Sierra Leone:

Strengthening Climate Information & Early Warning Systems for Climate Resilient Development and Adaptation to Climate Change Project

Towards Sustainability for Climate Information Services: Achievements, Impacts, Lessons Learned and Next Steps

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OVERVIEW

- Background
- Project Objectives
- Key Achievements
- Impacts So Far
- Key Challenges & Lessons Learned
- Opportunities & Next Steps



Background (Cont'n)

Sierra Leone has been victim of and remain vulnerable to the impacts of climate induced hazards for decades, with increasing frequency in the last 10 years

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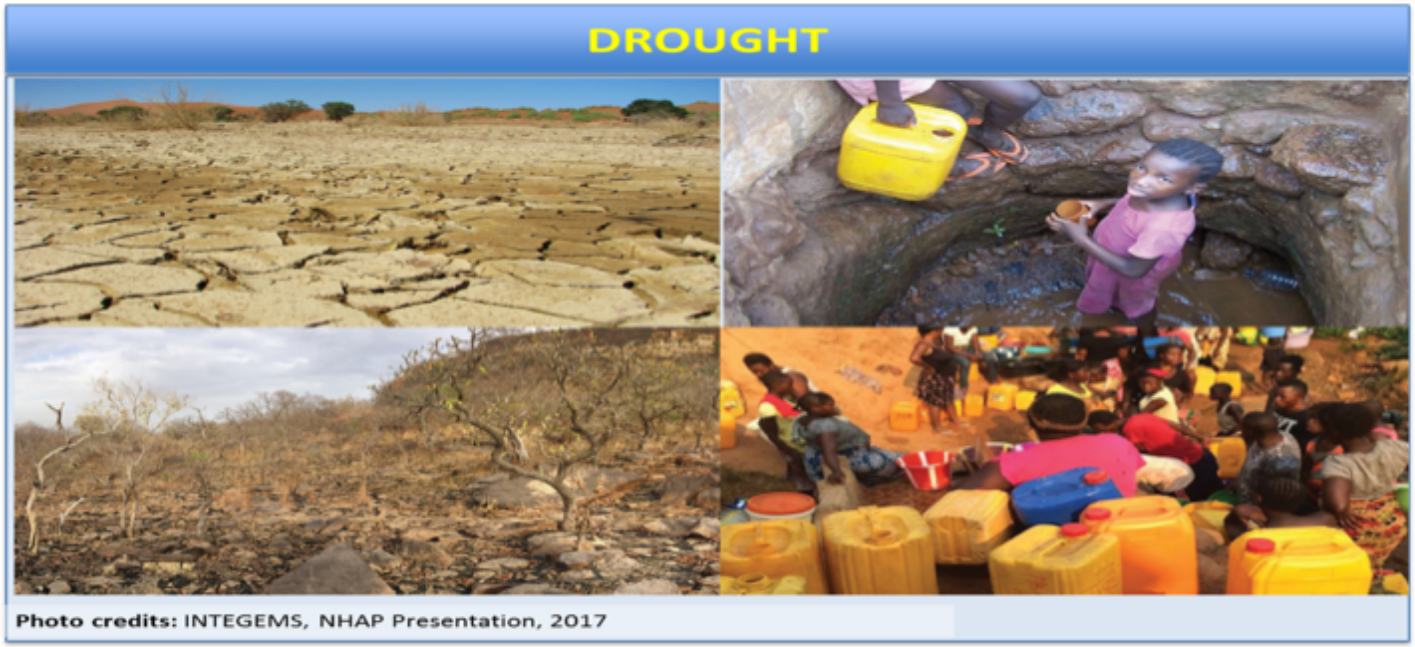

Photo credits: INTEGEMS, NHAP Presentation, 2017

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SEA LEVEL RISE & SEA WEED

Photo credits: INTEGEMS, NHAP Presentation, 2017

Background (Cont'n)

Sierra Leone has been victim of and remain vulnerable to the impacts of climate induced hazards for decades, with increasing frequency in the last 10 years

Project Objective, Outcomes & Components

The project aimed at supporting Sierra Leone to provide improved climate information, including early warnings to end-users, including Government & at-risk Communities

AIM: 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 risks

Component 1: Transfer technologies for climate and environmental monitoring

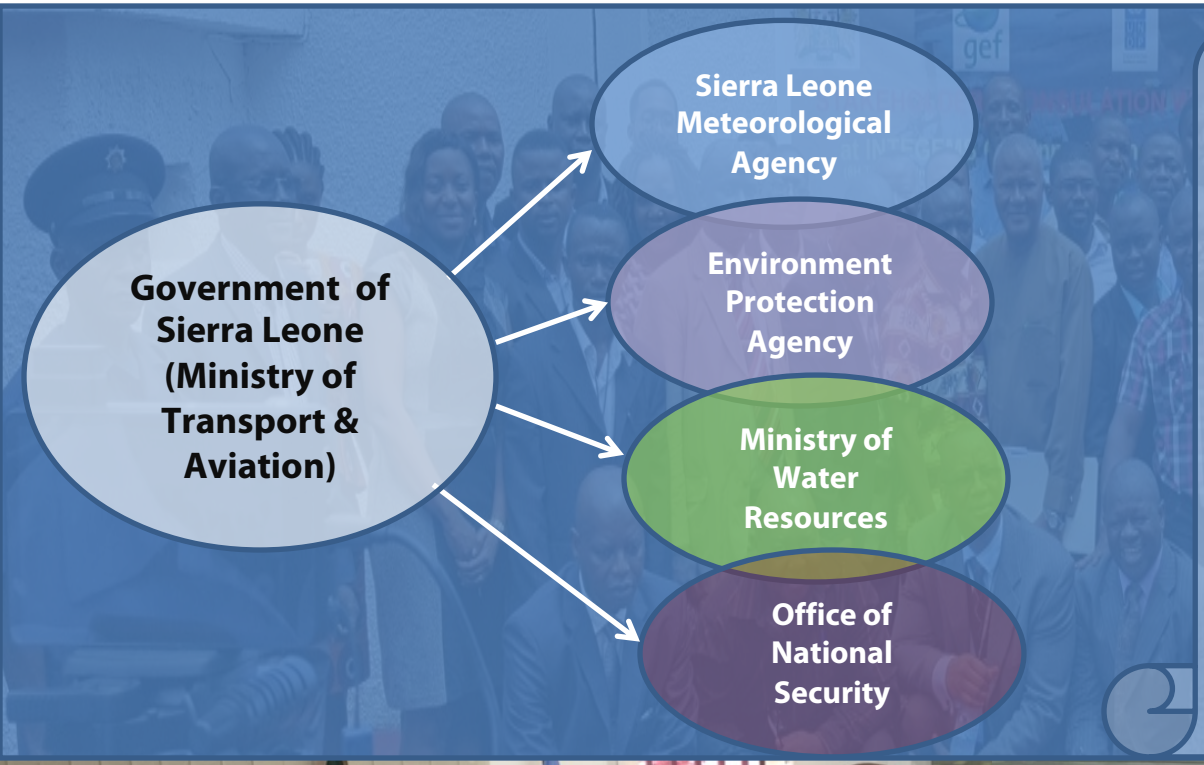
Component 2: Integrate climate information into development plans and early warning systems

Outcome 1: *Enhance Capacity of national hydro-meteorological & environmental monitoring institutions to monitor extreme weather and climate change*

Outcome 2: *Enhance efficient and effective use of hydro-meteorological & environmental information for making Capacity of national hydro-meteorological & environmental monitoring institutions to monitor extreme weather and climate change*

Project Partners & Stakeholders

The CIEWS-CIRDA Project was implemented by public and private stakeholders, including Government of Sierra Leone Ministry, Department, Agencies, local communities & non-state actors



Other stakeholders:

- Ministry of Energy
- Ministry of Agriculture, Forestry & Food Security
- Sierra Leone Civil Aviation Authority
- Sierra Leone Airport Authority
- Sierra Leone Maritime Administration
- Sierra Leone National Telecommunications Company (NATCOM)
- Sierra Leone Institute of Agricultural Research
- Sierra Leone Broadcasting & other electronics & print media
- Sierra Leone Police & Republic of Armed Forces

Progress Summary

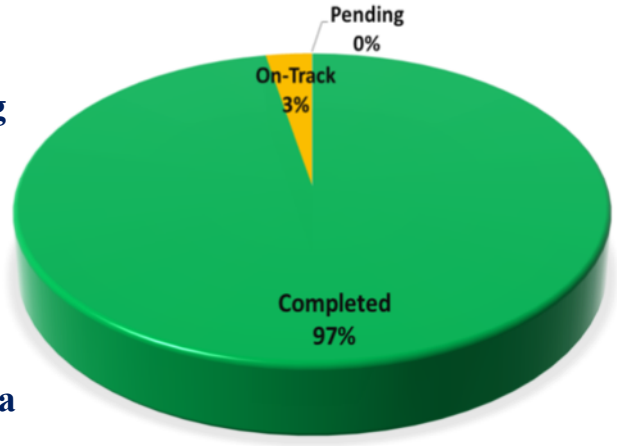
Implementation of the CIEWS-CIRDA Project in Sierra Leone is 97% completed and 2% on-track. This demonstrates remarkable achievement mindful of the severe delays caused by the 18 months Ebola crisis & protracted procurement of hydro-meteorological equipment in Copenhagen & Sierra Leone

- **67 of the 70 activities approved on the CIEWS-CIRDA Project, representing 97% have been successfully implemented, and 3 activities on-track. These include:**

1. Training of 8 Met. Technicians in Medium Level Meteorological Technicians (CL III) Course at the Regional Met. Research and Training Institute in Nigeria.

2. Refurbishment of offices of the Sierra Leone Met. Agency in Freetown (HQ) & at Lungi International Airport

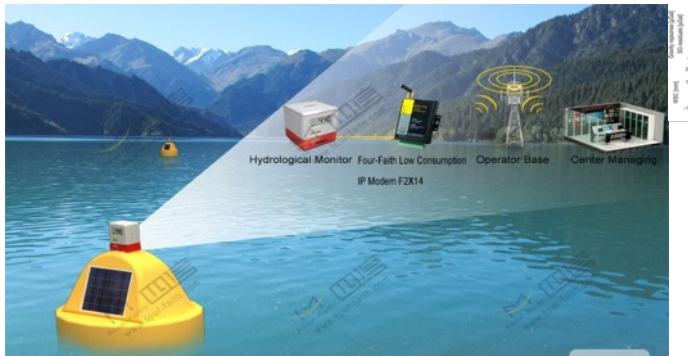
3. Installation of AWSs & Synoptic AWS with display system at the Sierra Leone Met. Agency at Lungi International Airport

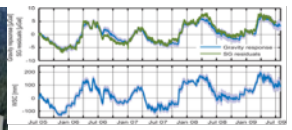


SPECIFIC ACHIEVEMENTS (CONT'N)

Hydrological monitoring equipment provided in 2016 have improved the monitoring capacity of the Ministry of Water Resources and has complemented watershed management networks of Guma, Bumbuna Watershed, etc.

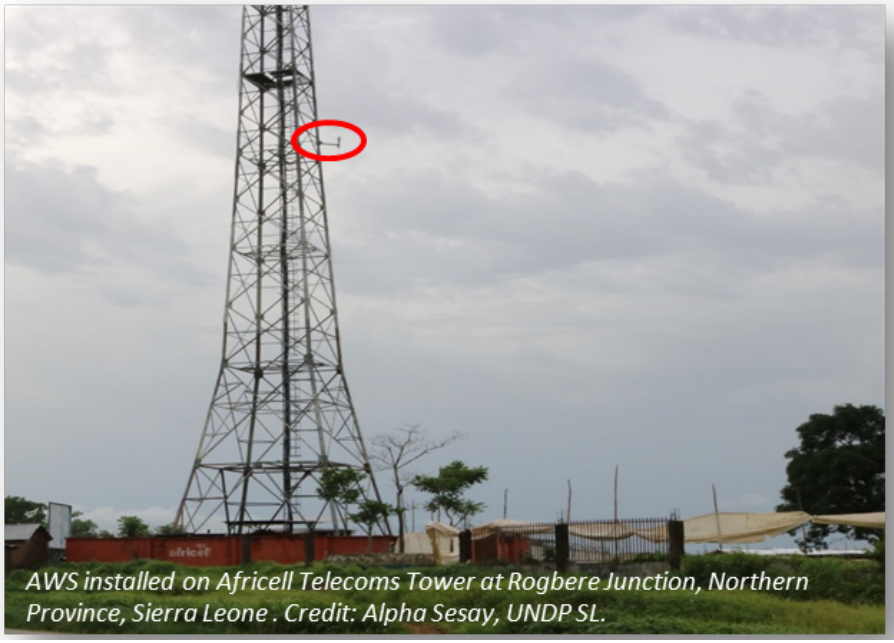
- A mobile Hydromet Automatic Station (HAS) for sensor's field calibration was procured in 2016. This will integrate installed and existing HAS and interfacing to central data collection & storage system;
- Hydrological monitoring equipment including 12 river gauges, 2 water level (limnimetric scale), 6 groundwater data logger, 2 signal counter rotations were procured in 2016 . Monitoring stations have been established in 5 water ways – Bumbuna, Badala, Sewa, Pampana & Moa Rivers.
- 6 hydromet officers, in the Ministry of Water Resources were trained in Niamey, Niger, in Sept. 2016 in operational watershed monitoring and hydrological modeling.
- Establishment of partnerships for the manning of the future hydrological monitoring network is on-going;





SPECIFIC ACHIEVEMENTS

Sierra Leone now has strengthened capacity for provision of improved and real-time climate information to end-users.

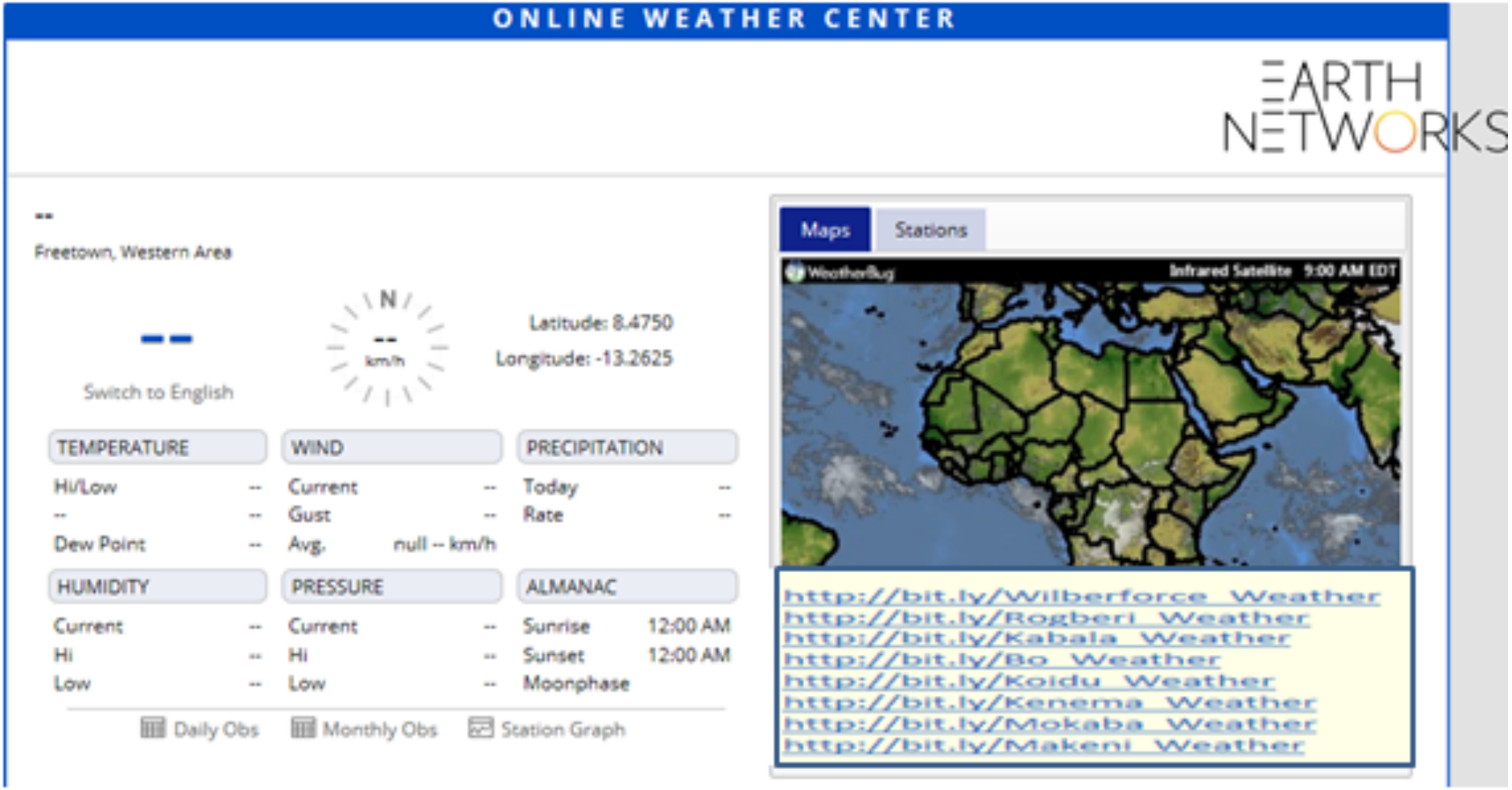


AWS installed on Africell Telecoms Tower at Rogbere Junction, Northern Province, Sierra Leone . Credit: Alpha Sesay, UNDP SL.

- 8 Climatological Automated Weather Stations (AWSs) installed in August 2016 now providing improved climatic data on 46 parameters, including precipitation, humidity, temperature, wind direction & speed. 6 hourly and 10 days forecasts are provided and updated every minute.
- Installation of Synoptic AWSs with display systems at Sierra Leone Met Office at the Lungi Airport is expected to take place in the first week of December 2017. This is expected to integrate installed and existing AWS with central data collection & storage systems at the SL Met HQ.

SPECIFIC ACHIEVEMENTS (CONT'N)

Improved climate data for forty-six parameters , for all locations in Sierra Leone now available and updated every minute . The data is currently hosted by Earthwork, as part of an initial 3 years data management plan.



SPECIFIC ACHIEVEMENTS (CONT'N)

Improved 6 hourly & 10 days weather forecasts for all locations in Sierra Leone now available and updated every minute

10-Day Forecast | Hourly Forecast

Time	Condition			Chance of Precip.	Feels Like	Wind	Dew Point	Rel. Humidity
	Weather	Temp	Sky Cover					
Thursday, November 2nd 2017								
3:00 PM		27°	78%	0%	30°	SW 11 km	25°	85%
4:00 PM		27°	62%	0%	30°	SW 11 km	24°	85%
5:00 PM		27°	60%	0%	30°	SW 7 km	24°	85%
6:00 PM		27°	41%	0%	30°	SW 7 km	24°	85%
7:00 PM		27°	40%	0%	30°	SW 7 km	24°	85%
8:00 PM		26°	40%	0%	26°	SSW 11 km	24°	87%

Next 6 Hours

SPECIFIC ACHIEVEMENTS (CONT'N)

Improved 10 days and 6 hourly weather forecasts for all locations in Sierra Leone now available and updated every minute

SPECIFIC ACHIEVEMENTS (CONT'N)

Sierra Leone now has a reasonably improved capacity for early warning system data handling and forecasting operations

Carine Yengayenge, Deputy Country Director (Operations, UNDP SL CO hands over flight ticket to one of 8 SL Meteorological Technicians prior to their departure for regional trainings in weather forecasting and observation Nigeria in September 2017, while Samuel Doe, UNDP SL Country Directior (right) looks on with delight. Credit: Jkaindaneh, Freettown, Sept. 2016

- 2 Experienced Meteorological Technicians obtained Masters Degrees in Meteorology and Climate Change at the University of Reading , UK in September 2016. They are now providing leadership at the SL Met. Agency.

- 8 Gender Met. Technicians currently undergoing Medium Level Meteorological Technicians (CL III) Course at the World Met. Organization training center in Nigeria, as part of on-the-job capacity development Programme.

SPECIFIC ACHIEVEMENTS (CONT'N)

Communications network to support early warning and climatological & hydrological information dissemination has been established for the Sierra Leone Met. & Disaster Management Department in Sierra Leone's Office of National Security

- The need for strengthening of outer meteorological stations, communications facilities for data collection and transmission including the provision of VHF radios, mobile phone sets, etc, has been re-assessed.
- The Ministry of Water Resources, Sierra Leone Met. Agency and Disaster Management Department (DMD) in the ONS have been provided with a reliable, direct and fast data and information communication system
- An efficient communication network between SLMD and the ONS- Disaster Management Department and all DM Committee Members including Directorate of Water Resources has been developed;
- An efficient communication network between SL Met. Agency and the DMD-ONS D and ALL the ONS- Disaster Management Department and all disaster management committees for early warning service delivery have been developed.

SPECIFIC ACHIEVEMENTS (CONT'N)

Sierra Leone now has improved capacity for EWS sector tailored weather and hydrological forecasting techniques and information packaging. However, further capacity building support is needed for efficient service delivery.

- A Communication and data sharing mechanism for the integration of weather, hydrological and disaster management information platform – a Climate Information, Disaster Management and Early Warning Systems **(CIDMEWS)** platform has been developed to feed future early warning system.

- 5 staff of the Water Directorate in the Ministry of Water Resources have undergone regional training & experience sharing session in Accra, Ghana in September 2016 hydrological forecasting techniques and information packaging.

- A systematic assessment of future climate change scenarios and impacts over Sierra Leone to satisfy adaptation needs has been carried as part of the development of the review of Sierra Leone's hazard profile and capacity gap assessment, completed in November 2016.

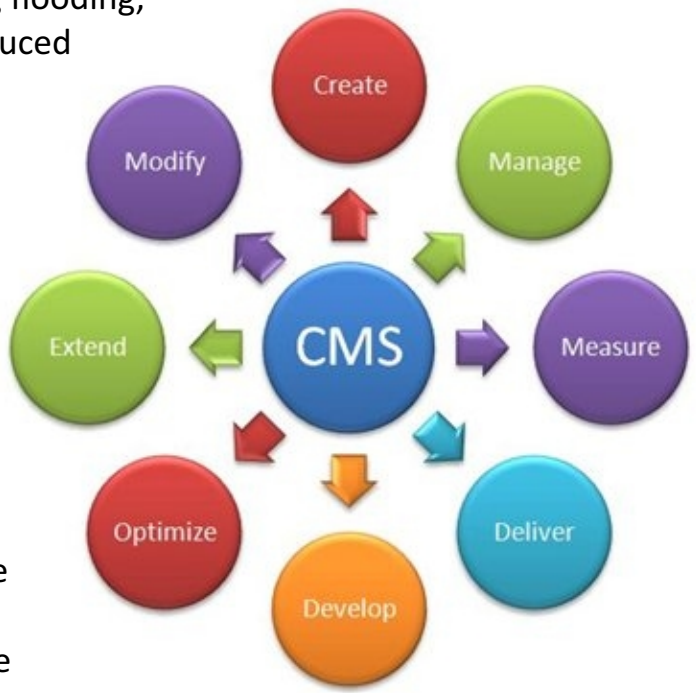
- Household surveys of targeted users of climate information to understand the social and economic costs and benefits of using advisories and warnings for ex-anti risk management in agriculture and water management was completed in early 2016.

SPECIFIC ACHIEVEMENTS (CONT'N)

Standard Operating Procedures have been developed, Multidisciplinary Inter-Institutional Technical Committee Established, and and plans for delivery of early warning products to various identified national end-users, including community sectors developed

- A multidisciplinary and inter-institutional Technical Committee on Early Warning System (EWS) was established in August 2016 by the DMD-ONS. Early warning information products, for different climate induced hazards, including flooding, were developed by the established committee for various climate induced hazards.

- Standard Operating Procedures (SOPs) for managing various climate-induced hazards were developed and/or reviewed by DMD-ONS, in collaboration with Government of Sierra Leone Ministries, Departments and Agencies, civil society, non-governmental organizations, and local community representatives in August 2016, in the Southern capital city of Bo, Sierra Leone.



- Review of Legal Framework supporting EWS will be completed by the first week of December 2016. This will strengthen the platform for effective early warning service delivery by the SL Met Agency and the ONS-DMD.

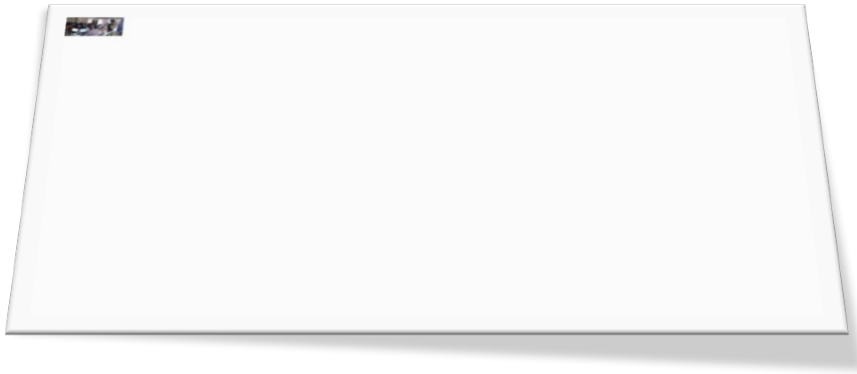
SPECIFIC ACHIEVEMENTS (CONT'N)

Standard Operating Procedures have been developed, Multidisciplinary Inter-Institutional Technical Committee Established, and and plans for delivery of early warning products to various identified national end-users, including community sectors developed

- Establishments of partnerships for the dissemination of improved climate information between the SL Met. Agency and public and private stakeholders is currently on-going.

- 115 stakeholder representatives from public and private sectors, were trained on climate change risk assessments by ONS-DMD, in June 2017. Traininings centered around assessments and management of climate change risks and issues, including adaptation mechanisms, and mainstreaming gender into climate change management.

- The capacity of these stakeholders to understand tailored warning generation/response according to international standards and protocols have also been developed



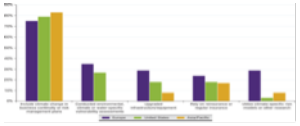
SPECIFIC ACHIEVEMENTS (CONT'N)

A Climate Change Data Management Systems has been established at the Sierra Leone Environment Protection Agency, paving the way for systematic storage and mainstreaming of digital information to support decision-making in Sector Planning

- A Climate Change Data Management System with appropriate advanced workstations and GIS facilities to function as National Climate Change 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 has been established at the Environment Protection Agency in Sierra Leone (EPA-SL).

- Partnership between CIESIN and EPA-SL has been established for systematic streamlining of digital information. This will supported the development of Climate Change risk/vulnerability GIS maps, and support the integration CC risks into national policies and plans.

- Integration of Climate Change into national policies and plans, targeting various sectors, including mining, tourism and land management, etc, on the verge of completion by the EPA-SL.

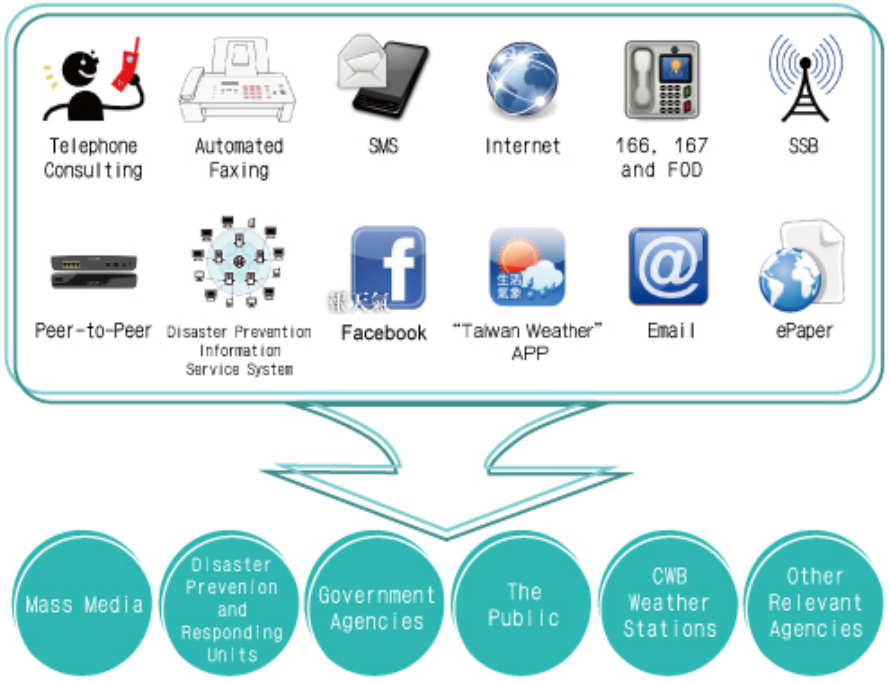


- Partnership between the EPA-SL and the University of Sierra Leone and Fourah Bay College has been established and capacity for systematic data mainstreaming and development of national Climate Change Vulnerability and Risk Mapping being developed.

- Partnership between the Ministry of Agriculture, Forestry and Food Security (Food and Nutrition Early Warning Platform) and the Sierra Leone Met. Agency has been for exchange of data and development of online agricultural advisory forecasting service.

SPECIFIC ACHIEVEMENTS (CONT'N)

Existing Climate Information dissemination/response system under the Disaster Management Department in the Office of National Security and Sierra Leone Meteorological Agency have been strengthened to support early warning systems



- Needs assessment of ONS-DMD's communication network to strengthen warning dissemination capacity including SMS-based systems has been assessed;
- Communication channels between SLMA & ONS-DMD for dissemination of forecasting products have been developed;
- 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 has been developed with strong participation of key stakeholders, including women, farmers associations,
- Institutional mechanisms for collection feedback from the community end-users on the usefulness of the warning messages to enhance efficiency of EWS have been established;

- Develop and deliver training programme for gender sensitive ONS-Sectoral Task Forces (STFs) in the Provinces/Districts to harmonise agreements and interagency protocols;
- Make provision for the procurement of 6 "sms-FrontLine" communication system to support emergency dissemination response mechanisms of ONS-DMD;

SPECIFIC ACHIEVEMENTS (CONT'N)

Existing Climate Information dissemination/response system under the Disaster Management Department in the Office of National Security and Sierra Leone Meteorological Agency have been strengthened to support early warning systems

- Partnerships between the ONS-DMD and NGOs & CBOs for managing climate information, including early warnings and promoting resilience to climate induced hazards at district and community levels established in the Northern, Southern and Eastern Provinces of Sierra Leone

- Gender sensitive training for conducted for 124 representatives ONS & Sectoral Forces, and other stakeholders in September 2016Develop and deliver training programme for gender sensitive ONS-Sectoral Task Forces (STFs) in the Provinces/Districts to harmonise agreements and interagency protocols;

- 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.



SPECIFIC ACHIEVEMENTS (CONT'N)

A framework for financial sustainability based on cost recovery service provision has been established for the Sierra Leone Meteorological Agency to support future early warning systems operations

- A comprehensive needs assessments for climate services has been conducted by the Sierra Leone Meteorological Agency;

- A Plan and a financial framework for the sustainable operations of the SLMA has been developed. The framework identified different end-users of climate information; gauged their willingness to pay, at what price, etc for improved climate services. The financial plan will generate revenue from the sales of climate information to end-users;

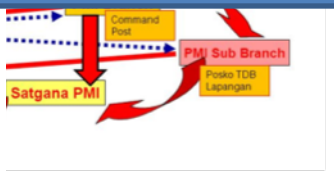
- Establish a public-private cost-recovery partnership and service level agreement between the SLMD and DWR and national internet service provider with regards to start-up costs for servers and modems as well as running bandwidth costs for internet connection to collect, analyse, exchange and archive data;

- 42 members of the Sierra Leone parliament (policy makers) benefitted from improved trainings, awareness raising and dialogue sessions on climate change issues and their roles in supporting and/or promoting early warning systems in Sierra Leone.

SPECIFIC ACHIEVEMENTS (CONT'N)

Community Based Early Warning System (CBEWS) networks have been developed in 2 of 3 targeted pilot demonstration sites in Bumbuna Watershed & Dodo Chiefdom, covering seventy most-vulnerable communities in the Northern & Eastern Provinces of Sierra Leone, to enhance and test its impacts on risks reduction in sectors and population

Slide to be reviewed in final version with speaking notes by Joe



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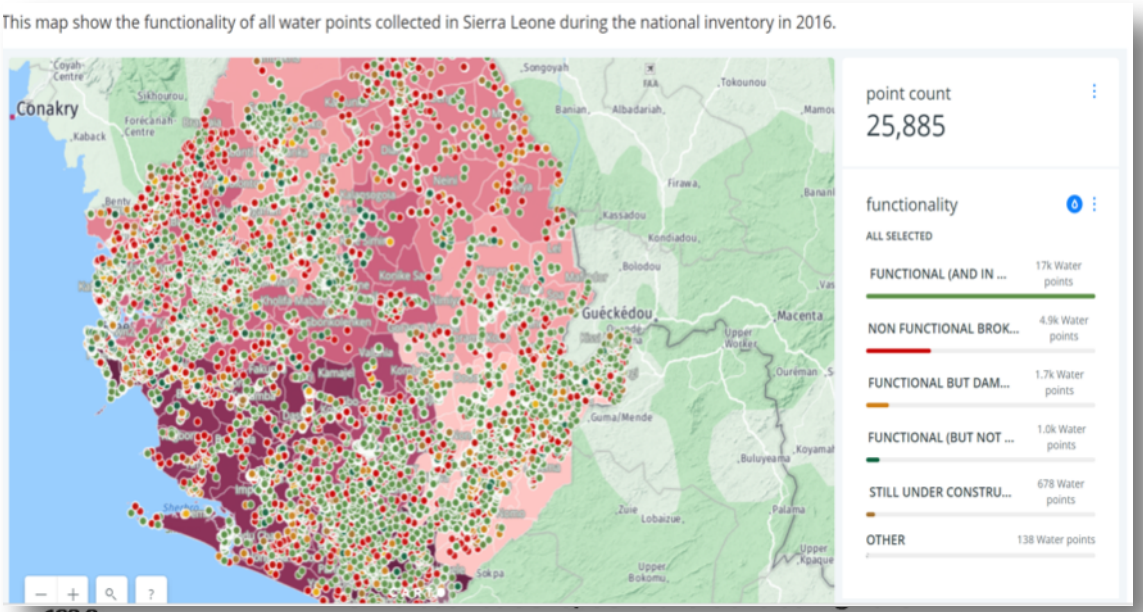
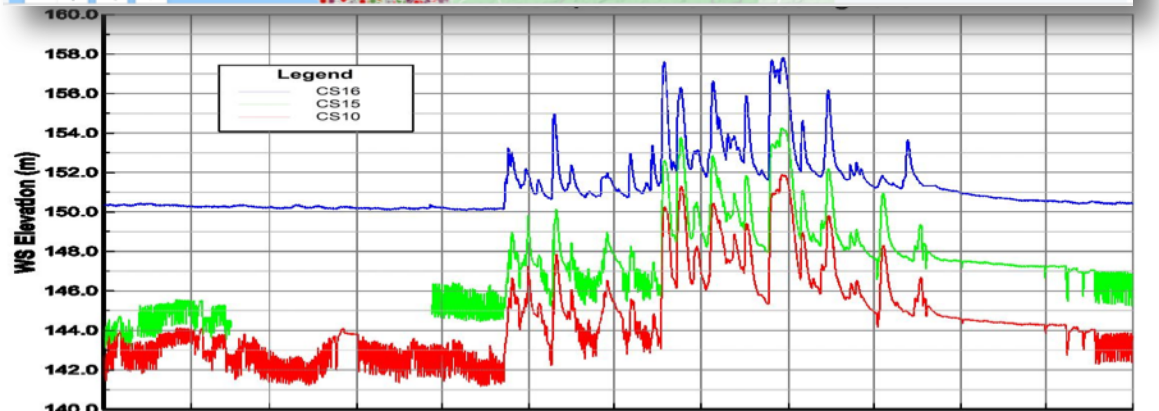
IMPACTS

Encouraging signs have been observed on efforts to disseminate and use available climate data. However, with the CIEWS Project only ending in November 2017, a detailed survey over a reasonable period of time would be needed to fully determine impacts





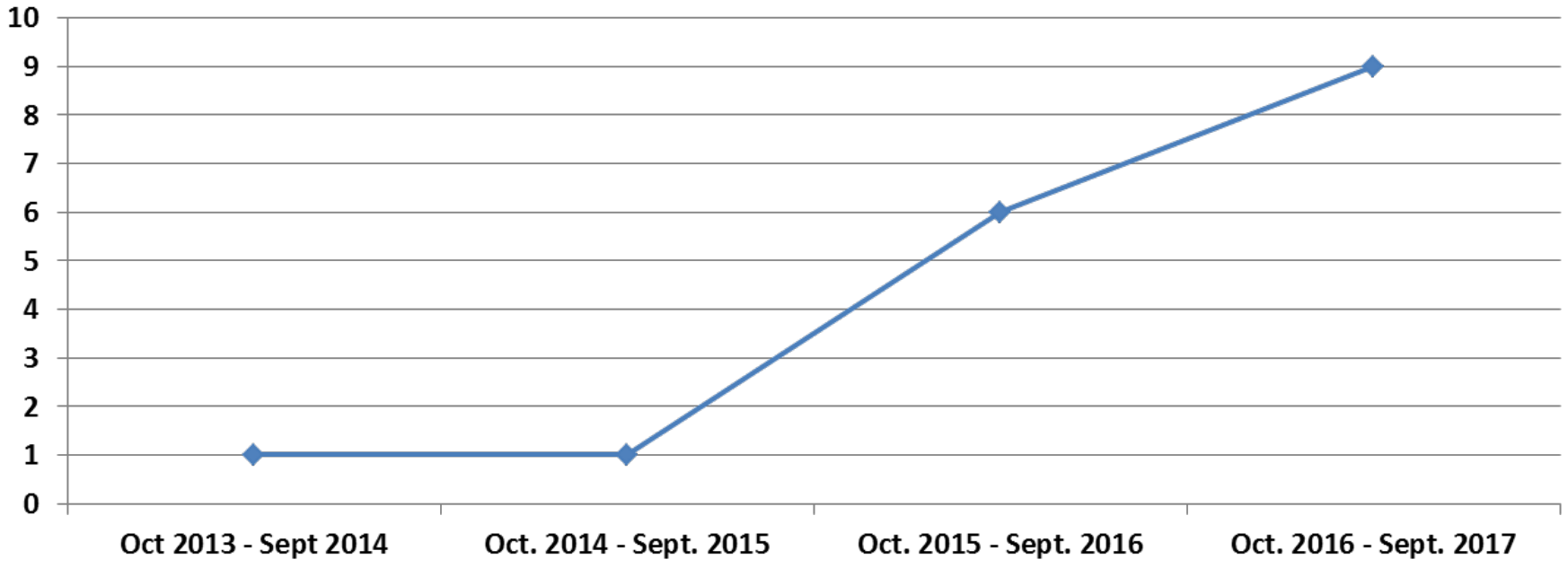
- Greater autonomy and growing capacity for the Meteorological Agency
- Upcoming launch of Climate Information Disaster Management Early Warning System (UNDP and partners)
- Sierra Leone WASH-Data portal providing transparency, accountability of water provision

Increasing political commitment towards climate resilience and action

CHALLENGES & LESSONS LEARNED

The Ebola Crisis in Sierra Leone and protracted procurement processes resulted in substantial implementation delays. Facilitating access to improved climate data by all end-users remains the next target.

- **Challenge:** The Ebola Crisis from May 2014 to November 2015 halted implementation of the CIEWS-CIRDA Project for 18 months as services were withheld and movements severely restricted in the country. Protracted procurement delays also resulted in substantial implementation delays.



- **Lesson Learned:** Possibility exist for key activities to have been delivered through individual service providers.

CHALLENGES (Cont'n)

Ensuring visibility of the development gains of the CIEWS Project and facilitating access to improved climate data by all end-users, including remote and at-risk communities remains a major challenge. ~~and the next target.~~

- Improved climate data, currently in online formats, not available in areas with no internet facility
- Data on entire groups (all sectors, including development sectors) and key issues not currently available. As such, major data gaps remain.
- Data that exist are often not useable. Not everyone understands forecasting terminologies, including millimeters readings, data map & related graphic interpretations, etc.
- Data that are useable are not accessible or open, due to the internet challenge.
- Data that are accessible are often not used effectively.

CHALLENGES (CONT'N)

~~**Ensuring visibility of the development gains of the CIEWS Project and facilitating access to improved climate data by all end-users, including remote and at-risk communities remains a major challenge. and the next target.**~~

Baseline information UPDATED BASELINE DATA

Baseline aUPDATED NATIONAL AGRIC SECTOR DATA

Slide to be updated

COORDINATION OF DATA COLLECTION

ADEQUATE AND TIMELY RESOURCES TO CONDUCT ANNUAL SURVEYS/THEMATIC STUDY/RESEARCH AND AGRICULTURAL CENSUS.

Slide to be updated

- CAPACITY BUILDING OF DATA COLLECTORS AND DATA ANALYSTS
- TO CONDUCT TIMELY AND REGULAR SURVEYS AND THEMATIC STUDIES
- TIMELY AND ADEQUATE BUDGET ALLOCATION FOR SURVEYS/RESEARCH/THEMATIC STUDY AND CENSUS.
- TIMELY DESSIMINATION OF DATA FOR END USERS
- ESTABLISHMENT OF FUNCTIONAL DATA BASE.
- COORDINATION OF STATE AND NON STAE ACTORS CONDUCTING AGRICULTURAL SURVEYS/RESEARCH/THEMATIC STUDY

- It is also clear that the quality of climate services vary considerably. Investment in and human resources needed to support effective climate services.
- Lack the basic observational infrastructure needed to gain an accurate understand climate trends.
- Heavily reliant on the ability of Regional Climate Centres and Regional Climate Ou provide tailored early warning information and seasonal outlooks, which are subs NMHSs.
- **Communication, outreach and engagement.** Inadequate quality of infrastructure

Slide to be updated

making needs.

- This is due, in large part, to a limited understanding of needs and constraints in
- In the case of seasonal forecasts for smallholders in, ineffective information pro ’those with the greatest potential to benefit from seasonal climate forecasts ma realize those benefits.’
- The inappropriate translation of key climate terms can lead communities to ign early warning systems.

Future Direction

8 Things to know about the new Strategic Plan

Slide to be updated in the final version

2 A plan that is forward-looking

3 A plan with a unifying vision and focused set of 7 outcomes

5 A plan that breaks free of practice silos

6 A plan designed with three interlocking parts

8 A plan with clear results and

icators

CONCLUSION & THE LAST WORD

Substantial progress has been made in strengthening the climate monitoring capability & early warnings of Sierra Leone. We have been positioned to provide improved climate information. However, significant challenges still need to be addressed, mainly in the area of human capacity development, additional technology transfer & infrastructure development .

THE LAST WORD

In Sierra Leone, a deadly mudslide, triggered by torrential rains on 14 August 2017 killed over 500 people, and displaced over 100 people. Also, severe flooding in September 2015 claimed the lives of 4 people and displaced over 5000 persons.

These climatic hazards serve as stark reminders of how deadly the impacts of climate induced hazards can be, especially when combined with the effects of unsafe human activities on the environment. Through the CIEWS-CIRDA Project, and additional support, future disasters can be minimized with effective weather & climate services: lives will be saved & country, including local communities will be resilient to the impacts of climate change.

Any Questions or Comments?

THANK YOU FROM THE PEOPLE OF SIERRA LEONE !

Photo credits:

Caroline Thomas, Oli Brown, Saskia Marijnissen, Tommy Trenchard