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STANDARD PROGRESS REPORT

Reporting Unit: Energy Environment & Natural Resources Management

Country: Sierra Leone

No. and title: Environment (Project # 00086856 / Award # 00074442)

Reporting period: 2016

I. PURPOSE

Despite substantial progress made, Sierra Leone remains vulnerable to the increasing frequency and severity of droughts, floods and severe storms. Their impacts on key development sectors cannot be overemphasized. Such climate-related hazards are having increasingly adverse effects on the country and future climate change is likely to further exacerbate the situation. Low capacity of the Sierra Leone population to adapt to climate change remains a huge challenge. Rural population continues to face the brunt of climate change impacts because of their high dependence on rain-fed agriculture and natural resource based livelihoods. Nonetheless, severe torrential rains and floods that affected Sierra Leone in September 2015, and the drought which affected the Freetown water supplies in mind 2016 proves that even the urban areas of the country are not completely immune from disaster risks. These occurrences justify the need to strengthen Sierra Leone's capacity to adapt to climate-related hazard, and to limit the negative impacts of climate change and address the country's socio-economic and developmental challenges in a n efficient manner.

This LDCF financed project, implemented by the Ministry of Transport and Aviation, has three focus areas namely 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 and 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 work plans 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.

II. RESOURCES

Resources provided by the GEF in 2016 was USD 2,294,164.00

III. RESULTS

Outcome 1 Result: Capacities of National Hydro-Meteorological (NHMS) and Environmental Institutions Enhanced to Monitor Extreme Weather and Climate Change

Output 1.1: Hydrological Equipment installed to complement watershed management networks of Guma Valley, Bumbuna Watershed and the Ministry of Water Resources

- 1.1.1 The need for hydrological monitoring to support flash floods re-assessed and equipment (water rulers and gauges and materials) procured in the 3rd quarter of 2016, as part of CIEWS support to the Water Directorate (WD), Ministry of Water Resources (MWR),
- 1.1.2 13 Surface Monitoring Stations (water pressure sensor and satellite-based telemetry), 2 Pigmy Current Meter, 13 GPRS Groundwater Measuring Stations, 60 staff Gauges, 1 Acoustic Doppler Current Profiler, 1 Leveling Equipment, 16 Manual Groundwater Level Meters, 1 Hydrological Data Acquisition, Management and Processing System (DAS), 1 Desktop computers and accessories, 1 Printer and 1 Laptop procured and delivered to the WB,MWR. Also, partnerships for manning of future hydrological monitoring network established with local communities in the 3rd quarter of 2016;
- 1.1.3 A mobile Hydromet Monitoring Station (HMS) procured in the 3rd quarter of 2016 for the WD, MWR. Civil works and installations on-going. Once operationalized, this will interface with the central data collection & storage system established by the Integrated Geo-Information and Environmental Management Services (INTEGEMS), as part of their consultancy to develop communications, early warning, and forecasting products on the CIEWS Project,
- 1.1.4 Five staff of the Water Directorate, MWR, attended trainings in operational watershed monitoring and hydrological modeling from the 10th – 30th September, 2016, in Niamey, Niger. These will serve as trainers to replicate and/or transfer knowledge to their colleagues.
- 1.1.5 Hydrological modeling licenses purchased and/or renewed; and two (2) water technicians trained in modeling softwares and development of flood risk warning.

Output 1.2: Meteorological Equipment installed and supporting the establishment of an integrated weather monitoring network

- 1.2.1 Sites in twelve (12) district head quarter towns in Sierra Leone were assessed by the SLMD and WD-MWR, with support from the UNDP for the installations of Automatic Weather Stations from 24 June – 6 July 2016. Arrangements for safe and sustained operations of the AWSs were also made with local stakeholders;
- 1.2.2 8 automatic weather stations, and related kits for the cell towers were procured and installed by Earth Network, and transmitting data with display systems at the SLMD,
- 1.2.3 1071 Dedicated Server in Cloud (IaaS)¹ – a virtualized server to host the Climate Information, Disaster Management and Early Warning Systems (CIDMEWS) Web Server,

and application Server and Data Server in the Cloud; HP Z1 G2 All-in-One Workstation (**Hardware**) with an ArcGIS for Desktop Advanced Concurrent Use License²; **Software/Hardware**; ArcGIS for Server Enterprise Advanced² (up to four cores) 365-Day Term License – to publish, serve and consume GIS resources as services for the CIDMEWS GIS Web Mapping Application; and ArcGIS Online Level 3 Plan³ (Includes up to 100 Named Users and 17,500 Credits) - collaborative cloud-based Web mapping platform to use, create, share maps, scenes, apps, layers, analytics, and data for the CIDMEWS GIS Web Mapping Application, and related soft and hardwares being procured to develop communications, early warning, and forecasting products on the CIEWS Project, by INTEGEMS,

- 1.2.4 Synoptic AWSs with display systems procured and installed at SLMD, Lungi Airport by Earth Network,
- 1.1.6 Central data collection and storage systems developed for the integration of recently installed and functioning AWS by the INTEGEMS, as part of their consultancy to develop communications, early warning, and forecasting products on the CIEWS Project,
- 1.2.3 Partnership established between Earth Network and Africell Mobile Telecommunications Company for transmission of data from 8 installed automatic weather stations (AWSs) to central servers at the SLMD. Also, initial consultations held between the SLMD, ONS-DMD and the Sierra Leone National Telecommunication Commission (NATCOM) to establish mobile communications including agreements for the sustainable long term use for data transfers,
- 1.2.4 SLMD premises at Tower Hill, Freetown, assessed for refurbishing, scope work and cost estimates determined. Once refurbished in the first quarter of 2017, it will accommodate new forecasting equipment and provide facilities in support of broadcasting climate and early warning information to end-users.

Output 1.3: Forecasting meteorological tools, soft wares, infrastructure facilities and specialized training available and running SYNERGIE, SADIS & AMESD Systems, and Capacity of the Sierra Leone Meteorological Department Strengthened to Produce Improved and Sector Tailored Weather Forecasts

- 1.3.1 10 workstations procured to support downscale of regional and international forecast products for sector tailored forecasting by SLMD. Installations to be completed in first quarter of 2017,
- 1.3.2 AMESD-PUMA e-station re-installed at the SLMD Office, Lungi Airport, and SYNERGY system upgraded to support tailored forecasting,
- 1.3.3 LIGHTNING DETECTOR system based on the upgrade of SYNERGY system procured and installed by Earth Network;
- 1.3.4 Initial consultations held between the SLMD and the Ministry of Agriculture, Forestry and Food Security (MAFFS) (Food and Nutrition Early Warning Platform) for collaboration in AMESD-PUMA e-station. Full-scale partnership to be finalized in 1st Quarter of 2017.

Output 1.4: Capacity of the SLMD Enhanced to Support Early Warning System Data Handling and Forecasting Operations

- 1.4.1 On-the-job capacity development programme for Meteorological Technicians developed by Fourah Bay College (FBC)/University of Sierra Leone (USL) in alignment with GoSL investment plan for SLMD develop. Rolling out of developed plan schedule planned for 2017;
- 1.4.2 Contacts established between USL/FBC and the SLMD and an advanced education programme for building the capacity of the Meteorologists at the SLMD developed;
- 1.4.3 Two staff of the SLMD, with support from the UNDP on the CIEWS Project successfully completed Masters Studies in Meteorology and Management at the University of Reading in the United Kingdom. They are back at the SLMD;
- 1.4.4 Six (6) staff of the SLMD Technicians admitted into WMO Regional Meteorological Centers in Dakar for WMO Class 11 Trainings in Observation and Forecasting;

Output 1.5: Communications Network Established for the SLMD and Disaster Management Department (DMD), Office of National Security (ONS) to Support Early Warning Systems Warning and Dissemination Mechanism

- 1.5.1 The need for the strengthening of outer Meteorological Stations Communications facilities for data collection and transmission, including the provision of SSB/VHF radios, mobile phone sets, etc re-assessed by INTEGEMS, as a component of the consultancy to develop communications, early warning, and forecasting products on the CIEWS Project,
- 1.5.2 The WD, MWR, SLMD and DMD-ONS provided with a reliable, direct and fast data and information communications system suitable for transmission and dissemination operations by INTEGEMS,
- 1.5.3 Initial consultations with the aim of establishing formal partnerships with the Sierra Leone National Telecommunication Commission (NATCOM) towards the sustainable utilization of mobile communication and internet signal for EWS dissemination/response network held in 2016. This will be formalized in the first quarter of 2017 when the communications, early warning and forecasting products are expected to have been developed by INTEGEMS,
- 1.5.4 Efficient communications between the SLMD, DMD-ONS, EPA-SL, WD-MWR developed as part of the CIDMEWS Portal, by INTEGEMS, as a component of the consultancy to develop communications, early warning, and forecasting products on the CIEWS Project,

Outcome 2 Result: Hydro-meteorological and environmental information for making early warnings and long-term development plans efficiently and effectively used

Output 2.1 Capacity of the SLMD enhanced in Early Warning System Sector Tailored Weather and Hydrological Forecasting Techniques and Information Packaging

- 2.1.1 Now cast, Medium, Short term and seasonal forecasting system of quantitative rainfall and other extreme weather events for Sierra Leone developed and operationalized by Earth Network and INTEGEMS. Partnership with Regional and International Meteorological Centres (including WMO Regional Centers, ACMAD, FAO) to be established in first quarter of 2017,
- 2.1.2 Capacity programme in sector tailored weather forecasting techniques and information packaging for all SLMD meteorologists developed and delivered by Earth Network in mid-December, 2016, in Freetown,
- 2.1.3 Sector oriented seasonal forecast to support community based EWS for Bumbuna (now cast), Guma Valley (seasonal), Urban extreme rainfall event and IVS farming communities (agro met) developed by INTEGEMS, as a component of the consultancy to develop communications, early warning, and forecasting products on the CIEWS Project,
- 2.1.4 Communication and data sharing mechanisms for the integration of weather, hydrological and Disaster management information to feed future Early Warning System created by INTEGEMS, as a component of the consultancy to develop communications, early warning, and forecasting products on the CIEWS Project,
- 2.1.5 Household surveys of targeted users of climate information to understand the social and economic costs and benefits of using advisories and warnings for ex-ante risk management in agriculture and water management completed in first quarter of 2016,

Output 2.2 An Early Warning System (EWS) Multi-Disciplinary and Inter-Institutional Committee Established and Standard Operating Procedures and EWS Products Developed Targeting Various Sectors

- 2.2.1 A Multidisciplinary and Inter-institutional Technical Committee (EWS-MITEC) established and plan for integration of, and delivery of EWS products developed by the DMD, ONS,
- 2.2.2 Climate and Early Warning Scoping Study conducted and existing situation assessed against international best practice by the DMD-ONS. This resulted to the establishment of a national early warning system,
- 2.2.5 Capacity of Sierra Leone's Disaster Management Committee, established by the DMD-ONS, with support from the CIEWS Project developed with adequate understanding of tailored warning generation/response according to international standards and protocols, in late September 2016,
- 2.2.6 Interagency (SLMD, ONS-DMD, WD-MWR, EPA-SL) capacity development sessions for exchange of skills and experiences on SOPs (standard operation procedures) for vulnerability/risk assessment, Forecasting/warning dissemination and response convened in late September 2016 by the DMD-ONS, on 22nd & 23rd September, 2016, in Makeni,

Output 2.3 A Climate Change Data Management Systems established and allowing Systematic Storage and Mainstreaming of Digital Information to Support Decision-Making in Sector Planning

- 2.3.1 A Climate Change (CC) Data Management System (CC-DAMAS) established at the Sierra Leone Environment Protection Agency (EPA-SL) with appropriate advanced workstations and Geographic Information System (GIS) facilities. This will function as Sierra Leone's CC

- information portal which will allow systematic storage, integration and mainstreaming of climate and weather data to assist DMD-ONS and other interested agencies,
- 2.3.2 Partnership established between CC-DAMAS and CIESIN at EPASL 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 EPASL provided with CLIMSOFT facilities for data treatment (digitalization) and quality control, building on ACMAD data recovery programme,
 - 2.3.4 GIS integrated within CC-DAMAS a project Website for dissemination of lessons learned for end-users, including policy makers, communities, private sector, etc,
 - 2.3.5 Partnership established between the EPASL and the University of Sierra Leone (USL) and Fourah Bay College (FBC) to develop capacity for systematic data mainstreaming and development of national CC and risk mapping,
 - 2.3.6 Establish Partnership established between the SLMD and Ministry of Agriculture, Forestry and Food Security (MAFFS) (Food and Nutrition Early Warning Platform) for exchange of data and development of online agricultural advisory forecasting service.

Output 2.4: Existing Dissemination/response system strengthened to support and Early Warning System at the Disaster Management Department - Office of National Security:

- 2.4.1 The communications network needs of the DMD-ONS and SLMD assessed with the aim of strengthening warning dissemination by INTEGEMS, as a component of the consultancy to develop communications, early warning, and forecasting products on the CIEWS Project,
- 2.4.2 Communication channels between SLMD and ONS-Disaster Management Department developed for dissemination of forecasting products by INTEGEMS, as a component of the consultancy to develop communications, early warning, and forecasting products on the CIEWS Project,
- 2.4.3 Training for mainstreaming gender into early warning and disaster management for ONS-Sectoral Task Forces (STFs) and local stakeholders conducted on 22nd and 23rd September 2016 in Kambia, Northern Province, Sierra Leone. Agreements and inter-agency protocols for managing climate-induced risks to be harmonized in the first quarter of 2016,
- 2.4.4 Institutional mechanisms for collection feedback from the community end-users on the usefulness of the warning messages to enhance efficiency of EWS established by INTEGEMS in the 3rd quarter of 2016,
- 2.4.5 Communication and awareness raising strategy, pilot application and implementation 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 developed by INTEGEMS, as a component of the consultancy to develop communications, early warning, and forecasting products on the CIEWS Project,
- 2.4.6 Non-Governmental Organizations (NGOs) and Community-Based Organizations (CBOs) identified in most-vulnerable pilot communities in the Northern, Eastern and Southern

Provinces in Sierra Leone. Also, disaster-profiles of targeted communities determined. Full-scale partnerships between ONS & NGOs formalized in first quarter of 2017,

- 2.4.7 6 “SMS-FrontLine” communication system procured as part of softwares to support emergency dissemination response mechanisms of ONS-DMD by INTEGEMS, as a component of the consultancy to develop communications, early warning, and forecasting products on the CIEWS Project,
- 2.4.8 Field visits and stakeholder consultations undertaken to understand end-users early warning information needs for managing climate and weather related risks and how their decision frameworks affect the interpretation of advisories and warnings by INTEGEMS in the 3rd quarter of 2016.

Output 2.5: A Framework for Financial Sustainability Based on Cost-Recovery Service Provision established at the SLMD to support future EWS operations

- 2.5.1 A comprehensive needs assessment for climate services targeting the private and public sectors and institutions have been conducted by Kaifala, Kanneh and Co, Legal Consultants, as part of the framework for the sustainable plan for the SLMD.
- 2.5.2 A framework for the financial sustainability of the SLMD based on cost-recovery service provision has been developed to support early warning service provision in Sierra Leone, between August – November, 2016. This will support the SLMD in the in the context of forthcoming transformation into Sierra Leone Meteorological Agency,
- 2.5.3 Consultations with the private sectors have been undertaken to build partnerships based on cost-recovery service provisions, by Kaifala, Kanneh and Co, Legal Consultants, as part of the framework for the sustainable plan for the SLMD.
- 2.5.4 Public and private end-users of climate and early warning information identified; willingness to pay for climate and early warning services gauged; and cost-recovery prices for delivery of climate and early warning information determined. Next steps involves the establishment of partnerships and service level agreements between the SLMD, DMD-ONS, WD-MWR, CC Secretariat, EPAL-SL, national internet service provider(s) with regards to start-up costs for servers and modems as well as running bandwidth costs for internet connection to collect, analyze, exchange, disseminate and archive data;
- 2.5.5 Workshop and dialogue session for senior policy makers held on the 22nd and 23rd September, 2016 in Makeni, Northern Province, Sierra Leone. Awareness raised on climate change risks and issues, and the need for political will to address Sierra Leone’s climate change challenges, as well as adjust the needs for effective early warning systems service delivery.

Output 2.6: Community Based Early Warning Systems (CBEWS) Network Established in 3 Pilot Sites to Enhance and Test its Impacts on Risk Reduction in Sectors and Population

- 2.6.1 Community Based Early Warning Systems established at Bumbuna Watershed through capacity building, establishment of structures for managing climate-induced risks, community-based small-scale adaptation activities for flood and drought resilience under a “Cash-for-Work” schemes by the Bumbuna Watershed Management Authority

in the Ministry of Energy;

- 2.6.2 Infrastructure and technical capacity of community radios (Radio Numbara in Bumbuna, Northern Province , Kamboi Radio in Kenema District, and Radio Wanje, Pujehun Districts) assessed for strengthening for warning dissemination in areas of pilot demonstration sites;
- 2.6.3 Women, girls and youths key participants in the community consultations for the development of community-based communication and information sharing tool using local languages (community media: TV, radio and newspaper) for climate and hazards predictions in 3 pilot demonstration sites in Bumbuna, Dodo and Guma.
- 2.6.4 Community disaster-risks and issues determined by local Non-Governmental Organizations (NGOs) and Community Based Organizations (CBOs) aimed at raising awareness for local communities targeting in particular women and youth associations, to assess and address local risk levels and provide Early Warnings on extreme weather events. Support to NGOs & CBOs planned for 2017.
- 2.6.5 National drills involving meteorological and disaster management stakeholder institutions and disaster prone community representatives, in particular women and youth associations were conducted in Bumbuna, Northern Province of Sierra Leone from the 19th – 24th July, in Bumbuna. This was to test the effectiveness and readiness of EWS for vulnerable communities downstream of the Bumbuna Dam.
- 2.6.6 Climate-induced hazards for selected disaster-prone communities in pilot demonstrations and other most vulnerable communities have been determined. Partnership 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" is planned for 2017.

IV. CHALLENGES AND LESSONS LEARNT

- The eighteen months Ebola Virus Disease outbreak in 2015 in Sierra Leone resulted in substantial delays in the delivery of project activities, as government services were withheld, movement in the country severely restricted, and also international travel limited thereby hampering access to services from international consultants and delivery of goods.
- Additionally, considerable delays were experienced in the procurement of automatic weather stations and associated equipment through a Long-Term Agreement (LTA) with Procurement Support Office in Copenhagen with support from the Regional Service Centre. Though the procurement process was initiated in 2015, meteorological equipment were only delivered in August 2016, whilst hydrological monitoring equipment were delivered in November 2016.
- Timely initiation of procurement proceedings and constant follow-up to ensure timely delivery is a major lesson learnt.

V. FUTURE WORK PLAN

- Activities that would build on gains made on the 2016 AWP, with the aim of delivering real-time information to identified end-users, with priority on a cost-to-user and cost-recovery service basis,

- Priority actions planned for 2017 to build on address constraints, operational risks and issues, strengthening and/or establish public and private partnerships, and use the lessons learned in 2016,
- Indication of any major adjustments in the strategies, targets or key outcomes and outputs planned in the country programme,
- Field activities to strengthen, establish, consolidate and/or replicate community based early warning systems efforts in identified pilot communities,
- Annual work plan budget estimates, and resource mobilization to address any shortfalls, including start-up costs for servers and modems as well as running bandwidth costs for internet connection to collect, analyze, exchange, disseminate and archive data.