

COUNTRY HYDROMET DIAGNOSTICS

Sierra Leone 2021 peer review



Peer Reviewer
Nigerian Meteorological Agency (NiMet)



COUNTRY HYDROMET DIAGNOSTICS

Informing policy and investment decisions for high-quality weather forecasts, early warning systems, and climate information in developing countries.

Sierra Leone Report

Peer reviewed by

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Nigerian Meteorological Agency (NiMet)

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INTRODUCTION

There is a growing uncertainty surrounding weather, water and climate related services created by the increasing frequency of unprecedented meteorological and hydrological extremes that leave communities of affected nations in distress across the globe. The impacts of these extreme events have also increased the level of awareness and demand for quality, timely, accurate, reliable and tailored impact-based information for adaptation, mitigation and resilience by the user communities. Hence, service providers in weather, water and climate related sciences, especially the National Meteorological and Hydrological Services (NMHSs) are faced with the need to step-up their capacities in delivering efficient services in line with global best practices that will meet the ever-increasing high expectations on them. It is therefore mandatory to consistently invest in equipping and strengthening the capacities of hydro-meteorological services which their ability to succeed depend on. Moreover, routine and comprehensible monitoring and evaluation mechanism are required for improved efficacy.

Livelihoods and means of production are constantly threatened in Africa nations due to the rapidly growing population and their inability to cope with the challenges of climate variabilities and change. These circumstances are predicted to worsen in the future especially if actions to combat climate change are not enough, therefore, leading to increased flood incidences, drought occurrences, desertification, tropical cyclones, squally thunderstorms among others. The direct results include reduced agricultural productivity that threatens food security, water disasters that increase health risks, infrastructural damages and loss of lives and property. This situation is made worse by the harsh economic realities within the region exacerbated by the recent COVID pandemic.

The Country Hydromet Diagnostics (CHD) is to conduct gaps analysis and responds to the need for a standardized, integrated and operational tool and approach for diagnosing National Meteorological and Hydrological Services (NMHSs), their operating environment, and their contribution to high-quality weather, climate, hydrological, and environmental information services, and warnings. The Diagnostics are an umbrella tool that draws on and adds value to existing WMO assessment results by synthesizing existing approaches and data into easily interpretable form, validating the information provided by WMO Members through a peer-review process, and obtaining missing information.

The Diagnostics assessment, therefore, aims at informing policy and investment decision-making, in particular guiding investments of the members of the Alliance for Hydromet Development (AHD) towards the development of a Systematic Observations Financing Facility (SOFF). The Alliance brings together major development and climate finance partners behind a joint commitment to strengthen developing country's hydromet capacity. Through the Diagnostics, developing countries are expected to benefit from better targeted and aligned financial and technical support.

The Country Hydromet Diagnostics is based on the ten most critical elements of the hydromet value cycle, grouped under four categories – **enablers-observation & data processing system, services, product production & dissemination, and user & stakeholder interaction**. For each value cycle element, a limited number of standardized indicators are used, and each indicator uses explicitly defined data sources. The assessment of these critical elements of the National Meteorological and Hydrological Services (NMHSs) should lead to their maturity level. Please note that Level 5 is the highest attainable maturity level in this CHD assessment.

With a population of about 8 million, land area of 72.3 sq. thousand km, and nominal GDP of about 4 billion USD, Sierra Leone is a country in West Africa, on the Atlantic Ocean. The country was a victim of civil war that lasted twelve (12) years and epidemics over the past decades which have disrupted socio-economic activities including meteorological and hydrological services. The harsh economic realities have significantly reduced the country's capacities to observe, monitor, forecast, package and communicate weather, water and climate information, products and services to the nation.

The Diagnostics draw as much as possible on primary data (self-reported and other sources of quantitative data). To inform the peer review, additional data were used, in particular data from country user/client surveys. The WMO Post-disaster mission to Sierra Leone/ Needs Assessment Mission Report/Country hydromet diagnostics survey provided baseline data. Additionally, the WMO Community Platform and the CHD administered Questionnaire provide the primary source of data information requirements for the Diagnostics and the results of the Diagnostics will be integrated into the Platform adding substantial value.

In this vein, a draft prototype of the Country Hydromet Diagnostics has been developed for Sierra Leone, a developing country in West Africa recovering from civil war and Ebola epidemic. Sierra Leone is located at 7°- 10° N, 10°-13.5° W. It is bordered by the north Atlantic Ocean to the coast and two other African nations, Liberia to the east and Guinea to the north. (see figure 1).



Figure 1. Map of Sierra Leone. Source; Worldatlas.com

The Nigerian Meteorological Agency (NiMet) has over the years built a strong collaboration of partnerships and support to countries within the African region including Sierra Leone in the West Africa sub-region.

To actualise the aims and objectives of the CHD and promote the development of NMHSs in Africa, NiMet accepted to assist in this CHD to provide an assessment of the critical elements of the hydro-meteorological value chain. This was combined with feedbacks from virtual meetings by critical staff members of the Sierra Leone Meteorological Agency (SLMA), especially the Permanent Representative with World Meteorological Organisation. The Climate Services Checklist as well as the WMO Mission Report on Needs Assessment and Post-disaster mission to Sierra Leone were also intensively reviewed. The Sierra Leone Meteorological Agency (SLMA) was consulted in the course of this assessment and as such the focus of this report is only limited to the SLMA.

This report is presented along with the ten most critical elements of the hydro-meteorological value cycles with an indication of their respective maturity level informing where additional focus and support is needed (based on the assessment of the indicators) and some high-level recommendations offered to aid the upliftment of the maturity level.

I. GOVERNANCE AND INSTITUTIONAL SETTING

The main focus of this report is the Sierra Leone Meteorological Agency which is responsible for providing hydro-meteorological services in Sierra Leone. This agency is under the authority of the Ministry of Transport and Aviation.

- 1.1. The Sierra Leone Meteorological Agency (SLMA), formerly Sierra Leone Meteorological Department (SLMD) was established by the Act of parliament in 2017 (Gazette Vol. CXL VIII, No.64 dated 28th September 2017). It is a government agency with commercial activities and also has the mandate to provide climate services.
- 1.2. The budget provided for the government does not cover the Agency's needs. Thus, the budgets are being directed for some administrative activities.

Budget Table

Budget	Currency (USD)
Expenditures	164,323.09
Investment	Nil
Operating	Nil
Salaries	420,263.33
Income	190,414.10
State Contribution	95,604.92
Aeronautic Contribution	Nil
Others	Nil

- 1.3. The SLMA has not implemented internationally funded hydrometry projects and/or research and development projects in general.
- 1.4. From the staffing information provided by the Permanent Representative of Sierra Leone with the World Meteorological Organisation (WMO), SLMA has **76** personnel out of which there are **55** males and **21** females which consist of; a Director General, a Deputy Director General, 39 Meteorological Observers, 7 Forecasters, 5 Trainee Meteorologists, 5 Office Assistants, 4 Drivers, 3 Administrative Assistants, 2 Assistant IT Officers, 2 Climate Change Officers, 1 staff each as Store Clerk, Assistant Account Officer, Public Relation Officer, Instrument Technician, Internal Auditor, Procurement Officer, and Head of Climatology. **Details on table 1.**

Based on the above assessment using the tools of the CHD, the Governance and Institutional setting element of the hydro-met value cycle has been set to **Maturity Level 2** basically because of complete absence of the Strategic Operational Plans and Policies. A PPE-approach in running the NMHS is recommended. **WMO** interventions can help lift the maturity level.

NO	Name	Surname	Title	Gender	First App.	Present App.	Salary Grade
1	IBRAHIM SINNEH	KAMARA	Director General	Male	9/9/2010	1/1/2018	13
2	GABRIEL	KPAKA	D/ Director General	Male	1/8/2011	1/1/2018	12
3	PATRICK	MUSA	Head of Climatology	Male	18/9/84	1/1/2018	9
4	MAMBU	KOROMA	Procurement Officer	Male	1/1/2018	1/1/2018	8
5	LUCIANO	SESAY	Internal Auditor	Male	1/6/2020	1/6/2020	7
6	DESMOND	NAT-GEORGE	Instrument Technician	Male	1/6/2020	1/6/2020	7
7	SUCCESS IBRAHIM SEI	KAMARA	Met. Public Relation Officer	Male	1/6/2020	1/6/2020	7
8	AMARA SALAMI	KANU	Climate Change Officer	Male	1/6/2020	1/6/2020	7
9	ROGERS	PETER	Climate Change Office	Male	1/6/2020	1/6/2020	7
10	IBRAHIM	KALOKO	Trainee Meteorology	Male	1/6/2020	1/6/2020	6
11	JUSU MOMOH	LUSENI	Trainee Meteorology	Male	1/6/2020	1/6/2020	6
12	LANSANA ABDUL-AZIZ	KALLON	Trainee Meteorology	Male	1/6/2020	1/6/2020	6
13	BAI THAIMU	BANGURA	Trainee Meteorology	Male	1/6/2020	1/6/2020	6
14	SAFFIATU	THOMAS	Assistance Accountant	Female	1/6/2020	1/6/2020	6
15	JOSEPH POLYNUS	THOMAS	Trainee Meteorology	Male	1/6/2020	1/6/2020	6
16	SAIDU MOMOH	KAMARA	Forecaster	Male	1/7/2011	1/1/2018	5
17	MAJID	WILLIAMS	Forecaster	Male	1/7/2011	1/1/2018	5
18	MOSES THEOPHILUS	KPAKA	Assistance IT Officer	Male	1/6/2020	1/6/2020	5
19	ALHAJI SAFIEU	BAH	Forecaster	Male	1/6/2020	1/6/2020	5
20	BENJAMIN	KOROMA	Forecaster	Male	1/6/2020	1/6/2020	5
21	ABDUL WOLLOI	DUMBUYA	Forecaster	Male	1/6/2020	1/6/2020	5
22	MARILYN HANNAH	GODWIN	Forecaster	Female	1/6/2020	1/6/2020	5
23	ALUSINE	CONTEH	Assistance IT Officer	Male	1/6/2020	1/6/2020	5

24	SHERIFF	ANSUMANA	Met. Observer	Male	1/6/2020	1/6/2020	4
25	MOISA	SENESIE	Met. Observer	Male	1/6/2020	1/6/2020	4
26	ALHAJI TEJAN	BAH	Met. Observer	Male	1/6/2020	1/6/2020	4
27	RANDY ANITA	FORNAH	Met. Observer	Male	1/6/2020	1/6/2020	4
28	AHMED	ABDULAI	Met. Observer	Male	1/6/2020	1/6/2020	4
29	EWART B	CAMPBELL	Met. Observer	Male	1/6/2020	1/6/2020	4
30	FANTA	KONDEH	Met. Observer	Female	1/6/2020	1/6/2020	4
31	ISREALLA PROSPER MABINTY	KAMARA	Met. Observer	Female	1/6/2020	1/6/2020	4
32	FRANCIS	BOCKARIE	Met. Observer	Female	1/6/2020	1/6/2020	4
33	FODAY	KAMARA	Met. Observer	Male	1/6/2020	1/6/2020	4
34	AUGUSTINE	LAHAI	Met. Observer	Male	1/6/2020	1/6/2020	4
35	ADAMA FATU	KAMARA	Met. Observer	Female	1/7/2011	1/1/2018	4
36	FATU	KOROMA	Met. Observer	Female	1/7/2011	1/1/2018	4
37	MARIAMA	GOGRA	Met. Observer	Female	1/7/2011	1/1/2018	4
38	MANSOUR	JALLOH	Met. Observer	Male	1/7/2011	1/1/2018	4
39	JALIKATU	FOFANA	Met. Observer	Female	1/7/2011	1/1/2018	4
40	BINTU	TEJAN- COLE	Met. Observer	Female	1/7/2011	1/1/2018	4
41	IBRAHIM JOSEPH	LAVALIE	Met. Observer	Male	1/7/2011	1/1/2018	4
42	OREDOLLA TRYPHENA	SAINT-JOHN	Met. Observer	Female	1/7/2011	1/1/2018	4
43	ALFRED SANUSI	MANSARAY	Met. Observer	Male	1/7/2011	1/1/2018	4
44	JESSIE TOMMY	MASSAQUOI	Met. Observer	Male	1/7/2011	1/1/2018	4
45	ABUBAKARR SIDIQUE	SESAY	Met. Observer	Male	1/7/2011	1/1/2018	4
46	FATMATA REBECCA	BAH	Met. Observer	Female	1/7/2011	1/1/2018	4
47	MOHAMED WURRIE	BAH	Met. Observer	Male	1/7/2011	1/1/2018	4
48	ABIBATU	KORJI	Met. Observer	Female	1/7/2011	1/1/2018	4
49	NED KAI	SWARRAY	Met. Observer	Male	1/7/2011	1/1/2018	4
50	JAMINATU	LEMOH	Met. Observer	Female	1/7/2011	1/1/2018	4
51	ALPHA M. SULTAN	CONTEH	Met. Observer	Male	1/7/2011	1/1/2018	4
52	RASHIDATU	KARGBO	Met. Observer	Female	1/7/2011	1/1/2018	4
53	AMINATA	SESAY	Met. Observer	Female	1/7/2011	1/1/2018	4
54	MICHAEL SAMUEL	BAIMBA	Met. Observer	Male	1/7/2011	1/1/2018	4
55	MOHAMED SHIAKA	KAWA	Met. Observer	Male	1/7/2011	1/1/2018	4
56	MOHAMED ISAAC	DORWIE	Met. Observer	Male	1/7/2011	1/1/2018	4
57	ISATU	BANGURA	Met. Observer	Female	1/7/2011	1/1/2018	4
58	ERNEST	SONGA	Met. Observer	Male	1/7/2011	1/1/2018	4
59	EDNA S.	BRIMA	Met. Observer	Female	1/7/2011	1/1/2018	4
60	TIMOTHY	TAMBA	Met. Observer	Male	1/7/2011	1/1/2018	4
61	ALHASSAN	MANSARAY	Met. Observer	Male	1/7/2011	1/1/2018	4

62	ABUBAKARR	JALLOH	Met. Observer	Male	1/7/2011	1/1/2018	4
63	RABIATU	BANGURA	Store clerk	Female	10/11/1983	1/1/2018	4
64	EMMANUEL ELOGIMA	VANDI	Forecaster	Male	1/1/2018	1/1/2018	4
65	GBESSAY	KAMARA	Admin. Assistant	Male	1/11/1986	1/1/2018	4
66	AMINATA	SANKOH	Admin. Assistant	Female	1/8/1985	1/1/2018	4
67	SAMANTHA JUANITA	M- WILLIAMS	Admin. Assistant	Female	1/11/2010	1/1/2018	4
68	SHEKA BOCKARIE	MANGO	S/Driver	Male	30/5/2011	1/1/2018	3
69	FODAY	KAMARA	Office Assistant	Male	1/5/2014	1/1/2018	2
70	YUSIF	KAMARA	Office Assistant	Male	1/12/2013	1/1/2018	2
71	BAI FODAY	BANGURA	Office Assistant	Male	14/2/1997	1/1/2018	2
72	ROBERT	KARGBO	Office Assistant	Male	6/5/1981	1/1/2018	2
73	ALIMAMY	BANGURA	Office Assistant	Male	1/11/2014	1/1/2018	2
74	SAMA	TURAY	Driver	Male	1/11/2018	1/1/2018	2
75	EMMANUEL	PETERS	Driver	Male	1/11/2018	1/1/2018	2
76	SHEKU	KAMARA	Driver	Male	1/11/2018	1/1/2018	2

Table 1: Staff list at Sierra Leone Meteorological Agency (SLMA)

II. EFFECTIVE PARTNERSHIPS TO IMPROVE SERVICE DELIVERY

Effectiveness of the organization in bringing together national and international partners, thereby improving service delivery.

- 1.
- 2.

2.1. The SLMA has an existing Memorandum with relevant organizations for collaborative efforts. However, there is also a strong partnership with MDAs regarding issues bothering meteorological and climate services.

2.2. The SLMA has no partnership agreement currently with national and international private sector, research centres and universities, including joint research and innovation projects. However, the Agency has initiated a partnership with a few International Non-Governmental Organisations and currently awaiting acceptance for the advancement of the proposed agreements.

2.3. There is not in existence any ongoing partnerships with international climate finance and development partners.

2.4. The following are the new/improved products and dissemination technique offered by the SLMA for successful partnerships:

- Weather forecasting outcome Mobile application (SLMET app) for the public weather forecast.
- Provision of marine weather forecast and uninterrupted aviation meteorological services to flight.
- Availability of forecast on the SLMA forecasting products which can be assessed on the Agency's website, Facebook page, LCD display at the Agency head office, and Applications.
- Availability of seasonal forecast recommendations via memos to different agencies.

Based on the aforementioned, it was believed that the **maturity level** of SLMA is placed at **Level 2**. To raise this level up, it is recommended that SLMA intensify effort with assistance from the WMO Regional Office for Africa and in particular WMO Sub-regional office for North, Central and West Africa to implement partnership/co-operation arrangement between SLMA and other national and international (especially private) organisations for effective climate early warnings and service delivery.

III. OBSERVATIONAL INFRASTRUCTURE

3.1. The observational structure of SLMA can be summarized as follows:

- a) All observing stations/facilities were destroyed during the civil wars. New ones are being established with the effort of GEF through UNDP and IFAD. Currently, there is a manual synoptic station in Makeni operating 24/7, with hourly observations. The data collected from this station are stored in Makeni and brought to Freetown on monthly basis.
- b) SLMA currently does not have an upper-air station, nor a weather radar.
- c) A UNDP/UKMO project was implemented with the installation of five Campbell Scientific Automatic Weather Stations (AWSs) around the country; all of which are no longer functioning while one of the AWS was damaged (a solar panel and battery stolen) and the sixth one has not been installed. There is no calibration, no maintenance, and all the trained technicians are no longer with SLMA. Data are not available in real-time; they are uploaded manually.
- d) SLMA also has eight AWSs provided by the IFAD project. Four of them are presently working, the other four are not working due to faulty sensors and no spares were supplied. The installation included a small building, with solar power and a PC to receive data at each site.
- e) Another set of eight AWSs supplied by Earth Networks under the UNDP Early Warning Project has been installed on Airtel Cell-phone towers. These should be regarded as secondary data, because of their height above ground and possible contamination from the structure to which they are attached.
- f) SLMA currently has highly sparse network of stations.
- g) The SLMA does no additional observations for nowcasting and specialised purposes.

- 3.2. The two sets of AWSs (from the UNDP/UKMO project and IFAD project) were designed to make use of cell-phone communication to a base station in Freetown but the contract on the cell-phone SIMs supplied are not suitable and are far too expensive. Currently, data are collected approximately monthly by sending the vehicle to download into a USB key. The provision of new SIMs on affordable contracts should be able to fix this issue.
- 3.3. Sierra Leone National Water Resources Management Agency (NWRMA) has installed about 60 rainfall stations across the country. Many mining companies are reported to be collecting rainfall data at the sites of their operations and the National Minerals Agency (NMA) is willing to assist SLMA to develop a partnership with the mining companies to access the data.
- 3.4. The deployment of stations is based on project intervention areas and historical station networks that were destroyed during the civil war. However, there is no existing Standard Operating Procedure (SOP) in place for maintenance, calibrations, and quality assurance of the observing network within the SLMA.

Considering the above, the maturity level of observational infrastructure at SLMA is assessed to be **Level 2 due to the limited number of functional observation infrastructure**. This status could easily be improved once all the AWSs are connected to SIMs on affordable contracts and their data are seamlessly transmitted through the GTS and with sufficient resources for training of staff and maintenance of equipment. This could be achieved by the development of a master plan with priorities set according to the specific internal and external needs of SLMA and to the major technological choices available. This will, therefore, set a roadmap for at least 5 years to help lift the maturity level.

IV. DATA AND PRODUCTS SHARING AND POLICIES

- 4.1. The SLMA has the following operational surface stations:
- **8** Agromet stations (but some stations have faulty sensors)
 - **4** Marine weather stations
 - **3** manual stations
 - **60** automatic rainfall stations

However, none of the existing stations are registered with WIS and currently do not transmit data to WMO WIS/GTS platforms.

- 4.2. Presently, there is no existing formal policy and practice for free and open sharing of observational data in SLMA. International data reception is not readily available because of inadequate operational systems (workstations, telecommunication, and internet facilities).
- 4.3. SLMA has access to *ECMWF forecasting products* through the publicly open channel but does not have any dedicated channel as a WMO member country. SLAM also have access to *UK-MET office forecasting products*. However, they presently do not have access to any satellite data either in a national, regional, or global context.
- 4.4. Nigeria provides daily forecast based on COSMO-Model.

The **maturity level** of Data and Products Sharing and Policy is, therefore, assessed to be **level 2**. This is due to the non-availability of data-sharing infrastructure and lack of data sharing policy and practice in SLMA. Efforts should be made to develop national regulations that would govern the measurement, sharing, and use of meteorological data.

V. NUMERICAL MODEL AND FORECASTING TOOL APPLICATION

- 5.1. SLMA makes use of model outputs from ECMWF and UK-MET office as some of their main sources of information for forecasting at different timescales.
- 5.2. SLMA presently does not have the internal ability and capacity to run and maintain a fully functioning forecasting model of its own.
- 5.3. SLMA does their probability forecasts by ensemble forecasting using products from available models (ECMWF, UK-MET, and other forecasting centres that are available online)
- 5.4. SLMA does not perform data assimilation and forecast verification on their own.
- 5.5. NiMet also provides daily weather forecasts to SLMA, using COSMO model products. There has been a lack of feedback from SLMA to ascertain the skills and performances of the daily forecasts, as reported by NiMet.

The maturity level for this component is assessed at **level 2**, mainly due to their ability to access ECMWF forecast products and UK-MET office forecast products. With training for forecasters in the use and interpretation of Numerical Weather Prediction (NWP) models and products and the implementation of more robust operational forecast services, the maturity level could easily improve.

VI. WARNING AND ADVISORY SERVICES

- 6.1. The aviation meteorology division of SLMA operates as per WMO/ICAO guidelines concerning the issuance of warning and advisory services. Also, services such as public weather forecasts and marine weather forecasts are available on a 24/7 basis through the Agency's mobile application.
- 6.2. The Agency issues warning and advisory specifically for rainfall intensity, wind speed, and direction.
- 6.3. Feedbacks are received and considered via Facebook, Workshops, Meetings, WhatsApp and Emails.
- 6.4. The Agency is in the process of implementing the Common Alerting Protocol (CAP) and has undergone initial training on it.

This component is assessed as **Maturity Level 2**. To uplift this maturity level as a matter of urgency, the SLMA may consider having its own TV weather studio to assist in the local production of TV weather bulletins. However, immediate assistance is required to assist SLMA in receiving and disseminating NiMet produced TV weather bulletin and forecast.

In order to manage the flow of risk information available in the country, both with regard to hazards (flood and landslides) and exposure of populations and infrastructure, there is need to have an inter-ministerial coordinating committee, with responsibility for addressing and communicating climate and weather-related emergencies.

VII. CONTRIBUTION TO CLIMATE SERVICES

7.1. SLMA does not have a specific contribution to climate services, however SLMA offers the following services:

- Daily weather forecast for the public
- Daily weather forecast for marine
- Aviation services
- Vulnerability assessment reports

The maturity level is assessed at **Level 1**. The maturity level could be improved if climate database, historical data/documents management systems are in place and other services are provided to other sectors such as DRR/Environment, Health, and Construction etc.

The country require assistance in formulating and implementing National Framework for the Application of Water and Climate Services.

SLMA should, as a matter of urgency, nominate a staff member to lead on high-impact weather services. Given that floods are the highest priority cause of disasters, a collaborative effort is required to establish flood risk maps and thresholds for rainfall events likely to cause flooding. These thresholds should be fed into the risk mapping under the SWFDP West Africa.

SLMA should prepare to get involved in the Regional Climate Outlook Forums in the region e.g., PRESAGG and PRESASS organised by ACMAD and AGRHYMET.

In keeping with modern demand by the public for easy access to information provided over multiple channels of communication including mobile devices, it is recommended to develop capacity to deliver warnings in the Common Alerting Protocol (CAP) format which allows simultaneous communication of a warning over different communication channels. It will also make it possible for warnings provided by SLMA to be aggregated for sharing on the WMO Global Multi-hazard Alerting System (GMAS).

VIII. CONTRIBUTION TO HYDROLOGY

- 8.1. There are no standard products such as Quantitative Precipitation Estimate (QPE) and Quantitative Precipitation Forecasting (QPF) to meet the needs of the hydrological community in SLMA.
- 8.2. There is a Standard Operating Procedure (SOP) for the exchange of information between SLMA and hydrological communities.
- 8.3. Non-availability of real-time data for flood warnings, and no assessment of flood-related risks, determination of flood threshold levels, flood mapping, warning mechanisms.

In uplifting the capacities of the NMHS, considerable effort should be made to improve the synergy between the SLMA and Sierra Leone National Water Resources Management Agency (SL-NWRMA) and strengthening the NWRMA whose purview is to manage the hydrological activities for the country.

Considering the above, the **maturity level** has been assessed as **Level 1**. After the completion of the project, the **maturity level** could be re-assessed.

IX. PRODUCT DISSEMINATION AND OUTREACH

- 9.1. SLMA does not have a TV studio and it disseminates its information through Control tower for Aviation Meteorology, Radio stations, Newspapers, WhatsApp platforms, and Agency Facebook page (Sierra Leone Meteorological Agency). It doesn't have a website to help with disseminating its information.
- 9.2. The Agency doesn't have an outreach program of its own even though NiMet generates and transmits the daily weather forecast bulletin to SLMA.
- 9.3. There is no communication channel whatsoever to reach the high impacts whether vulnerable communities in Sierra Leone.
- 9.4. SLMA uses the formation of school nature clubs and MET hours on radio stations as NMHS's Education and Awareness initiatives.

Following the above, the **maturity level** is assessed at **Level 2** since there exists some channels of forecast dissemination to the public. To uplift the assessed maturity level of this critical element, there is a need for urgent action on the current daily TV weather presentation bulletins prepared for Sierra Leone by the Nigeria Meteorological Agency which are not aired.

Discussions between the WMO Team and the Sierra Leone Broadcasting Corporation (SLBC) on the one hand, and between the Team and SLMA on the other can aid the ability of SLMA to air the forecasts prepared by NiMet and result in the ability of SLMA to prepare its own TV weather presentation bulletins.

SLMA will consider and discuss with potential users who would benefit from warning services delivered through mobile phones. These could include fisher-folk and farmers, for example. Implementing such services for fishermen, for instance, would need the effort to create a framework for collaboration and coordination between SLMA, a mobile phone service provider, donor(s), the fisher community, local leadership, rescue service providers marine authorities, etc.

X. USE AND NATIONAL VALUE OF PRODUCTS AND SERVICES

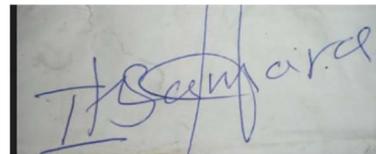
- 10.1. The SLMA lack any formal process for conducting feedback surveys and does not have a stakeholder platform for co-designing services with a user. This scenario can be improved with collaborative partnerships.
- 10.2. Following the critical operational situation at SLMA and the paucity of funds through annual budgetary provisions, there were never independent user satisfaction surveys that have been performed and there is no immediate or medium-term plan to do so in the nearest future.

The maturity level of this critical element is assessed as **Level 1** mainly because SLMA lacks any routine stakeholder feedback practice. Even the forecasting service being produced by NiMet is not being officially acknowledged nor provide feedback for improvement of the service.

To uplift this maturity level, there is a need for SLMA to formalize a periodic platform to engage user-community to co-design and improve service delivery. The conduct of independent user satisfaction surveys will also help improve service delivery and win the confidence of Sierra Leone citizens.



Reviewer:
Prof. M.B. Matazu (NiMet)
Nigeria.



Endorsement:
Director of SLMA and
Permanent Representative of
Sierra Leone with WMO

Summary of the Assessment and key Recommendations to lift the Maturity Levels

Maturity Level	Element of the Value Cycle	Key Recommendations to lift the Maturity level
2	Governance and Institutional Setting	<ul style="list-style-type: none"> • Develop SLMA Strategic Operational Plans and Policies. • Seek WMO interventions on leadership competencies to strengthen institutional framework • Make efforts to train Staff on Quality Management Systems and Competencies • Initiate process to appoint expert(s) to strengthen the institutional framework • Adopt a PPE-approach in the management of SLMA
2	Effective Partnership to improve service delivery	<ul style="list-style-type: none"> • Agree and implement cooperation arrangements between SLMA, NWRMA, and other MDAs • Seek assistance from the WMO Regional Office for Africa and in particular WMO Sub-regional office for North, Central and West Africa to implement partnership/co-operation arrangement between SLMA and other private (national and international) organisations for effective climate early warnings and service delivery. • Seek and develop partnerships with international Climate Finance and Development partners.

		<ul style="list-style-type: none"> • Establishment of improved products and dissemination techniques offered by the SLMA
2	Observational Infrastructure	<ul style="list-style-type: none"> • Ensure the existing 75 stations are functional and transmitting data to GTS • Develop a National observation plan in accordance with WIGOS including staff training • Identify and seek funding for more AWS • Develop a master plan with priorities set according to the specific internal and external needs of SLMA
2	Data and Products Sharing and Policies	<ul style="list-style-type: none"> • International data reception and exchange (GTS/WIS) should be provided immediately e.g., workstations, telecommunication, and internet facilities • Develop data-sharing infrastructure. • Efforts should be made to develop national regulations that would govern the measurement, sharing, and use of meteorological data.
2	Numerical Model and Forecasting Tool Application	<ul style="list-style-type: none"> • Train operational forecasters in accessing and interpreting NWP outputs to improve their forecasting capabilities • Prepare and key into projects (e.g., EUMETSAT MTG) that will allow reception of Numerical and Satellite products for operational forecasting and research.

2	Warning and Advisory Services	<ul style="list-style-type: none"> • Intensify effort at completing the process of implementing the Common Alerting Protocol (CAP). • Implement a TV weather presentation Studio with the assistance of WMO • Seek immediate assistance in receiving and disseminating NiMet produced TV weather bulletin and forecast. • Set-up an inter-ministerial coordinating committee, with responsibility for addressing and communicating climate and weather-related emergencies.
1	Contribution to Climate Services	<ul style="list-style-type: none"> • Develop capacity to deliver warnings in the Common Alert Protocol (CAP) format which allows simultaneous communication of a warning over different communication channels. • Develop and implement National Framework for the Application of Climate Services • SLMA should prepare to get involved in the Regional Climate Outlook Forums in the region e.g., PRESAGG and PRESASS organised by ACMAD and AGRHYMET. • Develop climate database, historical data/documents management systems • Develop products and services to other sectors such as DRR/Environment, Health, and Construction etc. • Nominate a staff member to lead on high-impact weather services.

		<ul style="list-style-type: none"> • A collaborative effort is required to establish flood risk maps and thresholds for rainfall events likely to cause flooding.
1	Contribution to Hydrology	<ul style="list-style-type: none"> • Establish Strong collaborations with Hydrological communities. • There is a Standard Operating Procedure (SOP) for the exchange of information between SLMA and hydrological communities. • Effort should be made to improve the synergy between the SLMA and Sierra Leone National Water Resources Management Agency (SL-NWRMA) • Strengthening the NWRMA whose purview is to manage the hydrological activities for the country. • Work with NWRMA to start issuing National Flood Outlook
2	Product Dissemination and Outreach	<ul style="list-style-type: none"> • Formalize the relationship with NiMet on forecast Dissemination • Sustain and explore further, the use of social media for dissemination of weather bulletins and Alerts • Collaborate with SLBC to air the TV weather presentations prepared by NiMet • Work towards developing capacity to prepare its own TV weather presentation bulletins including owning TV Weather Studio. • SLMA should consider effort to create a framework for collaboration and

		<p>coordination between SLMA, mobile phone service providers, donor(s), the fisher community, local leadership, rescue service providers, marine authorities, etc. for early warning advisories</p>
1	Use and National Value of Products and Services	<ul style="list-style-type: none"> • SLMA to formalize a periodic platform to engage user-community to co-design and improve service delivery. • Prepare to conduct independent user satisfaction surveys that will help improve service delivery and win the confidence of Sierra Leone citizens.

Glossary

ACMAD	African Centre of Meteorological Application for Development
AfDB	African Development Bank
AWS	Automatic Weather Station
CAP	Common Alerting Protocol
CHD	Country Hydromet Diagnostics
DRR	Disaster Risk Reduction
GEF	Global Environmental Facility
GMAS	Global Multi-hazard Alerting System
GTS	Global Telecommunication System
ICT	Information and Communication Technology
METAR	Meteorological Aerodrome Report
NiMet	Nigerian Meteorological Agency
NMA	National Minerals Agency
NWP	Numerical Weather Prediction
NWRMA	National Water Resources Management
PRESAGG	Regional Climate Outlook Forum for the Gulf of Guinea Countries
SLBC	Sierra Leone Broadcasting Corporation
SLMA	Sierra Leone Meteorological Agency
SOFF	Systematic Observations Financing Facility
SWFDP	Sever Weather Forecasting Demonstration Project
SYNOP	Surface Synoptic Observations
UK	United Kingdom
UNDP	United Nations Development Programme
WB	World Bank
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organisation

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