and district (48 months @ $1000/month) Project Manager travel and other internal flights (48 months @ $500/month)
s	Miscellaneous and other support cost such as stationary, insurance, bank charges and other sundries for project coordinating unit

5. MANAGEMENT ARRANGEMENTS

172. The project will be implemented by the UNDP under its National Execution (NEX) Modality and Harmonized Approach to Cash Transfer (HACT) procedures. The project is a four year intervention from expected to run from 01 October 2013 to October 2017. The executing agency in Sierra Leone is the MTA. The project will be executed in close collaboration with SLMD, the ONS-DMD financed-baseline project and the selected pilot communities, responsible for the local level pilot interventions of the project.

173. According to the capacity assessment (see Annex 4) MTA is a competent execution partner, with the countries mandate for safeguarding communities. The Ministry has a track record of successfully implementing programmes such as this and other donor support programmes. It is envisioned that the project team be housed at MTA. The SLMD has the major mandate for coordinating weather monitoring and forecasting as well as climate change related programmes and policies, and as such will execute relevant outputs under component 1 of the project. The Implementation oversight will be by UNDP Sierra Leone Meteorological Department and the UNDP Regional Service Centre. UNDP has overall responsibility for supervision, project development, guiding project activities through technical backstopping and logistical support.

Figure 2: Proposed Project Operational Structure



174. Project activities will primarily be implemented at a national level with a demonstration component at sub-national level. The Implementing Partner will establish a Project Board (PB) comprising national and sub-national representatives to guide and oversee the project.

175. **Project Board** is responsible for making management decisions for a project in particular when guidance is required by the Project Manager. The Project Board plays a critical role in project

monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the Project Manager and any delegation of its Project Assurance responsibilities.Based on the approved Annual WorkPlan, the Project Board can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans.

176. The responsibilities of the PB will be to:

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

177. In order to ensure UNDP's ultimate accountability for the project results, Project Board decisions will be made in accordance to standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. In case consensus cannot be reached within the Board, the final decision shall rest with the UNDP Project Manager.

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

1) **An Executive**: individual representing the project ownership to chair the group.
    - *The National Director of The Ministry of Transport and Aviation*
2) **Senior Supplier**: individual or group representing the interests of the parties concerned which provide funding for specific cost sharing projects and/or technical expertise to the project. The Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project.
    - *UNDP*
3) **Senior Beneficiary**: individual or group of individuals representing the interests of those who will ultimately benefit from the project. The Senior Beneficiary's primary function within the Board is to ensure the realization of project results from the perspective of project beneficiaries.
    - *National Directors of SLEPA, ONS-DMD, MWR, SLMD.*
4) The **Project Assurance** role supports the Project Board Executive by carrying out objective and independent project oversight and monitoring functions. The Project Manager and Project Assurance roles should never be held by the same individual for the same project.
    - *Portfolio Manager (Environment and Disaster Risk Management), UNDP Sierra Leone, Regional Technical Adviser Climate Change Adaptation, UNDP Regional Service Centre*

179. **Project Manager**: The Project Manager has the authority to run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Board. The Project Manager's prime responsibility is to ensure that the project produces the results specified in the

project document, to the required standard of quality and within the specified constraints of time and cost.

180. **Project Support**: The Project Support role provides project administration, management and technical support to the Project Manager as required by the needs of the individual project or Project Manager.

181. This project in Sierra Leone is part of a multi-country programme on Climate Information and EWS supported by UNDP-GEF. In response to LDCF/SCCF Council requirement that a regional component would be included to enhance coordination, increase cost effectiveness and, most importantly, benefit from a regional network of technologies, a cohort of technical advisors and a project manager will be recruited to support each of the national level project teams. In particular they will support countries to develop robust adaptation plans and provide technical assistance and deliver training for accessing, processing and disseminating data for early warning and national/sectoral planning related purposes on a systematic basis. The cost of these project staff has been prorated across the project budgets in all countries that are part of this multi-country programme including Benin, Burkina, Ethiopia, Liberia, Sao Tome, Sierra Leone, Tanzania, Uganda and Zambia. To ensure cost-savings and maximize on efficiencies in procurement for each project, recruitment of these posts will be done centrally on behalf of EWS projects that are part of this multi-country programme

6. MONITORING FRAMEWORK AND EVALUATION

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

183. **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.

184. 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 III of this project document, and finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
- Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- Plan and schedule 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.

185. 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.

186. **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.

187. **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.

188. 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

189. **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.

190. **Mid-term of project cycle**: The project will undergo an independent Mid-Term Review at the mid-point of project implementation (expected to be from September). 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 LDFC/SCCF AMAT as set out in the Project Results Framework in Section III of this project document) will also be completed during the mid-term evaluation cycle.

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

192. **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.

193. 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.

194. There will be a two-way flow of information between this project and other projects of a similar focus.

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

Table 8: Project Monitoring and Evaluation

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

7. LEGAL CONTEXT

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

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

3. The implementing partner shall:

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

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

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

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

8. ANNEXES

Annex 1. Details of stakeholder consultations – including reports, programmes and participant lists

Annex 2. Capacity assessment mission to Sierra Leone carried out by a WMO Technical Mission

Annex 3. Risks that could potentially affect the success of the project and the recommended countermeasures

Annex 4. Capacity assessment of Implementing Partner

ANNEX 1. Stakeholder involvement plan

Stakeholder consultation has been a key feature in the design of this LDCF Proposal, and stakeholders have been involved in identifying and prioritizing the proposed intervention activities. Details of the stakeholder engagement during the PPG Phase were provided in Section 1.4.1 and 2.8 above. Ongoing public consultation is critical for successful implementation. This section outlines some of the key consultation principles and processes at a strategic level that will need to be translated into practical action during the project implementation. It provides guidance based on the initial stakeholder analysis, conducted as part of the project preparation process, and the consultations so far. This can be used to define exact activities that will form part of a communications and consultation strategy developed during the inception period of implementation. Consultation is a regulatory process by which the Stakeholder's input on matters affecting the community is sought. The main goals are primarily in improving the efficiency, transparency and public involvement in large-scale project activities and policies. As involvement means the act of sharing in the activities of a group, it is important therefore, to specify goals and objectives for Stakeholder Involvement Plan, identifying key stakeholders and their interests relative to the project and to describe how stakeholders will be involved in the implementation of each project outcome.

The present Plan was designed based on: i) Bilateral consultation throughout the PPG process; ii) Inception Workshop (IW) - Information and consultation session Shangri La Conference Room, 92 Kingsley-upon-Hull (Lumley Beach) Road, Aberdeen in Freetown on Wednesday 12th September 2012.; iii)Joint Stakeholders Consultation Meeting - at The Office Of National Security (ONS) 19th January 2013; iv) Consultation Meeting (IW) - at Adam Smith International (ASI) Office, Wesley Street, Freetown, Sierra Leoneon 15th January 2013; v) The Validation Workshop for the UNDP-GEF EWS project took place at the Shangri La Conference Room, 92 Kingsley-upon-Hull (Lumley Beach) Road, Aberdeen, in Freetown on Wednesday 24th April 2013.

Outcome	Outputs	Lead institution & role	Stakeholders & roles
OUTCOME 1. Enhanced capacity of national hydro-meteorological (NHMS) 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.*	Sierra Leone Meteorological Department (SLMD). For coordination, system integration, capacity building and rainfall monitoring network management.	The Ministry of Water Resources (MWR). Hydrological monitoring network installation & oprationalisation. Data monitoring&strategy Development. Guma Valley, Bumbuna Watershed, WASH Facilities and IFAD-GEF partnership & coordination.
	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).*	Sierra Leone Meteorological Department (SLMD). For coordination, implementation, system integration, capacity building and overall management of the monitoring network	Sierra Leone Civil Aviation Authority (SLCAA) in airport forecasting Centre operationalisation; National Telecommunication Commission (NATCOM) in data transmission & communication coordination.

	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.*	Sierra Leone Meteorological Department (SLMD). For coordination, implementation, system integration, capacity building and overall management of the monitoring network	World Meteorological Organisation (WMO) for technical support, capacity development and system integration; ACMAD for technical support, capacity development and system integration; MAFFS for technical support and system integration. **SLCAA** (Sierra Leone Civil Airport Authority) &**SLAA** (Sierra Leone Airport Authority) for technical cooperation.
	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 Department (SLMD). For coordination, capacity building.	WMO Regional Meteorological Centers (Dakar, Lagos) for capacity development; ACMAD for capacity development;
	Output 1.5: *A Communications network is established for SLMD and ONS-Disaster Management Department to support EWS warning and dissemination mechanism.*	Sierra Leone Meteorological Department (SLMD). For coordination, capacity building.	National Telecommunication Commission (NATCOM) in data transmission & communication coordination. Sierra Leone TV and Radio Broadcasting Co. for technical support.
	Output 1.6: *Community based EWS (CB_EWS) network is developed in pilot sites to enhance and test its impact on risk reduction in sectors and population.*	Sierra Leone Meteorological Department (SLMD). For coordination, capacity building, technical support.	The Ministry of Water Resources (MWR). Bumbuna Watershed Management Authority, Guma Valley Water Co, IFAD-GEF Project, Local Community Radios for partnership & coordination; MAFFS for technical support and system integration. **SLIAR** (Sierra Leone Institute Agricultural Research). NGO´s & CBO´s for awareness campaign and capacity development.
OUTCOME 2. Efficient and effective use of hydro-meteorological information for	***Output 2.1.:****13 Meteorologists are trained in EWS sector tailored weather forecasting techniques*	Sierra Leone Meteorological Department (SLMD). For coordination, implementation,	World Meteorological Organisation (WMO) for technical support, capacity development and system integration;

generating early warnings and support long-term development plans	*and information Packaging*	system integration, capacity building and overall management of the monitoring network	
	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.*	ONS-Disaster Management Department. For coordination, implementation, system integration, capacity building and overall management of the output	Sierra Leone Meteorological Department (SLMD). For technical cooperation and capacity development; Sierra Leone Red Cross for technical cooperation and capacitance; GoSL District office departments; NGO's and CBO's All stakeholders represented at National Disaster Management Committee. **SLMA** (Sierra Leone Maritime Administration).
	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.*	**EPA-SL** (Environment Protection Agency of Sierra Leone). For coordination, implementation, system integration, capacity building and overall management of the output.	Sierra Leone Meteorological Department (SLMD). For technical cooperation and climate and weather data provision; Center for International Earth Science Information Networks (CIESIN) for technical cooperation and capacity development; UNDP
	Output 2.4.:*The existing dissemination/response system under the ONS-Disaster Management Department (DMD) is strengthened to support EWS.*	ONS-Disaster Management Department. For coordination, implementation, system integration, capacity building and overall management of the output	Sierra Leone Meteorological Department (SLMD). For technical cooperation and capacity development; Sierra Leone Red Cross for technical cooperation and capacitance; Provincial/district ONS-Sectoral Task Forces (STFs). **SLMA** (Sierra Leone Maritime Administration) for EWS response strategies.
	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.*	Sierra Leone Meteorological Department (SLMD). For coordination, implementation, and overall management of the monitoring network	Sierra Leone Airport Authority, Flight Information Region (Roberts FIR), Sierra Leone Maritime Administration, Sierra Leone Civil Aviation Authority for partnership and cooperation.

ANNEX 2. Capacity assessment of SLMD carried out by a WMO Technical Mission(Adaptedfrom: T. Butcher and I. Muhammed, 2010).

Spot assessment of the human resource capacity of the Meteorological

S/N	Operating Stations	AVAILABLE STAFF		
		Meteorologists	**Senior Technicians**	**Technicians**
1	Headquarters	2	-	5
2	Lungi (Forecast Office)	1	-	10
3	Tower Hill	-	-	3
4	Bonthe	-	-	1
5	Bo	-	-	1
6	Makeni	-	-	2
	TOTAL	**3**	**-**	**22**

Immediate staff requirement for operations of SL Meteorological Department

S/N	Stations	Meteorologists		Senior Technicians		Technicians	
		Existing	**Required**	**Existing**	**Required**	**Existing**	**Required**
1	Headquarters	2	5	-	5	5	5**
2	Lungi (Forecast Office)	1	5	-	5	10	10
3	Tower Hill	-		-	2*	3	6
4	Bonthe	-		-		1	3
5	Bo	-		-	2*	1	6
6	Makeni	-		-	2*	2	6
7	**Total existing staff**	**3**		**-**		**22**	
8	**Minimum Requirement**		**10**		**16**		**36**

Inventory of SLMD infraestructure

Rehabilitation of existing stations that were destroyed during the war							
1	Sefadu (Kono)						3
2	Kabala						6
3	Daru						6
4	Njala						3
5	Yele						3

6	Shenge						3
7	**TOTAL**						**24**
New MET Station to be established to keep in line with WMO Standard for Distance between Stations							
1	Bakuma						3
2	Musaia						3
3	Nitty						3
4	Sulima						3
5	Kenema				**1***		3
6	Kamakwe						3
7	Kailahun						3
8	Newton						3
9	**TOTAL**						**24**

Annex 3. Risk Analysis

#	Description	Date Identified	Type	Impact & Probability	Countermeasures / Mngt response	Owner	Submitted, updated by	Last Update	Status
1	Insufficient qualified human capacity	*September 2012*	Operational	P = 4 I = 5	Strong capacity development approach incorporated in project design. Specific training opportunities e.g. for technical staff concerned with the establishment of the EWS, trainings for district staff on various CC risk and adaptation issues; dedicated capacity building programme at community level. PPG report undertook initial training needs assessment.	RTA			
2	Lack of political will to support the	*September 2012*	Political/ Strategic	P = 2 I = 4	The proposed project is strongly supported by the	RTA			

	project				Government of Sierra Leone (GoSL) and other key stakeholders and development partners including the private sector. The GoSL is actively supporting the transformation of SLMD into a semi-autonomous Agency. The project team, in conjunction with UNDP, will therefore take advantage of this opportunity to seek substantial support from the Government and forge strong partnership with other development partners.				
3	Poor co-ordination among implementing and executing agency.	*September 2012*	Strategic/ Political	P =1 I = 3	The PPG phase consultations have shown the good institutional cooperation between GoSL departments participating in the project implementation. The above and clear Project Management arrangements should build the foundation for a good success for project implementation.				
4	Low Institutional/ Execution Capacity	*September 2012*	Strategic/ Operational	P =3 I = 4	A capacity support approach has been developed, which aims to build the capacities of the GoSL institutions and partners of the project to deal with climate change risk and CC adaptation. A				

					major part of the project is to strengthen institutional and technical capacity of two major players of the project the SLMD and the ONS-DMD. Specialist technical input will be contracted in, to work with local technical staff. A CTA will work closely with the Project Manager to ensure smooth and timely delivery of project outputs.				

ANNEX 4. Capacity assessment scorecardresults

CAPACITY ASSESSMENT SCORECARD

PROJECT: STRENGTHENING CLIMATE INFORMATION AND EARLY WARNING SYSTEMS IN AFRICA FOR CLIMATE RESILIENT DEVELOPMENT AND AD

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

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

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

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

DMD: Disaster Management Department (DMD is under the Office of National Security (ONS))

SLMD: Sierra Leone Meteorological Department

MTA: Ministry of Transport and Aviation (the SLMD is under the MTA)

MWS: Ministry of Water Resources

MDAs: Ministries, Departments and Agencies

SLRCS: Sierra Leone Red Cross Society

NSCC: National Secretariat for Climate Change (NSCC is under the EPA)

MAFFS: Ministry of Agriculture Forestry and Food Security

USL: University of Sierra Leone

ANNEX 5. Inception Report. October 2012

Strengthening climate information and early warning systems in Africa for climate resilient development and adaptation to climate change – Country: Sierra Leone

INCEPTION REPORT

Author:
T C Ferreira
International Consultant

October, 2012

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Executive summary

This report contains a description of all the initial activities which included a Training workshop for the Project Development Team in Cape Town, South Africa between 13th and 14th August 2012 to discuss the kick-off the PPG phase of the project: *"Strengthening climate information and early warning systems in Africa for climate resilient development and adaptation to climate change",* leading to the Inception Workshop that took place in Freetown, Sierra Leone on Wednesday 12th September 2012.

The report develops in some detail the main activities that were undertaken during the IW including the Initial Consultations, the project development aspects linked to the Current Situation, Current Equipment needs for project development, Current Training Needs for project development, Site Selection, Implementation arrangements and Main Gaps. Then the reports goes into analysing the potential Implications for Project Budget and Co-Financing, the Institutional Coordination and Implementation, the Identified Risks and finally the Follow-up activities – Timeline and Workplan.

The Training Workshop provided the opportunity to all International Consultants involved in the design of the project documents of the selected 10 countries (Malawi, Benin, Burkina Faso, Tanzania, Uganda, Ethiopia, Zambia, São Tomé and Príncipe, Liberia, Sierra Leone) to get to know each other and discuss general guidelines and GEF rules underlining Project design.

The IW resulted in Identification of major stakeholders and potential Implementing Partners to the project namely:

- Ministries of Transport and Aviation/ The Sierra Leone Meteorological Department (SLMD);
- Agriculture Forestry and Food Security (AFFS) Department;
- Lands Country Planning and the Environment (LCP&E) Department;
- Energy and Water Resources Ministry;
- Environment Protection Agency E&PA);
- Disaster Management Directorate (DMD) in the Office of National Security (ONS);
- UN agencies;
- Representatives of the University of Sierra Leone and Fourah Bay College;
- Local Press and bi-lateral donors were also in attendance and contributed to the discussions, planning and identification of useful EWS interventions in Sierra Leone. (Annex II provides a full list of Participants).

The IW also provided the opportunity to identify individuals with great knowledge of the country and its current conditions related to Environment and Climate Change issues with whom an initial Consultation was conducted to ascertain the existing baseline for project development and how far the PPG phase would have to cover.

The current constraints of SLMD run from lack of suitable equipment, shortage of qualified Met officers and breakdown of the supporting Met Departments particularly the Forecasting Services.

The strengthening of the SLMD will be attained with the installation of:

- Automatic Weather Station (AWS) network of nine (7 +2 spares) stations;
- Lightning network in substitution to a Radar system which cost is beyond the budget available for this project;
- Satellite Aviation Data International Service (SADIS) system to assist the aviation wing and the other sectors of SLMD;
- The rehabilitation the EUMETSAT-Satellite imagery (PUMA follow-up) via AMESD (African Monitoring of the Environment for Sustainable Development) e-station.

The shortage of qualified Met officers and breakdown of the supporting Met Departments requires SLDM to train a significant number of:

- 28 Met Observers WMO Class IV ;

- 20 Met Observers WMO Class III;
- 3 Meteorologist Forecasters WMO Class II;
- 7 Meteorologists WMO Class I;

Given the large number of electronic/automatic equipment being acquired there is urgency in training of at least six (6) officers, from relevant sectors (Agromet (2), Hydrology (2) and Meteorology (2)) to maintain and repair equipment, computer infrastructure and telecommunications.

Additional training should be provided to sector Institutions cooperating with EWS so to develop the necessary expertise in Dissemination and Response to warnings.

The locations for the installation of the synoptic AWS were identified to be at Freetown, Lungi, Bo, Makeni, Bonthe, Njala, Kabala, Sefadu, Daru, Yele and Shenge. However, specific locations for monitoring the EWS impact on hazards such as floods and related landslides or drought and fire related hazards could be potentially located at Kambia (Mambolo Chiefdom) and Kailahun (Jawie and Nyaluahun chiefdoms) Districts are prone to floods.

The report points at the main gaps identified and the risks associated to the EWS project development which the design of the project document should address so to minimize the impacts.

Finally a Work plan is presented and attached the follow-up activities and timeline.

Initial activities, workshop and consultations

2.1 Initial activities

i) Training workshop for the Project Development Team in Cape Town, South Africa on 13-14th August 2012 to discuss the kick-off the PPG phase of the project: *"Strengthening climate information and early warning systems in Africa for climate resilient development and adaptation to climate change"* to be developed in Malawi, Benin, Burkina Faso, Tanzania, Uganda, Ethiopia, Zambia, São Tomé and Príncipe, Liberia, Sierra Leone.

ii) **In attendance were:** Pradeep Kurukulasuriya (STA, UNDP-GEF), Mark Tadross (TA, UNDP-GEF), Eugene Poolman (Resource Person- EWS in South Africa), Benjamin Larroquette (Resource Person- EWS for Tsunami Warnings), Tim Caetano Ferreira (Project Development Consultant for UNDP-GEF), Cara Tobin (Project Development Consultant for UNDP-GEF), James Reeler (Project Development Consultant for UNDP-GEF), Mike Jennings (Project Development Consultant for UNDP-GEF) & Petra de Abreu (Research Analyst for UNDP-GEF) and;

Not In-attendance was: Joana Talafre (Project Development Consultant for UNDP-GEF).

iii) The training workshop provided an overview of the activities that have been undertaken prior to PIF approval by GEF by looking at the Project background; PIF structure and reasoning in the context of EWS; key Issues that will need to be examined during the project formulation phase; an overview of PPG Phase with timelines and inputs needed at the country level; Discussion of individual country contexts and UNDP procedures and regulations and finally the Regional Component on project formulation.

iv) During the training workshop comments on the PIF's received by the various partners and in particular the World Bank, US Government, German government were reviewed and amongst other recommendations the following were particularised and be sure to address during the project document design:

- Make the project documents country specific by having realistic understanding of current state of hydro-met + past failures and their causes; taking into consideration the limitations of current capacity to develop many of the proposed activities in some countries; having realistic cost estimates for equipment training and O&M (operations & management).

- Making clear how climate information will be integrated into development plans – as focus in PIF tends to be on early warnings and not include long term changes to extreme weather events.
- Recommend quantification of targeted people that should be reached through communication channels in sub-component 2.2 and making sure that the most vulnerable populations are reached (making vulnerability a country specific measurement).
- Consider gender issue by assuring that the project will also benefit women by making them receive EW messages in designing communication channels.
- The need for a Regional Component of the project by linking with other Weather/Climate Centres/Institutions (ACMAD, AGRHYMET, WMO, etc) and by integrating systems and coordinating training/capacitance, forecast product access, etc.
- Properly defining hazards by country priorities, climate vs weather aspects/events.

2.2 Inception workshop

i) The PPG Inception Workshop was carried out during 1 day and there were 2 additional days for bilateral meetings. (**Annex I** provides details of the mission schedule). This inception workshop was held in Sierra Leone and took place at the Shangri La Conference Room, 92 Kingsley-upon-Hull (Lumley Beach) Road, Aberdeen, in Freetown on Wednesday 12th September 2012. Forty five representatives attended the workshop, including representatives from government agencies with key roles to play in formulating and implementing the project. These included the following:

- Ministries of Transport and Aviation, Agriculture Forestry and Food Security (AFFS), Lands Country Planning and the Environment (LCP&E), Energy and Water Resources, Environment Protection Agency E&PA), Disaster Management Directorate (DMD) in the Office of National Security (ONS), UN agencies, representatives of the University of Sierra Leone and Fourah Bay College, local Press and bi-lateral donors were also in attendance and contributed to the discussions, planning and identification of useful EWS interventions in Sierra Leone. (Annex II provides a full list of Participants).

ii) The PPG Inception Workshop was made of two Sessions: Session 1 – Project background and ongoing activities and Session 2 – Review of project design and planning key activities both facilitated by Dr. Reynold Johnson, the National Coordinator for the Climate Change Project in Sierra Leone. The following presentations were delivered in Session 1:

- Mr Francis Moijue from the Ministry of Energy and Water Resources/ Water supply Division (Hydrological Monitoring in Sierra Leone);
- Mr Michael Lansana Kamara from the Disaster Management Department, Office of National Security (Response and Communication of Early Warnings);
- Mr Denis Lansana from the Sierra Leone Meteorological Department (The Status of the Meteorological Department);
- Mr Joseph S. Bangura, Assistant Director Monitoring and Evaluation/Coordinator from Food and Nutrition Early Warning Platform, Ministry of Agriculture Forestry and Food Security (Strengthening Climate Information and Early Warning System for Climate Resilient Development and Adaptation to Climate Change in Sierra Leone);

A description of the project background and the need for EWS in the African context (including the different aspects of EWS that may need to be strengthened) followed.

iii) In Session 2: A short review of the project background was presented by the UNDP CO to help participants to understand how the outcomes/outputs were developed during the PIF phase of the project. Two working groups discussed the validity of the proposed outcomes and outputs. Feedback and comments on the draft project design (outcome and outputs) from the two working groups have been the basis for the evaluation of Current Equipment status, Current Met Office Manpower situation, Current Met Office Forecasting Products and Facilities, Current Hydro-meteorological situation, Current Early Warning situation and Current Equipment and training needs per output.

2.3 Initial consultations

Initial consultation in the country took place during the two days prior to the IW and the full list of consulted institutions/personalities during this period is given in the Annex???. These consultations included:

- Mr Francis Moijue from the Ministry of Energy and Water Resources/ Water supply Division (Hydrological Monitoring in Sierra Leone);
- Mr Michael Lansana Kamara from the Disaster Management Department, Office of National Security (Response and Communication of Early Warnings);
- Mr Denis Lansana from the Sierra Leone Meteorological Department (The Status of the Meteorological Department);
- Mr Joseph S. Bangura, Assistant Director Monitoring and Evaluation/Coordinator from Food and Nutrition Early Warning Platform, Ministry of Agriculture Forestry and Food Security (Strengthening Climate Information and Early Warning System for Climate Resilient Development and Adaptation to Climate Change in Sierra Leone).
- Meeting Duty Officer at Forecasting Center at Lungui Airport
- Dr. Reynold Johnson, the National Coordinator for the Climate Change Project in Sierra Leone;
- Dr. Raymond G. Johnson - Institute of Marine Biology andOceanography, University of SierraLeone;
- Dr. Kolleh Bangura - GEF Operational Focal Point for Sierra Leone;
- SL Meteorological Department: with Ibrahim Kamara (Dep Dir SL Met Office);
- National Consultant of Water supply Division-Guma Valley Project;
- Ms Mariatu SWARAY - Portfolio Manager (Environment and Disaster Risk Management). UNDP CO, Freetown
- and Mr Hellal M Uddin (UNDP CO EFP).

Preliminary contacts were also made with IFAD led GEF project in the country.

3. Project development

3.1 Current situation

The development of the project will need to address the fundamental problem of not having a functioning Meteorological Services in Sierra Leone. The current constraints run from lack of suitable equipment, shortage of qualified Met officers and breakdown of the supporting Met Departments particularly the Forecasting Services.

Equipment wise the situation is that out of the 11 Synoptic weather stations in the country (Freetown, Lungi, Bo, Makeni, Bonthe, Njala, Kabala, Sefadu, Daru, Yele and Shenge), only four (4), (Lungi, Bo, Bonthe and Makeni) were operational but still below WMO standard in terms of observation instruments and manpower. In addition eight (8) Agromet stations need total rehabilitation (sensors, gates, fencing, screens) especially those at **Njala, Rokpurr, Kabala, Daru, Tormabum, Newton, Ogufarm and Kenema.**

The desperate human resources situation has been rescued recently due to urgent need for manpower. For that, the Human Resource Management Office (HRMO) and the Public Service Commission (PSC) recruited the following personnel:

-Thirty (30) Meteorological Observers (of which 15 of the observers have already been deployed at the Lungi office);
-Five (5) Meteorological Officers (WMO Class I & II) able to forecast 2 of which are performing Admin role;
-Four (4) Pupil Meteorologists who have all done basic weather observation course (WMO Class IV level) delivered locally by the UK Met Office and SLMD on the Job Training Programme.

The UNDP through the World Meteorological Organization (WMO) contracted three (3) data entry Personnel for the digitization of Meteorological/Climatological Data.

The Sierra Leone Meteorological Department (SLMD) currently produces: aeronautical forecast (30h validated every 6h); and tendency forecast for aviation purposes (every 2h) for both domestic and international air traffic requirements. The SLMD also participate in their Regional Forum (Regional Forum PRESAO 11) for Seasonal Forecast (3-6 months). The Service also carries out provision of data and services for related disciplines such as Agriculture, Marine, Construction, Hydrology, Tourism, Media, and Public. To produce these forecast SLMD counts on the EUMETSAT-Satellite imagery (PUMA off spring e-station) via AMESD (African Monitoring of the Environment for Sustainable Development) e-station (currently not functioning due to lack of fulfillment of contractual obligations with Agrymet); and Internet access to forecast products from regional (Dakar) and international (UK Met Office, Meteo France, USA) Centers.

Adding to these acute problems of the Meteorological Service is the fact that the Hydrological Services in the country are also non- existent starting with an absence of the institutional framework which would allow the functioning of a Hydrological Service. The 35 rainfall stations that made up the rainfall observational network none is currently working, requiring urgent replacement of all equipments and provision of observers. Due to the past security problems all station were vandalised and currently there is not a single station and the Hydrological Monitoring is carried out in *adhoc* (isolated initiatives) manner and fragmented between several institutions (Department of Agriculture, SL Meteorological Department, University of Sierra Leone and Fourah Bay College, etc.). The Department of Water Resources/ Water Supply Division (WSD) hydrological database is not computerised and no inventory of data is currently available and there is no hydrological monitoring network.

The resulting fact is that Early Warning in SL is embryonic and *ad hoc*, as there is not such tailored forecasting capacity in the country. However, the SLDM do issue a daily forecast for the aviation which is also applied for the wider public. Therefore the warning of an extreme event is given based on the tendency forecast for aeronautical purposes with no advance time to be preventive. It is known (NAPA) that the major hazards for disaster in the country are: flash floods, offshore storms, flood/rainfall related land slides, flood/rain related epidemics and occasional drought and forest fires in the dry season. To oversea the disaster management in the country the Office of National Security (ONS) was created in 2002 has the primary coordination point for the management of national disasters, both natural and man-made. Subsequently, a National Disaster Management Department was established within the Office of National Security. This Department, supported by the Red Cross, has developed Disaster Management Committees 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 documents[39].

3.2 Current equipment needs for project development

The setting up of a EWS in a country where extreme rainfall is on the rising with frequent flooding events requires a strong hydrological services unit with the express purpose ofcoordinating watershed data monitoring and handling to support flood forecasting, water management and all water-related activities. This includes the provision of sufficient and adequate equipment with installation of hydrometric and monitoring stations in the major river basins. During the inception workshop, group discussions indicated that there was no consensus on the number of hydromet stations required for the country with one group suggesting the installation of 24 AWS. Further consultations with the Energy and Water Resources Department (which handles hydrological services), as well as the Meteorological Department and other ongoing programmes dealing with water resources in SL will be carried out by the national consultant to assess the required number of Hydromet stations. It is known that the IFAD led GEF project will install a total of fifteen (15) AWS for hydromet monitoring, not knowing however the full details as the type of stations and data communication system that will be used. Further consultation should follow to ascertain these details. The provision of equipment should also be accompanied by training of professionals on the measurement and monitoring of water-related data.

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

The strengthening of the SLMD will be attained with the installation of an Automatic Weather Station (AWS) network of nine (7 +2 spares) stations with 7 installed at:

Synoptic (8): Bo, Makeni, Bonthe, Sefadu, Daru(upper Air), Yele, Mamama (Proposed new airport) and Shenge. (20 officers Class III-IV)

Agromet (8): Njala, Rokpurr, Kabala, Daru, Tormabum, Newton, Ogufarm and Kenema. (16 Class III-IV)

Rainfall network (38): 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(6), York, Tombo, Goderich (8+5 West). (for the regional supervision 4 officers + 4 Motorbikes (Class III)

These will add the six (6) stations that were installed at

Lungi (Airport), Freetown, Kabala, Kenema, Njala and Rokpur by the UK Met Office during these last two years under a project funded by the UNDP with support from the UKMO and WMO.

To support the Forescating Centre of SLDM other facilities should be provided such as a lightning network in substitution to a Radar system which cost is beyond the budget available for this project. In addition, to replace the installation or rehabilitation of upper air monitoring stations there should be a provision of the satellite (two ways VAST- System) Aviation Data International Service (SADIS) system[40] to assist the aviation wing and the other sectors of SLMD. Aurenautical Fixed National Telecommunication system

The argument for this conclusion is two fold. Firstly, an upper air system will require sustainability to cope with the running costs required for a daily launching of a balloon and radiosonde as well as to run a reliable source of gas (hydrogen, helium) which is extremely high on annual basis. Secondly, the data provided by such system could be assessed from other countries' products such as Senegal and Côte d'Ivoire in this case, where there are upper air soundings in operation.

Furthermore, the SL Met Office can receive data from the EUMETSAT-Satellite imagery (PUMA follow-up) via AMESD (African Monitoring of the Environment for Sustainable Development) e-station (re-installation of e-station and linux printer).SYNERGY System (upgrade) and internet lines (fibre optics)

However, SLMD does not have the capacity of using and receive the AMESD meteorological satellite products as the channelsproviding the information cannot be accessed due to lack of fulfilment of contractual obligations by SLMD towards Agrymet (i.e. the SLMD cannot keep up with the running costs). If the intended move of SLMD to shortly become an Agency will take place, then extra funds can be generated which would allow the use of this technology.

3.3 Current Training needs for project development

The minimum Capacity development to support the EWS project development was discussed by the two working groups at the IW. The conclusions of this discussion indicated the need for a large training programme involving all Meteorological Departments (SLMD headquarters, Forecasting Centre at Lungi Airport and Outer station posting). However, for the purpose of developing this EWS project the minimum capacity development is summarised in Table I.

[40]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.

From this it is highlighted the urgency in training of at least six (6) officers, from relevant sectors (Agromet (2), Hydrology (2) and Meteorology (2)) to maintain and repair equipment, computer infrastructure and telecommunications, including cost-effective electronic based technologies to interface with existing equipment/software considering the number of AWS and other supporting electronic equipment to be acquired.

The SLMD has already benefited from the training of 2 technicians to maintain AWS under the UK/DIFID programme. However, due to number of automatic equipment to be under the custodian of SLMD there will be a need for a further 2 officers to be trained. Moreover, there are other institutions dealing with AWS and also lacks this expertise and these are primarily the Water Supply Division and the Ministry of Agriculture who will need also two officers per institution. This number of officers to be trained was reached on the basis of current workforce mobility and the likelihood that one of the officers in each sector can be lost/ transferred.

Table 1.Summary of the minimum capacity development required at Sierra Leone Meteorological Department to support EWS project.

Item No	Met Officers Grade	Duty/Responsibility	Qty Available	Qty Required for training	Remarks
1	Meteorological Technicians (WMO Class III+V)	To observe and record the weather data at the Forecasting Centre and district stations	32	20 – 16 Local training IV and 4 Regional training III)	In service Training
2	Meteorological Superintendent (WMO Class III)	To supervise the observers and compile Climatological data	10	20 (6SYNOPTIC, 5 AgroMet), 5Climat, 4HydroMet)	MET to urge Human Resource Management Office (HMRO) to recruit or the Agency
3	Meteorological Officers (WMO Class I+II)	To assist the Meteorologist to forecast the weather	3	4 (UK or Regional)	The project to train these as soon as possible
4	Meteorologist (WMO Class I)	To forecast the weather With WMO (Class I)	1	6(Uk or Regional)	These pupil to be trained to become meteorologists with WMO standard
5	Television Weather Broadcast	To Present the weather on TV	2	2 (Studio set up at Tower Hill in Freetown with forecast	3 months training for Two MET Officers

				product sent by E-mail to the TV station) The TV broadcast will be a sponsored by companies that MET advertised (Mining Company)	to be Weather presenters
6	IT & Electronics	Met Equipment Maintenance & Repair	1	6	From relevant sectors: Agromet (2), Hydrology (2) and Meteorology (2)
7	Information Technology /GIS Specialists	To operate and manage the ASMED-PUMA, SUFER, CPT, MAGIS SCHENGEN, terminal+ SADIS,	0	5 (1GIS-France-UK), 2AMESD= 1France, 1ACMAD-Niamey) 2 SADIS= 1UK, 1ACMAD),	To be trained at Agrymet, ACMAD or other International Centres

The SLMD supporting staffs is made up of Meteorological Observers (WMO Class III & IV), which are presently in reduced number. Therefore, there should be an in-service and on-the-job training programme to be developed during the PPG phase and for which an International Consultancy will be required to oversee the training standards, so to comply with WMO requirements.

The forecasting capability of SLMD, is presently made of only five (5) trained forecasters of whom two of them are now performing administration roles and will soon be retired. Therefore, the capacity of SL to use information from numerical weather prediction models should be strengthened. Due to the nature of the activities developed by the Met Office at the Forecasting Centre at Lungi Airport, there is also a need for at least 6 Met Officers to cover the daily shift rota. As there are currently 3 existing Forecasters actually performing this duty, there is a need for training 3 additional Forecasters to make a total number of six.

In addition, SLMD should also train Meteorologists (WMO Class I) which will oversee and give scientific support to all aspects of Forecasting and development of EWS products. At moment there are four of these officers and given the size of the SLMD there should be a need for a further 7 to be trained (with and without WMO Class I level) to make a total of 13 Forecasters (EWS Packaging).

Nevertheless, before the SLMD Met Officers can engage themselves in the design of early warning bulletins in collaboration with disaster management, the SLMD should have all their six (6) Forecasters (WMO Class II) and eleven (11) Meteorologists (WMO Class I) to be trained in climate projections downscaling of Regional (PRESAO (RCOF), ACMAD, AGRYMET) and International (Meteo France, ECMWF, UK Met Office) forecast products as well as EWS sector tailored weather forecasting techniques.

From the IW Group discussion and bilateral meetings held with the Office of National Security (ONS) it was identified that SL Disaster Management Department is seeking the support of the Met Office to provide EWS forecasts which can predict the intensity and extent of Climate/Weather related events (flash flood, offshore storms flood/rainfall related land slides, flood/rain related epidemics (352 people died in 1985) and finally drought and forest fires in the dry season), which can be rapidly *communicated* to communities at risk (or generated by the community itself) who should have *preparedness plans* in place. SLMD needs to train Met Officers to be able to produce accurate weather forecast and issue EW information in appropriate technical language. Before the SLMD Met Officers can engage themselves in the design of early warning bulletins in collaboration with disaster management, the SLMD would like to send their six (6) officers to be trained in climate projections downscaling of Regional (PRESAO, ACMAD, AGRYMET) and International (Meteo France, ECMWF, UK Met Office) forecast products as well as EWS sector tailored weather forecasting techniques. ONS also expressed the need for training related to EWS information handling and Disaster Management for their officers. Communication systems between SL Met Office Forecasting Centre should also be enabled for the rapid dissemination of alerts. The Office of National Security (ONS) have benefited from some training[41] via 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.

3.4 Site selection, Implementation arrangement, Gaps

Site Selection

The locations for the installation of the synoptic AWS were identified to be at Freetown, Lungi, Bo, Makeni, Bonthe, Njala, Kabala, Sefadu, Daru, Yele and Shenge. However, specific locations for monitoring the EWS impact on hazards such as floods and related landslides or drought and fire related hazards were not yet identified and it will be a matter for further consultation during the PPG Phase. Nevertheless, it is known that the Kambia (Mambolo Chiefdom) and Kailahun (Jawie and Nyaluahun chiefdoms) Districts are prone to floods, particularly in the former district where high tidal flows combined with intense rainfall (Storms) can cause a spill over to coastal settlements and crop fields along the Little Scarcies River. Furthermore, Seli River districts (Koinadugu and Tonkolili) can also be targeted by disruptive flood events. This is an interesting area as it comprises 6 chiefdoms, approximately 23,359 households, and about 147,966 people in the Seli River Area, including the poorest 24 poor villages. Therefore, these sites are potentially the locations were monitoring of EWS impact will be concentrated.

Implementation arrengements

From the IW group discussions key sectors/users of climate information and EWS have been identified. These were: the Ministry of Transport and Aviation (Implementing Partner, (IP)) where the PMU should be located within the National Meteorological Institute and the Ministries of Agriculture Forestry and Food Security, Lands Country Planning and the Environment, Energy and Water Resources, the Environment Protection Agency and Disaster Management Directorate (DMD) in the Office of National Security (ONS).

A Regional Component to the project was accepted by all participants and the majority of training activities in specialized fields would benefit from a joint process with all other countries involved in this programme. Similarly the procurement process for AWS and other specialized equipment could also benefit from a coordinated Regional Component once the rules and agreements between the various countries are sought. Access to forecasting products of Regional Centers or International institutions for EWS requiring a specific Memorandum Of Understanding (MOU) could also be channeled though the Regional Component.

The IW group discussed the need to increase Climate monitoring and forecast to identify extreme events but also use this information to help the decision making process in disaster management, particularly towards the reduction of the impact of floods, landslides and rainfall related epidemics during the rainy

[41] In 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.

season and drought and forest fires during the dry season. A follow up discussion with Dr Raymond Johnson, research fellow and Assistant Head of Department of Institute of Marine Biology and Oceanography, Fourah Bay College, University of Sierra Leone and Dr. Reynold Johnson, the National Coordinator for the Climate Change Project in Sierra Leone, it was identified the need for updating the vulnerability and risk analysis of SL from the embryonic study carried out earlier by the IFRC. This suggests that a nationwide coordinated action towards the establishment of an intersectoral data gathering and handling Task Force should be considered. This would allow creating the conditions for the development of a detailed risk and vulnerability mapping of the country, taking into account each of the identified hazards. This would also generate information to help the decision making process in disaster managementand socio-economic development of the country. The project team in coordination with CO will therefore need to consult directed interested stakeholders on their needs and view for setting up a national framework for sharing climate and environmental data and enable its use in disaster management.

Gaps

During the consultations carried out in the country and results from the working groups at the Inception Workshop the following four major gaps were identified:

1. The capacity for the country to carry out climate monitoring and reliable field data collection is extremely low particularly due to reduced human capacity, Infrastructural constraints linked to Equipment and Weather Forecasting facilities:

2. Weak capacity to produce Warnings and lack of an organised system to communicate climate and CC information to end users;

3. Low effectiveness of the policy impact to ensure some measure of climate change are mainstreaming into relevant policies for disaster management;

4. Dispersed and weak scientific and data foundations leading to poor intersectoral information and data sharing network.

3.5 Implications for the project budget and co-financing

Due to the constraints that the SLMD currently faces and the gaps identified above the project should be design in order to address to some of these constraints and try and fill the existing gaps. The project PIF already indicates two large areas of action which makes the main components of the project. In the design of the project there should be the intention to:

- Enhance the capacity of hydro-meteorological services and networks for predicting climatic events and associated risks;
- Develop a more effective, efficient and targeted delivery of climate information including early warnings;
- Support improved and timely preparedness and response to forecast climate-related risks and vulnerabilities.

Given the acute shortage of adequate equipment and human resources a considerable amount of money will be directed to the purchase of equipment and setting up of monitoring and collection of weather, climate and hydromet data as well as to the capacity development of the human resources of the main stakeholders. Nonetheless, there is an urgency in also addressing issues concerning to the institutional framework required to establish a strong and efficient dissemination and response apparatus for a EWS, as well as, the need for data and information sharing network across all institutions. This will promote the gathering and sharing of scientific material for strengthening the foundations for ESW sustainability.

To fulfil the goals and objectives of the project there should be a significant component of cooperation between all stakeholders and also with all ongoing projects and programmes in SL dealing with weather climate and development aspects to leverage co-financing, rationalise resources and avoid overlapping of activities. Therefore the management and/or focal point of the following current ongoing programmes will be contacted during the PPG phase so to establish synergies and ensure alignment with the proposed LDCF project:

- UNDP supported project (started in 2010) implemented with collaboration of the UK Met Office in SL under which 6 AWS stations were installed. This will bring further clarity about the next activities to be developed in this programme and if any further acquisition of equipment or training is foreseen.

- The linkage of the 2 UNDP LDCF projects ("*Building Adaptive Capacity to Catalyze Active Public and Private Sector Participation to Manage the Exposure and Sensitivity of Water Supply Services to Climate Change"* and *"Strengthening climate information and early warning systems in Africa for climate resilient development and adaptation to climate change – Sierra Leone"*) through its component one which deals with "*establishing a climate monitoring system for the Guma Valley"* as well as the coordination required to support the Water Sector Project on climate risk to map the country's vulnerability.

- The World Bank-funded project, "Sierra Leone-Rapid Response Growth Poles: Community-Based Livelihood and Food Support Program" (2010-2014; $2.8m) particularly its activities on the foreseen construction of 6 Communications Centres for risk management, which will include weather and crop forecasts, disaster risk and prevention information using telecommunications, etc.

- IFAD led GEF project entitled: *Sierra Leone: Integrating Adaptation to Climate Change into Agricultural Production and Food Security in Sierra Leone*which plans to reinforce capacity of MET services in term of climate/hydro stations.

- The WASH Facility project awarded to the Ministry of Energy and Water Resources (MWR) to help initiate water resources management activities to assist in laying the foundations for a National Water Resources Management Agency and for enacting the National Water Resources Management Act (once passed). This project will work in the vicinity of the Bumbuna Watershed and is conceived as a grounded demonstration which can inspire stakeholders and set the foundations for a scalable national monitoring system.

The current budget allocation covering outcomes 1 and 2 will probably need to be rearranged depending on the degree of co-financing and synergies that will result from the contacts suggested above to be carried out during the PPG phase.

3.6 Institutional coordination and implementation

The Institutional Framework and Project Implementation Arrangements will be completed after the next consultation to take place during the PPG phase of the project. However, UNDP will be the GEF implementing agency for this project. The implemented modality under UNDP it be will defined later after discussions with the CO and assessment of the Institutional Capacity.

Currently there is no institution with a mandate to issue warnings. However the ONS has the primary coordination point for the management of national disasters, both natural and man-made. In addition, a national Disaster Management Department (DMD) was subsequently established within the Office of National Security. The future establishment of a EWS in SL would probably have either the ONS or the NDMD as the institution with mandate for issuing a Warning. At the moment it is not clear which of these two will be the one with such mandate as there is the intention to transform the Disaster Management Department of the ONS into a separate agency. In any case, from the IW group discussion it became clear that SLMD will have to be supported to be able to carry out tailored weather forecast and that other institutions such as the Water Supply Division (WSD), Agriculture Forestry and Food Security (AFFS), Lands Country Planning and the Environment (LCP&E), Energy and Water Resources, Environment Protection Agency E&PA) will have to complement the SLMD with data and information to support hazards identification and forecast. These will constitute the monitoring and forecast warning component of the future EWS. The strategy and details required to carry out the design of the EWS will be the object of further consultations with the referred institutions to be undertaken by the project Team in close cooperation with CO.

What it clear is that the National Executing Agency (NEA) will be supported by a small Project Management Unit (PMU) attached it with the function of coordinating and direct project execution. As a fisrt approach the PMU will be headed by a Project Manager (PM) with two support staff (an

administrator/financial assistant and a driver if necessary). The PMU will be responsible for work plans, reporting, preparation of TOR, coordination of all the partners involved in project execution.

As part of the project implementation structure it envisaged to have a Project Steering Committee (PSC) who will oversee the project. This committee will be composed of representatives from government line ministries, institutions, parastatals, UNDP, NGOs and representatives of the pilot communities. The Chairman for this committee will be appointed by the NEA. The PSC will be constituted from the kick off Inception Workshop. The PSC will meet quarterly during the first year and semi-annually thereafter. The PSC will provide high level policy guidance to the project and will provide guidance and assistance for the resolution of any difficulties experienced during implementation. The PSC will endorse annual work plans. In this way, the PSC will be the main body to monitor and evaluate the project during its implementation. The PSC will further facilitate resource mobilization for the implementation of the National Action Plan. The PSC can draw expertise from other ministries / departments /organizations when required.

The Institutional responsibilities by Outcome will be known after the Stakeholders Consultation to take place during the PPG phase.

3.6 Identified risks

The list of risks potentially associated to the implementation of this project is innumerous given the difficult conditions of the country. However, those risks which are obvious and known to stakeholders met during the IW are shown in Table 2.

Table 2.Summary of the identified risks, Risk level and risk category.

Identified risks	Risk Level	Risk Category
Lack of political will to support Project	L	Political
Lack or poor coordination between implementing and executing Agencies	M	Strategic and organizational
Low Institutional/ Execution Capacity	M/H	Strategic and organizational
Insufficient qualified human Resources	M/H	Organizational
Inadequate provision, and/or late deployment and poor maintenance of critical EWS infrastructure and climate monitoring equipment	M/H	Organizational
Limited capacity to tackle all project components	M	Strategic and organizational
Inability to effectively sensitize communities to the magnitude of alerts and warnings	M	Strategic
Inadequate or poor level of collaboration and commitment of participating communities to share information and/or adopt project interventions	M	Strategic
Inadequate sensitization of relevant authorities to undertake climate change and EWS sensitive policy reforms	M	Strategic
Poor coordination among the participating stakeholders (government, non-government and private)	M	Organizational and political
Extreme weather events	M	Environmental

Delays in funding disbursement and administrative slowness	M	Operational

Most of risks identified are organizational and or strategic in nature. These risks and their level is a reflection of the current relatively low institutional and individual capacities of the Meteorological Services and indeed of the stakeholder institutions who will potentially collaborate with the project. Those risks which can be high are those where the project should concentrate efforts in tackling the gaps and barriers so to minimize their impact.

4. Follow up activities – Timeline and Workplan

Timeline	Workplan - Activities
September 2012	Initial PPG meeting (1-2 days) + 3-4 days bilateral meetings.
October 2012	• Information gathering via internet based search and NC feeding source; • Desk Review of country specific material; • Summarization of info for building up of: - Project baseline, based on local consultations and detailed analysis of existing initiatives. - Development of contextualized Outputs and activities. - Development of costing of Outputs activities - Development of costing of Equipament, Facilities, Training and Capacitance
November 2012	• *Draft of contextualized Outputs and related activities developed*; • In country discussion for fine tuning of contextualized Outputs and related activities initiated; • Situation analysis developed • Root causes and Barriers developed • Budget Table development initiated • Capacity and Vulnerability Assessments to help develop baselines and Hazard prioritization needs assessed and requested: -Evaluation of need for Capacity Assessment (elicit information from stakeholders, including rural communities on how to best feed with climate information for anticipatory measures and EWS information required). -Evaluation of need for Vulnerability Capacity Assessment (Policymakers and Communities & CC negative impacts on Livelihoods and water sector).
December 2012	• Situation analysis, Root causes and Barriers aspects developed by NC integrated in the PRODOC narrative. • Stakeholder Analysis and Project Strategy (resulting from NC fine tuned in country consultations) integrated. • Summary of VCA and CCA from Bureau for Crisis Prevention and Recovery (BCPR)/CO integrated in the project document narrative. • Budget Table descriptions developed and awaiting Atlas incorporation *First draft of PRODOC developed and sent to Mark for Revisions*

January 2013	• Continue to refine PRODOC Sections on Situation analysis, Root causes and Barriers, Stakeholder Analysis and Project Strategy (Outputs/Activities/Budget Table) including inputs from Mark's Revision/Advice; • Build up and or strengthen PRODOC Sections on: - Country ownership: country eligibility and country drivenness; - Design principles and strategic considerations - UNDP comparative advantage - Cost-effectiveness - Sustainability - Replicability
February 2013	• 2nd Draft of the PRODOC (with integration of inputs from NC on **stakeholder engagement plan)** developed**;** • **Tentative Indicators, Risks and Assumptions for Results Framewok execution developed;** • PRODOC reviewed by RTAs (Jessica, Mame, Henry and Keti) & STA (Pradeep); • **PRODOC sent for** Peer review comments (on the logical flow of the project)**;** • Co-finance letters obtained (National Consultants); • Validation meeting and stakeholder consultation Prepared.
March 2013	• Second draft finalized; • Final in-country consultations with main stakeholders for Output/activity adjustments before; • Validation meeting and stakeholder consultation conducted; • Further PRODOC adjustments following stakeholder consultation carried out (if necessary); • Government Sign-off obtained while in the country.
April 2013	• Budget notes and description of cost item table adjusted (with inputs from the stakeholder consultation meeting); • Management arrangements (following stakeholder consultation meeting) finalised; • M&E workplan and budget section completed; • PRODOC Annexes (risk log, key stakeholder vs roles table, VCA reports, Capacity Assessments Report, etc.) developed; • UNDP final review (Pradeep) completed; • CEO endorsement prepared; • OFP endorsement and co-finance letter obtained.
May 2013	Submission to GEF/GEF review. • GEFSec takes 10 days to respond. • 10 days allocated for the revisions.
June 2013	PRODOC revisions in line with GEF comments.
July 2013	Project completion.

Annex 1: Initial mission schedule

ACTIVITY	TIME	NOTES
Monday 10 September 2012		
Arrival of Timoteo Fereira	*XXX*	*Airport + Hotel*
Meeting with Ms Mariatu SWARAY and Mr Hellal M Uddin (UNDP CO EFP)	*09h00-10h00*	*Workshop agenda and budget validation*
Meeting with Mr Deputy Director - Programme, UNDP, Mohamed Abchir	*10h00-10h30*	*Courtesy visit and project management arrangement*
Meeting with Ibrahim Kamara (Dep Dir SL Met Office)	*11h00-12h00*	• *Discussion on synergies, Project implementation and management arrangement*
Meeting with Francis Moijue (Water supply Division-Guma Valley Proj)	*12h30-13h30*	• *Discussion on synergies, Project implementation and management arrangement*
Lunch	*13h30-14h30*	
Michael Lansana Kamara - Disaster Management Department, Office of National Security	*14h30-15h30*	• *Discussion on synergies and possible co-financing*
Field visit –	*15h30-17h30*	• *SL Met Office AWS network in Freetown*
Tuesday 11 September 2012		
Meeting with Ms Mariatu SWARAY and Mr Hellal M Uddin (UNDP CO EFP)	*09h30h-10h30*	• *Discussion on synergies, Project implementation , management arrangement and co-financing*
Meeting with Denis Lansana (Director General SL Met Office)	*10h30- 11h30*	• *Discussion on synergies and possible co-financing*
Meeting with Joseph S. Bangura Assistant Director Monitoring and Evaluation/Coordinator- Ministry of Agriculture Forestry and Food Security	*12h00-13h00*	• *Discussion on synergies and possible co-financing*
Lunch	*13h00 -14h00*	
Meeting with Ms Mariatu SWARAY and Mr Hellal M Uddin (UNDP CO EFP)	*14h00-17h30*	• *Inception Workshop preparation* • *Project development and workplan*
Wednesday 12 September 2012	*08h30-17h30*	**Inception Workshop**
Meeting Duty Officer at Forecasting Center at Lungui Airport	*19h00-20h30*	• *Acquaintance with current status of Forecasting Centre and needs assessment*
Thursday 13 September 2012	***Departure***	

Annex 2: Inception Workshop Agenda

Time	Programme	Action
09:30-10:00	Arrival participants	
10:00 – 10: 50	Official Opening (Introduction of chairperson/Chairman's opening statement)	
	Statements i. UNDP Deputy Country Director - Programmes ii. GEF Operational Focal Point iii. Director, Meteorological Directorate iv. Director, Disaster Management Directorate (ONS) **Official Opening Statement** The Hon Minister, Ministry of Transport & Aviation	Chairman
10:50 – 11:20	**Tea Break**	
	Session 1 – Project background and ongoing activities	
11:20 – 11:35	Presentation on current state of observational infrastructure, forecasting and EWS.	Meteorological Directorate
11:35-11:50	Presentation on response and communication of warnings etc	Disaster management Department (ONS)
11:50 – 12:15	Presentation on the current state of hydrological monitoring, water resources and flood forecasting	Water Division (Min of Energy & Water Resources)
12:15-12:30	Presentation on extension services and responses to climate hazards	Department of Forestry (MAFFS)
12:30 -12:45	Existing and completed relevant initiatives relevant to the project	National consultant
12:45- 1:00	Introduction to EWS in the African context, gaps, needs and outline of the project aims and outcomes	International consultant
1:00-2:30	**Lunch**	
	Session 2 – Review of project design and planning key activities	
2:30-3:00	Project components and timeline - the regional approach and potential benefits	International consultant
3:00 – 4:00	Working Groups on two components: Hydro-met technical requirements and EWS for disaster management and long term planning - Component review: develop key activities to achieve outcomes, milestones, key stakeholders and implementation partners, identify key vulnerable populations, areas at risk, private sector interests, innovative communication channels etc	Participants/ International & Local Consultants
	Tea Break	
4:00 – 5:00	Group Presentations	Group leads
5:00 – 5:30	Close of workshop	UNDP Focal & Consultants

Annex 3: List of stakeholders and contact details

	Name	Institution	Designation	Email	Contact Number
1.	Betty Milton	Awoko Newspaper	Reporter	jesmilton@ymail.com	076 674147
2.	Patrick J. Kamara	Concord Times	Reporter	kamarapatrick@yahoo.com	076 250703
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30	James Saspo	SLMD	Met Officer		076 785694
31	Mohamed Dabor	ONS	Ast Director		033 862767
32	Laura Rose	SLMD	Met Officer		076 814200
33	William Sannoh	MAFFS	Ast. Secretary		030 250661
34	Bintu Tejan-Cole	SLMD	Met Officer		078 704510
35	Musa Kamara	NUC	Lecturer	musakamara07@hotmail.com	088838328
36	Oredola Saint John	SLMD	Met Officer		033306691
37	Aminata Sankoh	SLMD	Met Officer		088 253755
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Annex 4: List of stakeholders needing tailored forecast

LIST OF STEAKHOLDERS NEEDING TAILORED FORECAST:

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 (Robers FIR)- Four hourly Termination Aerodrome Forecast and hourly MET Report
4. Sierra Leone Maritime Administration- Daily Forecast including Tidal Forecast
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)

FORECAST DONE NOW

1. All Aviation Forecast to SLAA, Roberts FIR, Sierra Leone Navy – For Lungi Airport and Roberts International Airport in
2. Outlook forecast after PRESAO Training
3. Daily Radio Weather Broadcast
4. Weather Data requested by various institutions, organisations and individuals

WHAT WE INTEND TO BE DOING

1. To provide tailored made forecast to each of the institutions mentioned above that have requested for these products
2. Daily weather forecast to all community radios and TV station for the whole country coverage

3. To provide seasonal forecast/out look to the nation before the approach of the period
4. To be able to provide the necessary early warning of expected weather events that will have adverse effect on the people or institutions so as to prevent/minimise disaster.

Annex 6. TOR for key project groups, staff and specialists

A. Project Board

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

The Project Board (PB) shall comprise national and sub-national representatives to guide and oversee the project. The PB will be housed within The Ministry of Transport and Aviation (MTA) and chaired by the Director of National Directorate for Transport and Aviation. The PB will convene annually to discuss project progress and approve annual workplans. The PB will comprise: MTA representative, Director od Sierra Leone Meteorological Department, Director SLEPA, Director General of DWR, The Director of Office of National Security-Disaster Management Department (ONS-DMD), Representative of the Ministry of Agriculture, Forestry and Food Security), UNDP Sierra Leone Portfolio Manager (Environment and Disaster Risk Management). It is proposed that UNDP co-chair the PB. The National Project Coordinator (NPC) Officer will be an ex officio member of PB responsible for taking minutes. Potential members of the Project Board are reviewed and recommended for approval during the PAC meeting. Representatives of other stakeholders can be included in the Board as appropriate

The responsibilities of the PB will be to:

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

B. National Project Coordinator

The National Project Coordinator will be responsible, on behalf of the Ministry of Transport and Aviation (MTA), for the project. The NPC reports to the DG of MTA and maintains liaison with UNDP. The NPC will be located within the MTA offices and will be responsible for

- Day-to-day oversight and coordination of implementation of project activities
- Recruitment and supervision of technical and training expertise as required for implementation of the project.
- Developing and maintaining close linkages with relevant sectoral government agencies, UNDP, NGOs, civil society, international organisations and implementing partners of the project.

- Coordinating the project team in carrying out their duties at an optimum level through ensuring efficient and effective resource utilization.
- Coordinating inputs into annual results-based work plans and logical frameworks as endorsed by the management.
- Coordinate the establishment of sub-national project Task Teams.
- Coordinate annual task team meetings for experience sharing and lesson learning/

C. Project Manager

The Project Manager will be recruited and to the NPC and will lead the project team through the planning and delivery of the Project. The PM will be within MTA and has the authority to run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Board. The Project Manager's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost

Responsibilities

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

D. Technical Financial Assistant

One Technical Financial Assistant will report to the PM. He will be contracted by the Project. His/her responsibilities will be to:

- Set up and maintain project files and accounting systems whilst ensuring compatibility with Government and UNDP financial accounting procedures.
- Prepare budget revisions of the project budgets and assist in the preparation of the annual work plans.
- Process payments requests for settlement purposes including quarterly advances to the implementing partners upon joint review.
- Update financial plans, prepare status reports, progress reports and other financial reports.
- Undertake project financial closure formalities including submission of terminal reports, transfer and disposal of equipment, processing of semi-final revisions, and support professional staff in preparing the terminal assessment reports.

- Assist in the timely issuance of contracts and assurance of other eligible entitlements of the project personnel, experts, and consultants by preparing annual recruitment plans.
- Collect and maintain project related information data and establish document control procedures
- Administer Project Board meetings
- Administer project revision control
- Compile, copy and distribute all project reports
- Provide support in the use of Atlas for monitoring and reporting

E. Assistant Project Managers (Provincial level)

In each of the three provincial sites, the task team shall be comprised of an Assistant National Project Manager who will be recruited and paid to manage the project at the Provincial level on a full time basis. They will work closely with all local representatives of Responsible Parties, the Regional Offices of MTA-SLMD in the three targeted provinces, staff of district municipalities, community leaders as well as Community based Organisations involved in the project activities.

These Assistant National Project Managers will be responsible for developing the integrated climate resilient development plans, the on-the-ground adaptation measures and for facilitating community mobilization. They will coordinate the project activities at the site level and will act as focal points for community mobilization. They will be knowledgeable of coastal rural development and natural resources management with expertise including water supply & irrigation, agronomy, coastal forest and erosion control and management.

Responsibilities

Coordination

- Implement project activities at site level, in coordination with local communities and participating agencies.
- Work with site level partners to implement project activities and complement ongoing activities.
- Organise and conduct community meetings, local workshops, seminars, and other local project meetings
- Present monthly progress reports to the PM.
- Supervise contractors;
- Work with the relevant researchers and technical experts to prepare the integrated climate resilient development plans.

Training and Awareness Programmes

- Participate in training exercise to build their capacity for integrated planning and for supporting community adaptation.
- Conduct training in support of local farmer training centres to facilitate implementation of adaptation actions.
- Organise awareness campaigns and workshops at the district and village levels in collaboration with local organisations.

Institutional Development

- Assist in formation of farmer/ self help groups as required to organise the farmers training and piloting of adaptation activities.
- Assist in formation of community level management committees for management of community natural resources and rangelands.
- Participate with farmers in the site-specific feasibility assessments for design of specific activities.
- Help the farmer self-help groups build capacity to prepare adaptation initiatives and to access and make the best use of project funds.

Monitoring and Reporting

- Prepare local work plans, derived from the national workplan complete with measurable targets and milestones.
- Prepare monthly, quarterly, and annual work plans for the project activities as required.
- Prepare and submit monthly and all other types of progress reports at the site level..