COUNTRY HYDROMET DIAGNOSTICS

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

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Liberia Peer Review Report

Reviewing Agency: Nigerian Meteorological Agency (NiMet)

Lead Author: Prof. Mansur Bako MATAZU

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PROFESSOR MANSUR BAKO MATAZU
Permanent Representative of Nigeria
with WMO
National Weather Forecasting and
Climate Research Centre,
Nigerian Meteorological Agency,
Bill Clinton Drive, Nnamdi Azikiwe
International Airport,
Abuja-FCT, Nigeria.

with a copy to:

MR ARTHUR GAR-GLAHN
Permanent Representative of Liberia
with WMO
Liberia Meteorological Service (LMS),
Ministry of Transport,
Monrovia, Liberia.

The findings, interpretations and conclusions expressed are those of the named authors alone and do not necessarily reflect those of the agencies involved. Authorisation for the release of this report has been received from the Nigerian Meteorological Agency and the Liberia Meteorological Service as of December 2023.

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Executive Summary

The SOFF Project was initiated with the objective of strengthening climate adaptation and resilient development through data collection, processing and availability that will improve weather forecasts, early warning systems and climate information services. The Nigerian Meteorological Agency (NiMet) signed an agreement with the World Meteorological Organization (WMO) to provide SOFF Peer Advisory Services to Liberia. As part of the deliverables under this agreement, a Country Hydromet Diagnostics (CHD) is to be developed during the readiness phase.

The project provides finance and technical assistance to Least Developed Countries (LDC) and Small Island Developing States (SIDS) to improve their hydrometeorological observation network, data collection, processing and sharing.

CHD is designed to provide a high-level strategic assessment of National Meteorological and Hydrological Services (NMHS), their operating environment, and their contribution to high-quality weather, climate, hydrological and environmental services, and warnings. Its aim is to encourage informed policy and investment decisions for high-quality weather forecasts, early warning systems, and climate information in developing countries.

Over the past six (6) months a team of experts from the Nigerian Meteorological Agency (NiMet) has engaged their counterpart from the Liberia Meteorological Service (LMS) in a series of online meetings and exchanged communication through various platforms (Email, WhatsApp, etc.). The aim was to enable the Agency to gather information on the status of weather and climate services value chain. These series of engagements cumulated in an in-country visit to Liberia by the NiMet team, to carry out an on-the-spot assessment and verification. A stakeholders' engagement was also organized to get input from all those involved in the weather and climate information value chain in Liberia.

This CHD report is a product of the work that has been carried out by NiMet in collaboration and agreement with the LMS. The WMO Needs Assessment Mission Report to Liberia, WMO Early Warnings for All Rapid Assessment Report, and previous CHD report among others provided baseline data.

Some of the observations and recommendations contained in the report are as follows:

- There is an urgent need to give legal backing to the activities and operations of the Liberia Meteorological Services (LMS). The current effort by the Government and other stakeholders towards merging LMS and Liberia Hydrological Services (LHS) into one entity is a welcome development but needs to be finalized and implemented as soon as possible.

- Poor investment has greatly affected the observation network and infrastructure for LMS. The Service has not been able to maintain equipment that were donated in the past, largely because such projects were executed without the direct involvement of LMS, and provisions were not made for maintenance during the installation phase. It is recommended that any intervention from SOFF should ensure the active participation of LMS throughout the processes and must also include a period of post-installation maintenance. Additionally, a well-detailed post-installation sustainability plan must also be developed in conjunction with the Liberian Government.

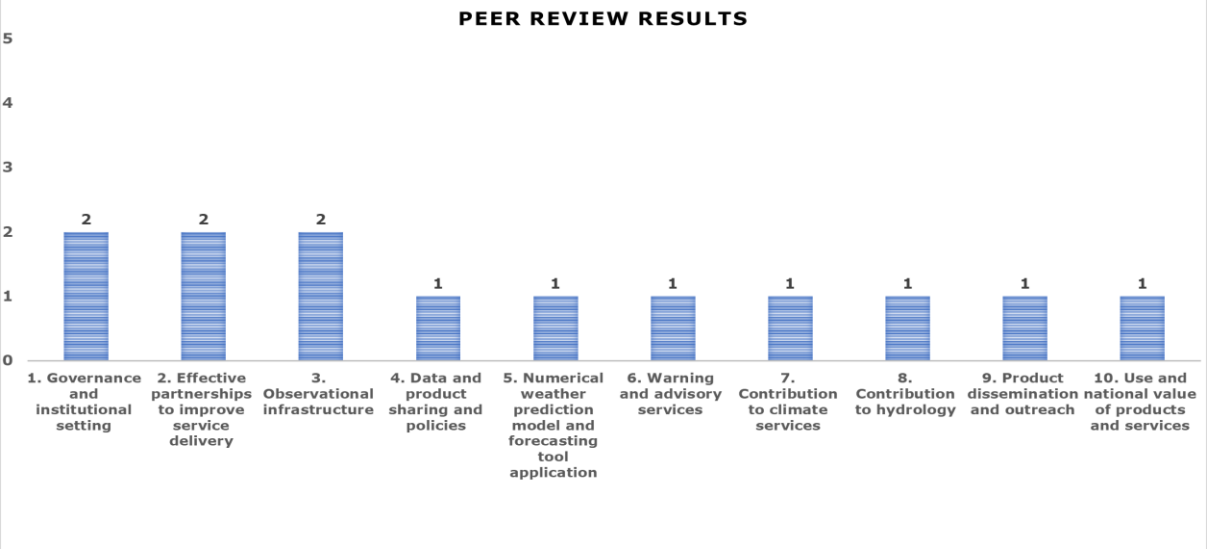
- The lack of a Standard Operating Procedure and Strategic Plan has hindered the operations of LMS and its ability to deliver products and services to its stakeholders. The LMS should as a matter of urgency develop a Strategic Plan and Standard Operating Procedure to guide its operations and collaboration with partner

organizations. The LMS is encouraged to key into available WMO support initiatives in actualizing this.

- Where products and services have been generated through Regional Climate Outlook Forum (e.g., PRESAGG), Regional Climate Centres (e.g., ACMAD, AGRYHMET), Regional Specialized Meteorological Centre (RSMC), and NMHSs such as NiMet, there has not been a proper channel for national downscaling and dissemination. The LMS should take advantage and downscale those products and services for National use (DRR, PWS, Health etc.). A targeted capacity development towards the communication of weather and climate information including Early Warnings and Advisories through local media, social media platforms and other electronic channels, is critically needed.

- A WMO-supported co-generation of products should be introduced in Liberia with adequate training and competency framework for the generation of Impact-Based Weather Forecasts, development of Advisories and appropriate usage.

Summary of assessment rating for CHD elements



Element	Maturity level score
1. Governance and institutional setting	2
2. Effective partnerships to improve service delivery	2
3. Observational infrastructure	2
4. Data and product sharing and policies	1
5. Numerical weather prediction model and forecasting tool application	1
6. Warning and advisory services	1
7. Contribution to climate services	1
8. Contribution to hydrology	1
9. Product dissemination and outreach	1
10. Use and national value of products and services	1

Chapter 1: General information

Introduction

CHD in Perspective

Global threats and challenges related to climate change and the impact of extreme weather and climate events are rising, and demand to provide high-quality weather, climate, hydrological, and related environmental information services - referred to as HYDROMET - is rapidly increasing. Despite the urgency and substantial investments in strengthening developing country hydromet capacity, difficult challenges remain in monitoring and tracking the performance of public meteorological services in an easy understandable and coherent manner.

Countries in the African region have never been more vulnerable to climate change impacts than at present, forcing them to continually adjust national development programmes at considerable costs. Most countries or sub-regions are increasingly prone to floods, droughts, heatwaves, and storms resulting in food shortages. Water for economic activity, drinking and livestock is becoming increasingly scarce. Dust storms are increasing in frequency, with associated health problems. There has been a resurgence of weather and climate-sensitive diseases in some countries and an increase in the geographic spread of epidemics like malaria and cholera. These changes are happening against the backdrop of increasing population on the continent and global changing climate.

The Country Hydromet Diagnostics responds to the need for a standardized, integrated, and operational tool and approach for diagnosing National Meteorological Services, their operating environment, their observation infrastructure, and their contribution to high-quality weather, climate, hydrological and environmental information services, and warnings. The Diagnostics is an umbrella tool that draws on and adds value to existing WMO assessment material by synthesizing existing approaches and data into an 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. The Alliance brings together major development and climate finance partners behind a joint commitment to strengthen developing country hydrometeorological capacities. 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 and data processing system, Services, Product production and dissemination, and user and 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 Service should lead to their maturity level. Please note that Level 5 is the highest attainable maturity level in this CHD assessment.

The CHD draws as much as possible on primary data (self-reported and other sources of quantitative data), but to inform the peer review, NiMet used additional data, in particular, data from country-level stakeholders' engagement and third-party surveys. The WMO Needs Assessment Mission Report to Liberia, WMO Early Warnings for All Rapid Assessment Report, and previous CHD report among others provided baseline data.

Country Status and Justifications

According to the World Bank Group's Climate Risk Country Profile on Liberia, the country is one of the wettest countries in the world, with the heaviest rainfall occurring from May to October. The country's average annual rainfall is relatively high, nearly exceeding 2,500mm. Rainfall is highest along the coast but decreases towards Liberia's interior plateaus and low mountains, where average rainfall reaches approximately 2,030mm per year. The Southern areas of the country receive rain year-round, while the rest of the country experiences two seasons due to the West African Monsoon.

The report also indicated that climate change is projected to increase temperatures and impact water availability across Liberia; some areas may also experience flooding due to increased intensity of rainfall, coastal erosion, and sea-level rise. Liberia as well as the West African Region are at high risk of projected climate trends of increased temperatures, and high variability of precipitation with the potential for increased heavy rainfall events.

Liberia is at high risk of natural hazards. Vulnerability is exacerbated due to the country's high level of poverty and high dependence on climate change-sensitive sectors, such as agriculture, fisheries, mining, and forestry. The contributing factors to the country's vulnerability to climate change conditions include mal-adapted agricultural practices, unregulated coastal sand mining, high levels of deforestation, inadequate infrastructure, low level of socio-economic development, **low institutional capacity and inadequate meteorological and hydrological data and data gathering capabilities** (*Climate Risk Profile: Liberia (2021): The World Bank Group*).

At present, Liberia's national capacity to handle predicted climate changes is weak; thereby increasing vulnerability. The Liberia Meteorological Service (LMS) reports that riverine flooding, sea level rise in coastal counties, severe thunderstorms and strong winds have become more frequent and caused huge damage across Liberia in recent years.

Despite the present challenges and the projected future impact of climate change on the country, the capacity to provide the level of required hydrometeorological information remains severely lacking. Decades of low investment in public sector institutions, coupled with slow post-conflict recovery has completely disrupted the meteorological and hydrological services of Liberia. Most hydrometeorological stations and records were lost during the conflict, thereby creating a significant capacity gap in the country's ability to observe, monitor, forecast, package, and communicate information products/services on the various states of the climate and surface water resources.

Hence, this has created a huge necessity for investment in the country to rehabilitate the existing network of stations and set up new ones to close all gaps in the delivery of weather, climate, and water-related services.

Key Service Needs and Natural Hazards Vulnerabilities

Liberia, like many countries around the world and West Africa in particular, is vulnerable to the impacts of climate change, including rising temperatures, flooding, severe thunderstorms, coastal flooding, sea level rise and tropical storms, altered rainfall patterns, and increased frequency and intensity of extreme weather events.

The UNDP-Liberia in 2009 conducted needs assessment in disaster risk reduction for Counties, Districts and Communities. According to the report of the assessment, the most common hydrometeorological hazards causing disasters in Liberian communities are floods, windstorms, and sea erosion. These climate-related hazards are expected to worsen with climate change. A survey conducted as part of the assessment indicated that windstorm constitutes 47% and floods, 23% of weather-related disaster affecting Liberia.

Lightning was also noted hazard increasingly more frequent and violent because of a changing climate.

While Liberia is mostly prone to flooding but not drought, human displacement in neighbouring countries may become an additional future challenge. Heavy rains, storm surges, sea level rise and increased erosion, put both urban and rural infrastructure at risk. Furthermore, heavily populated parts of the coast would be affected by frequent waterlogging, increased coastal erosion, and sea-level rise. This is likely to result in significant economic losses, damage to agricultural lands, infrastructure as well as human casualties. Climate change is also expected to increase the risks and severity of natural disasters in Liberia, through more intense temperatures as well as rainfall patterns, increased temperatures, and prolonged heat waves (*Climate Risk Profile: Liberia (2021): The World Bank Group*).

To address this, it is imperative that the Liberia Meteorological Service (LMS) is empowered with the adequate instruments and human skills to efficiently monitor the weather and climate of Liberia, as well as provide the much-needed Early Warnings and Alerts. Forecasts of impending storms and areas of likely high impacts will enable Disaster Risk Reduction (DRR) agencies to adequately prepare and respond in line with the global call for Early Action in building resilient societies.

Geographical Location of Liberia

This CHD report was developed for Liberia, a developing country in West Africa recovering from one and a half decades of civil war. Liberia is located at 4.38 to 8.42°N, -11.37 to -7.71°W. It borders the North Atlantic Ocean to the southwest (580 kilometres (360 mi) of coastline) and three other African nations on the other three sides, Sierra Leone to the northwest, Guinea to the northeast and Ivory Coast (Côte d'Ivoire) to the east.

Liberia is one of the most biologically diverse countries and was originally covered by continuous, dense tropical rainforest. Liberia has a predominantly equatorial climate, with three (3) distinct topographical belts. The low coastal belt is about 40km wide; and constitutes tidal creeks, shallow lagoons, and mangrove marshes. The second belt includes rolling hills that reach elevations of 60–150m, while the third belt comprises the bulk of Liberia and is marked by abrupt changes of elevation in a series of low mountains and plateaus, which are less densely forested.

In total, Liberia comprises 110,000 square kilometres (43,000 sq. mi) of which 96,300 square kilometres (37,190 sq. mi) is land and 15,000 square kilometres (5,810 sq. mi) is water (see Fig. 2). Liberia has a population of over 5m people with a population growth rate at of 2.4%. Approximately, 51.6% of the population currently live in urban areas and this is projected to increase to 57.3% and 68.2% of the population by 2030 and 2050, respectively. Liberia became a member of the World Meteorological Organization (WMO) on March 8, 1974.

Figure 1: The Geographical Location of Liberia

CHD Methodology

To conduct the assessment of the critical elements of the hydro-meteorological value chain, the Nigerian Meteorological Agency (NiMet) agreed to work with Liberia in this CHD as the Peer Advisor. In addition to the Country Information on the WMO Community Platform available in the database, a structured questionnaire was adopted based on the indicators of the CHD. This was combined with feedback from virtual meetings with critical staff members of the Liberia Meteorological Service (LMS). The Climate Services Checklist, WMO Early Warnings for All Rapid Assessment Report and the WMO Country Mission Report on Needs Assessment were also intensively reviewed.

In-country visit was also conducted by the Nigerian Meteorological Agency (NiMet). During the visit, meetings were held with critical stakeholders in the Ministry of Transport and the airports. A stakeholders' engagement workshop was conducted, bringing together all those involved in the weather and climate services value chain in Liberia.

This report is presented along 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 uplift maturity level.

Chapter 2: Country Hydromet Diagnostics

Element 1: Governance and institutional setting

1.1 Existence of Act or Policy describing the NMHS legal mandate and its scope

At present, there is no legal framework for LMS or its operations. The initial process of transforming LMS into an Agency of Government has been halted, this was done to accommodate a new proposal that will merge the LMS and LHS as one Agency of Government which is to be called "Liberia Hydromet Agency" (LHA). The process is ongoing with a bill before the parliament.

However, the Functions/Responsibilities of the Liberia Meteorological Services in its present format include but are not limited to the following:

a) Advise the Government of Liberia on all aspects of meteorology.

b) Collect, process, store and disseminate meteorological and climatological information in support of poverty reduction.

c) Analyse, prepare, and issue weather forecasts, including warnings of severe weather conditions and floods hazardous to human life and property.

d) Provide meteorological services for the development of national socio-economic activities.

e) Coordinate and supervise all meteorological, Climatological, and other related activities in the country in including those of line Ministries and Agencies of Government.

f) Cooperate and coordinate with the World Meteorological Organization (WMO), the African Centre of Meteorological Applications for Development (ACMAD) and the International Civil Aviation Organization (ICAO).

g) Cooperate and coordinate with universities and other scientific and research institutions locally and internationally.

h) Issue weather forecasts, warnings, and other information of use to the public, aviation, coastal and offshore marine, energy (wind, solar and hydro-electric), environmental sectors, water resources management, agricultural production, and food security.

i) Collect, process, and archive all meteorological and related data observed by all meteorological and climatological stations including airports and seaports.

j) Exchange data and products and disseminate data, analyses, forecasts, and other interpreted products in accordance with international agreements.

k) Prepare publications for planning and other purposes.

l) Collect fees and charges for the data, products or services rendered in accordance with the Law.

m) Represent the Government in meetings, conferences or seminars related to the purpose of the Liberia Meteorological Agency or as otherwise designated by the Government.

However, these functions are underperformed due to inadequate capacity and competency within the LMS.

1.2 Existence of Strategic, Operational and Risk Management plans and their reporting as part of oversight and management.

LMS does not have any existing strategic, operational or risk management plans. At the time of the assessment, LMS did not generate data nor perform most of the functions in relation to their mandate. Furthermore, the LMS personnel, though limited in number, possess varying skills (observation, forecasting, instrumentation, etc.) but lack the operational environment to apply their skills.

1.3 Government budget allocation consistently covers the needs of the NMHS in terms of its national, regional, and global responsibilities and based, among others, on cost-benefit analysis of the service. Evidence of sufficient staffing to cover core functions.

The LMS currently does not have a budgetary allocation for operations and procurement of necessary supplies, as it is currently domiciled as a unit within the Ministry of Transport (MoT). The annual salaries budget of the LMS personnel stands at USD 60,000. 100% of this budget comes from the Ministry of Transport, as the LMS does not generate any revenue on its own. As a result, the Liberia Meteorological Service is ill-equipped to meet its obligations, especially regarding the provision of Early Warnings for current climate and water threats and future climate- and water-related impacts. These capacity deficits in the LMS have negative impacts on national socio-economic development.

1.4 Proportion of staff (availability of in-house, seconded, contracted-out) with adequate training in relevant disciplines, including scientific, technical, and information and communication technologies (ICT). Institutional and policy arrangements in-country to support the training needs of NMHS.

Despite the absence of budgetary allocation, the LMS consists of the following categories of sixteen (16) staff, who receive salaries from the MoT: Management Staff (1), Technicians (7), Professionals (Engineers) (1), Observers (3), and Support Staff (4). See **Table 1.**

Most of these categories of staff have inadequate training or capacity building at the national level as there is no training policy in LMS. The Meteorologist and Meteorological Technicians have benefited from WMO Fellowships on capacity building.

Table 1: Staff list at Liberia Meteorological Service (LMS)

Category of Staff	Validated (by Peer-Reviewer)
Number of Staff (Management)	1
Meteorologist	7
Meteorological Technician	3
Hydrologist	0
Hydrological Technician	0
Climate Services	0
Researcher	0
Other	5
Total Staff number Male (M): Female (F)	(M= 12, F=4) 16

1.5 Experience and track record in implementing internationally funded hydromet projects as well as research and development projects in general.

The LMS in recent years has benefited and participated in the implementation of some internationally funded hydromet projects, such as the following:

i. The project in which EPA and UNDP-Liberia in consultation with LMS/MoT and LHS/MME collaborated to hire a national consultant to perform the task of drafting a bill to provide legal backing for LMS. Note that EPA is hosting a 5-year GCF/CDSF-funded Project under AfDB targeting LMS, LHS, NDMA and EPA and the development of this bill is one of the key deliverables. The EPA has been fast-tracking this deliverable under UNDP funding.

ii. The METAGRI ROVING Seminars and the Norwegian Hydrometric Project (NVE) were executed by international partners for LMS recently.

iii. Management of the GEF-funded Early Warning System project, though it was done through the Ministry of Transport (MoT), however, the MoT Project Manager is not a staff of LMS. This caused a significant disconnect in the project, which led to the delivery systems that are of questionable utility for climate risk analysis or for forecasting timescales from seasonal to sub-daily in Liberia.

iv. The Early Warning project which is financed by the GEF/LDCF through UNDP, which contracted the Earth Networks company to install Automatic Weather Stations on mobile phone towers as well as some ground stations.

v. The Early Warning System (EWS) project was developed under Liberia's National Adaptation Program of Action (NAPA) with the objective of rehabilitating the Liberia Meteorological Service (LMS) under the Ministry of Transport and the Liberian Hydrological Service (LHS) under the Ministry of Mines & Energy. The project established five (5) synoptic, six (6) agro-meteorological and seventeen (17) rainfall stations.

Summary Score, Recommendations and Comments for Element 1

In Liberia, hydro-meteorological services are provided by two Government institutions: Meteorological Services are being provided by the Liberia Meteorological Service (LMS) while Hydrological Services are provided by the Liberian Hydrological Service (LHS).

Though the LMS has some stated functions and responsibilities assigned to it, there is currently no legal framework backing it. However, there is an ongoing plan to merge the LMS and LHS. The LMS does not have any existing strategic, operational or risk management plans. No budgetary allocation for operational purposes and no existing training policy. The service has benefitted from some projects and programmes on weather and climate services over the years, however, the involvement of LMS in the executions was mostly indirect.

Based on the above assessment and the potential benefit of the proposed merger, the Governance and Institutional setting element of the hydro-met value cycle has been set to **Maturity Level 2 - indicating that "efforts ongoing to formalize the mandate, introduce improved governance, and management processes and address resource challenges" in the LMS.**

To lift the maturity level of this element:

- The Director of LMS should strive to liaise with the MoT to fast-track the merger of LMS and LHS.

- The PR should seek the support of WMO in the development of organizational strengthening, strategic and operational planning and setting up of Quality Management System in a process-driven structure.
- The Service should be fully involved in the implementation of any future intervention projects relating to weather and climate.

Element 2: Effective Partnerships to Improve Service Delivery.

2.1. Effective partnerships for service delivery in place with other government institutions.

There is no formal coordination arrangement for both inter- and intra-institutional partnerships. However, there are some levels of informal relationships based on goodwill. This requires the LMS to facilitate consultations to find and develop a national mechanism for effective partnership and collaboration on weather, climate, and water information as part of the LMS and LHS proposed merger.

2.2. Effective partnerships in place at the national and international level with the private sector, research centres and academia, including joint research and innovation projects.

LMS participates in the PRESAGG Seasonal Forecasting workshops before the commencement of the hydrological growing season. LMS usually participate in other regional programs from ACMAD and SWFDP West Africa. Answers to questionnaires indicate that there are no existing collaborations with academia and research institutions. There is no indication of any joint research, however, LMS has been involved in innovation projects such as EWS and NAP in the past and proposed Climate Information System (CIS) project.

2.3. Effective partnerships in place with international climate and development finance partners.

There is no indication of any effective partnerships in place with international climate and development finance partners. However, there is a CIS project that is about to take off.

2.4. New or enhanced products, services or dissemination techniques or new uses or applications of existing products and services that culminated from these relationships.

Liberia lacks a fully operational forecasting system to develop a variety of products and services responding to its partners'/users' needs. LMS currently has little capacity to deliver weather services. However, the LMS does have access to seasonal forecasts from RCOF, RCC, RMSC and NiMet. Though LMS has PUMA installed at the Roberts International Airport, Margibi County, it is only being by the Liberia Airport Authority (LAA). The absence of an internet facility has greatly impacted LMS access to products.

Summary Score, Recommendations, and Comments for Element 2

There is no existing formal framework for institutional partnership (Government and Private). The LMS participates in international technical meetings and has access to external forecast products. Though there is a proposed CIS project anchored by GCF and AfDB, the LMS does not have any relation with international finance partners. The absence of an internet facility has also impacted negatively on the LMS's ability to access products. However, it is believed that the proposed merger of LMS and LHS would improve the current situation.

Given the foregoing, it is believed that the maturity level of LMS in Effective partnerships to improve service delivery is at **Level 2 – reflecting that there is a "limited partnership and that LMS is mostly excluded from relevant finance opportunities".** Meteorological service provision in Liberia can currently be described as permissive.

To raise this level, it is recommended that the merger of LMS and LHS should be fast-tracked. Also, the LMS should urgently consider the development of a framework for formal cross-institutional partnerships. The LMS is encouraged to seek national and international support for the immediate closure of the infrastructural gap (internet facility) to aid easy access to products and their dissemination.

Element 3: Observational infrastructure

3.1. Average horizontal resolution in km of both synoptic surface and upper-air observations, including compliance with the Global Basic Observing Network (GBON) regulations.

There is no existing manual observation station in Liberia. The observing network of stations is made of twelve (12) AWS comprising four (4) synoptic stations, six (6) Agromet stations, one (1) vandalized third-party synoptic station; and eighteen (18) self-recording rainfall stations **(See annex 6 for list of stations).**

Though the LMS has no functional manned/manual surface observation stations, the existing AWS are not registered with the WIGOS and currently do not transmit data to the WMO WIS/GTS Platform. On average, the LMS AWS stations have a horizontal resolution of about 150km. There is no upper air station in Liberia.

Currently, only one LMS station located at Roberts International Airport, Margibi County, managed by personnel of LAA, is operational and transmitting data through Aeronautical Fixed Telecommunication Network (AFTN). However, if internet service is provided and WIS2.0 is implemented, eleven (11) LMS AWS stations could be transmitting data in line with GBON requirements, while the vandalized third-party station requires replacement.

3.2. Additional observations used for nowcasting and specialized purposes.

There is no additional observation used for nowcasting and specialized purposes.

3.3. Standard Operating Practices in place for the deployment, maintenance, calibrations, and quality assurance of the observational network.

The LMS has no existing Standard Operating Procedure (SOP) for either deployment or maintenance, quality assurance or calibration of equipment.

3.4 Implementation of sustainable newer approaches to observations.

Presently, none.

3.5. Percentage of the surface observations that depend on automatic techniques.

The LMS network of observation is 100 percent automatic stations.

Summary Score, Recommendations, and Comments for Element 3

Liberia has a total of twelve (12) AWS stations comprising eleven (11) LMS stations and one (1) vandalized third-party station. If the LMS stations are overhauled and provided with internet services, and the vandalized third party is adequately replaced, the twelve (12) stations will meet GBON requirements. Therefore, concerted efforts should be deployed towards making the AWS stations operational. There is no additional observation for Nowcasting and specialized products by the LMS. While the whole observation network is automatic, there is no SOP in place.

Considering the above, the Maturity level of the observational infrastructure at LMS is assessed to be **Level 2 – indicating the existence of a "basic network, large gaps, and mostly manual observations with severe challenges and data quality issues".**

This Status could be improved once the 11 AWS are fully operational (internet, power, and computer resources), and their data are seamlessly transmitted through WIS. The

development of a Strategic Plan and Standard Operating Procedure for an effective observation network and data exchange will also raise this maturity level.

Element 4: Data and Product Sharing and Policies

4.1. Percentage of GBON compliance – for how many prescribed surface and upper-air stations are observations exchanged internationally. Usage of regional WIGOS centres.

The LMS has no functional surface observation and upper air stations that are fully GBON compliant. The 11 AWS are not registered with WIGOS. Only the station at the airport in Monrovia is transmitting through AFTN but the data reporting is not in compliance with GBON requirements.

4.2. A formal policy and practice for the free and open sharing of observational data.

There is no existing formal policy in place.

4.3. Main data and products received from external sources in a national, regional and global context, such as model and satellite data.

While forecast models (GFS, ECMWF, UK MET, DWD), satellite products (NCEP, NASA, EUMETSAT), and finished products (ACMAD, AGRHYMET, NiMet) are available to LMS with valid credentials where applicable, however, access to them remains a challenge due to lack of power supply and internet connectivity. The PUMA station is operational when powered but not utilized by the LMS due to a lack of manpower and remote access.

Summary Score, Recommendations, and Comments for Element 4

While there are models, satellite products and finished products available through the internet, the LMS is not utilizing them due to lack of ICT infrastructure. The 11 AWS are currently zero per cent GBON compliant and are not registered with any WIGOS centre, and there is no existing formal policy in place for data sharing.

As such, the maturity level of the data and product sharing and Policies is, therefore, assessed and put at **Level 1** – **an indication that "no observational data is shared internationally, either because not available to be shared or due to the lack of data sharing policies or practices, or the existing infrastructure does not allow data sharing".**

To lift the maturity level, a good ICT infrastructure must be provided. Concerted efforts should be geared towards:

- The development of national regulations that govern the measurement, sharing and use of meteorological data.
- Creating a data policy for LMS that encourages the sharing of observational data.
- Implementation of a CDMS which is compliant with WMO standards.
- Resuscitation of any known previous National Statistical Database of meteorological data.

Element 5: Numerical model and forecasting tool application.

5.1. Model and remote sensed products form the primary source for products across the different forecasting timescales.

Although there is a PUMA workstation at the airport in Monrovia, it is not currently used by the LMS due to lack of power backup, internet connectivity and manpower.

5.2. a) Models run internally (and sustainably), b) Data assimilation and verification performed, c) appropriateness of horizontal and vertical resolution.

The Service does not have the internal capacity and capability to run and maintain a forecasting model of its own.

5.3. Probabilistic forecasts produced and, if so, based on ensemble predictions.

Since there is no fully operational forecast office at LMS, probabilistic ensemble predictions at any timescale are not being produced by the LMS.

Summary Score, Recommendations, and Comments for Element 5

There is a PUMA workstation at the Roberts International Airport, Margibi County, which is operational when powered. The LMS does not have the capacity to simulate forecast models and generate probabilistic forecasts of their own. Therefore, the maturity level for this critical element is assessed at **Level 1 – meaning that "forecasts are based on classical forecasting techniques without model guidance and only cover a limited forecast time range".**

To improve on the maturity level, LMS should consider the redeployment of some of their personnel to work with the LAA in utilizing the PUMA workstation. Capacity building towards the generation of probabilistic forecasts is highly recommended.

Element 6: Warning and advisory services

6.1. Warning and alert service cover 24/7.

The LMS does not have 24/7 warning services in place.

6.2. Hydrometeorological hazards for which forecasting and warning capacity is available and whether feedback and lessons learned are included to improve warnings.

The LMS presently does not provide forecasting or warning alerts for any hydrometeorological hazards (Flooding, Severe Thunderstorms, Coastal Flooding, Sea Level Rise, and Tropical Storms) on any timescale of their own. NiMet generates and issues forecasts with Early Warnings, when necessary, as part of technical support to Liberia. However, the utilization of the forecasts from NiMet and other secondary sources is impaired by a lack of ICT infrastructure. Therefore, adequate feedback could not be provided.

6.3. Common alerting procedures in place based on impact-based services and scenarios taking hazard, exposure, and vulnerability information into account and with registered alerting authorities.

There is no evidence of any implementation of a Common Alerting Protocol (CAP). However, with support, the LMS has indicated its readiness for CAP implementation.

Summary Score, Recommendations, and Comments for Element 6

There are no warning and advisory services in place at the LMS. Due to inadequate ICT infrastructure, their ability to utilize forecasts from secondary sources like NiMet and other centres is highly limited. This component is assessed as Maturity **Level 1 – this indicates that "warning service is not operational for public preparedness and response".**

To lift the maturity level:

- There is a need to improve the capacity of the LMS to issue warnings, alerts and advisories of their own.
- Immediate provision of ICT infrastructure will aid the utilization of third-party forecast products.

Element 7: Contribution to Climate Services

7.1. Where relevant, contribution to climate services according to the established capacity for the provision of climate services.

There is no governance structure in place, no basic systems of observation in place, no and user feedback interface in place to support contribution to climate services provision.

The LMS presently does not provide basic climate service to the citizens of Liberia. The provision and application of Climate Services, monitoring and evaluation of the socio-economic benefits, and capacity development in support of climate service delivery are below basic at present.

Note that the LMS currently have staff members with specialization in agrometeorology and climate services, however, there is no established formal arrangement with relevant ministries and agencies/institutions to design and implement suitable climate products and services.

Summary Score, Recommendations, and Comments for Element 7

The maturity level is assessed at **Level 1 – indicating that the LMS has "less than basic Capacity to provide Climate Services".**

However, to raise this maturity level, there is a need for improvement in the existing informal relationships among institutions and the development of a formal arrangement.

The maturity level could also be improved if climate database, and historical data/document management systems are resuscitated to aid the development of products and services in support of DRR/Environment, Health, Transportation, and Construction etc.

Element 8: Contribution to Hydrology

8.1. Where relevant, standard products such as quantitative precipitation estimation and forecasts are produced on a routine basis according to the requirements of the hydrological community.

The LMS has no formal mechanism for the exchange of data and products with the LHS.

8.2. SOPs in place to formalize the relation between Met Service and Hydrology Agency, showing evidence that the whole value chain is addressed.

There is no existing Standard Operating Procedure (SOP) for working relationship between LMS and LHS. However, the proposed merger should address this.

8.3. Data sharing agreements (between local and national agencies, and across international borders as required) on hydrological data in place or under development.

There is no formal data-sharing agreement/policy.

8.4 Joint projects/initiatives with the hydrological community designed to build hydrometeorological cooperation.

There are no joint projects/initiatives available between LMS and LHS.

Summary Score, Recommendations, and Comments for Element 8

Considering the above information, the **maturity level** has been assessed as **Level 1 – "No or very little meteorological input in hydrology and water resource management".**

However, it is recommended that the proposed merger through the CIS project should be accelerated to raise the maturity level of this element.

Element 9: Product Dissemination and Outreach

9.1. Channels used for user-centred communication and ability to support those channels (for example, does the NMHS operate its own television, video or audio production facilities? Does it effectively use cutting-edge techniques?).

- LMS does not have a TV studio and doesn't have a website of its own to help with the dissemination of meteorological information.
- The Service doesn't have an outreach program of its own even though NiMet generates and transmits the daily weather forecast bulletin to LMS.
- There is no communication channel to reach the high-impact weather-vulnerable communities in Liberia.

9.2. Education and awareness initiatives in place.

None

9.3. Special measures in place to reach marginalized communities and indigenous people.

None

Summary Score, Recommendations, and Comments for Element 9

Given the above, the maturity level is assessed at **Level 1 – "Dissemination using only limited traditional channels such as daily newspapers and the national broadcaster and with little control over messaging and/or format".**

To uplift the assessed maturity level of this critical element:

- There is a need for urgent action to improve LMS's ability to access and disseminate the daily weather bulletins prepared for Liberia by the Nigeria Meteorological Agency (NiMet).
- LMS should enter discussions with LBS and other media stations to agree on modalities for providing weather forecasts for the public.
- LMS should consider and discuss with relevant stakeholders and user communities who would benefit from early warning services. These could include fisherfolks and farmers, DRM etc.

Element 10: Use and National Value of Products and Services

10.1. Formalized platform to engage with users in order to co-design improved services.

No existing formalized platform for engaging users.

10.2. Independent user satisfaction surveys are conducted, and the results used to inform service improvement.

The LMS does not have any formal process for conducting feedback surveys and does not have a stakeholder platform for co-designing services with users.

10.3. Quality management processes that satisfy key user needs and support continuous improvement.

There is no QMS in place.

Summary Score, Recommendations, and Comments for Element 10

The maturity level of this critical element is assessed as **Level 1 – "Service development lacks any routine stakeholder feedback practice".**

To uplift this maturity level, there is a need for LMS:

- To improve their ability to access products provided by third parties e.g., NiMet, ACMAD, RCOFs etc. for downscaling and dissemination.
- Develop strategy for co-design of products and improved service delivery. This will create an avenue for generating feedback surveys.
- Support in the development of QMS and Competency framework is recommended.

Annex 1 Consultations (including experts and stakeholder consultations)

i. Virtual meeting with SOFF Secretariat and the LMS on the commencement of the process.

ii. Virtual meetings with the LMS team for information and data gathering.

iii. Consultation with the LMS for their input in the CHD report.

iv. Consultation with the official of the Liberia Ministry of Transport during the in-country visit.

v. Consultation with the official of Liberia Airport Authority during visits to the Roberts I'ntl. Airport and the James Spriggs Payne Airfield.

vi. Consultation with Stakeholders and partners of LMS during the Stakeholders' engagement segment of in-country visit.

vii. Commissioning of third-party consultants for the assessment of stations outside Monrovia.

Annex 2 Urgent needs reported

i. The rehabilitation of the existing 10 AWSs should be given urgent and immediate attention.

ii. Provision of ICT infrastructure and power supply including workstations for the LMS office at the Ministry of Transport is a necessity.

iii. Linking the AWSs to a central data collection point should be given the necessary attention.

iv. Development of a Standard Operating Procedure and Strategic Plan for the LMS.

v. Immediate training on products and services development for the technical staff of LMS is highly recommended.

vi. Fast-tracking the merger of LMS and LHS.

Annex 3 Information supplied through WMO

Most baseline information was retrieved from previous WMO documents directly or indirectly linked to Liberia. These include the Early Warning Rapid Assessment report and the previous CHD report for Liberia.

- WMO Monitoring System Data
- WMO EW4All Rapid Assessment for Pillar-2
- WMO Hydrology Survey
- Data from Checklist for Climate Services Implementation

Annex 4 List of materials used

i. GBON station data collection template.

ii. Previous CHD report on Liberia

iii. CHD_EW4All_Data Inventory and Review Sheet

iv. Station Checklist developed for Liberia

v. CHD-questionnaire

vi. Data from country-level stakeholders' engagement

vii. The WMO Needs Assessment Mission Report to Liberia

viii. WMO Early Warnings for All Rapid Assessment Report

ix. National disaster management policy for Liberia

x. UNDP-Liberia capacity needs assessment in disaster risk reduction for counties, districts and communities

xi. Climate Risk Profile: Liberia (2021): The World Bank Group

xii. Documentary: Liberia's National Adaptation Plan

Annex 5 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	• The Director of LMS should strive to liaise with the MoT to fast-track the merger of LMS and LHS. • The PR should seek the support of WMO in the development of organizational strengthening, strategic and operational planning and setting up of Quality Management System in a process-driven structure.
2	Effective Partnerships to Improve Service Delivery	• The merger of LMS and LHS should be fast-tracked. • LMS should urgently consider the development of a framework for formal cross-institutional partnerships. • The LMS should seek national and international support for the immediate closure of the infrastructural gap (internet facility) to aid easy access to products and their dissemination.
2	Observational Infrastructure	• The existing 10 AWSs should be made fully operational (internet, power, and computer resources), and their data seamlessly transmitted through WIS. • Develop a Strategic Plan and Standard Operating Procedure for an effective observation network and data exchange
1	Data and Products Sharing and Policies	• A good ICT infrastructure must be provided. • The development of national regulations that govern the measurement, sharing and use of meteorological data. • Creating a data policy for LMS that encourages the sharing of observational data. • Implementation of a CDMS which is compliant with WMO standards.

		• Resuscitation of any known previous National Statistical Database of meteorological data.
1	Numerical Model and Forecasting Tool Application	• LMS should consider the redeployment of some of their personnel to work with the LAA in utilizing the PUMA workstation. Capacity building towards the generation of probabilistic forecasts is highly recommended.
1	Warning and Advisory Services	• There is a need to improve the capacity of the LMS to issue warnings, alerts, and advisories of their own. • Immediate provision of ICT infrastructure will aid the utilization of third-party forecast products
1	Contribution to Climate Services	• There is a need for improvement in the existing informal relationships among institutions and the development of a formal arrangement. • Climate database, and historical data/document management systems should be resuscitated to aid the development of products and services in support of DRR/Environment, Health, Transportation, and Construction etc.
1	Contribution to Hydrology	• It is recommended that the proposed merger through the CIS project should be accelerated to raise the maturity level of this element.
1	Product Dissemination and Outreach	• There is a need for urgent action to improve LMS's ability to access and disseminate the daily weather bulletins prepared for Liberia by the Nigeria Meteorological Agency (NiMet). • LMS should enter discussions with LBS and other media stations to agree on modalities for providing weather forecasts for the public. • LMS should consider and discuss with relevant stakeholders and user communities who would benefit from early warning services. These could include fisherfolks and farmers, DRM etc

1	Use and National Value of Products and Services	• To improve their ability to access products provided by third parties e.g., NiMet, ACMAD, RCOFs etc. for downscaling and dissemination. • Develop strategy for co-design of products and improved service delivery. This will create an avenue for generating feedback surveys. • Support in the development of QMS and Competency framework is recommended.

Annex 6 List of stations.

S/N	STATION NAME	TYPE OF STATION	LOCATION OF STATION	STATUS OF THE STATION
1.	Roberts I'ntl. Airport	Synoptic	Harbel	Operational
2.	James Spriggs Payne Airfield	Synoptic	Monrovia	Vandalized
3.	Zwedru Air Strip	Synoptic	Grand Gedeh	Lack Internet Connectivity and maintenance
4.	Tapeta Air Strip	Synoptic	Nimba	Lack Internet Connectivity and maintenance
5.	Harper Air Strip	Synoptic	Maryland	Out of Order
6.	Grand Cess Air Strip	Synoptic	Grand Cess	Out of Order
7.	Forestry Training Institute	Agromet	Bomi	Lack Internet Connectivity and maintenance
8.	Bassa MoA	Agromet	G. Bassa	Lack Internet Connectivity and maintenance
9.	Fish Town MoA	Agromet	River Gee	Out of Order
10.	CARI	Agromet	Bong	Lack Internet Connectivity and maintenance
11.	Voinjama MoA	Agromet	Lofa	Lack Internet Connectivity and maintenance
12.	Sarclepea Magisterial Court	Agromet	Nimba	Lack Internet Connectivity and maintenance
13.	Cestos High	Rainfall	Rivercess	Lack Internet Connectivity and maintenance
14.	Timbo Bridge	Rainfall	Rivercess	Lack Internet Connectivity and maintenance
15.	Panama	Rainfall	Greenville	Lack Internet Connectivity and maintenance
16.	Sinoe Multilateral	Rainfall	Greenville	Lack Internet Connectivity and maintenance
17.	MoA Barclayville	Rainfall	Grand Kru	Lack Internet Connectivity and maintenance
18.	GVL Kabadeh	Rainfall	Sinoe	Lack Internet Connectivity and maintenance
19.	Philadelphia	Rainfall	Maryland	Lack Internet Connectivity and maintenance

20.	BTC Barracks	Rainfall	Monrovia	Lack Internet Connectivity and maintenance
21.	Search & Rescue	Rainfall	Monrovia	Lack Internet Connectivity and maintenance
22.	EBK Barracks	Rainfall	Margibi	Lack Internet Connectivity and maintenance
23.	Cpd #1 Police Station	Rainfall	G. Bassa	Lack Internet Connectivity and maintenance
24.	Bomi Community Collage	Rainfall	Bomi	Lack Internet Connectivity and maintenance
25.	Bassa Community Collage	Rainfall	G. Bassa	Lack Internet Connectivity and maintenance
26.	Edina G. Bassa	Rainfall	G. Bassa	Lack Internet Connectivity and maintenance
27.	C Mount LWSC	Rainfall	Cape Mount	Lack Internet Connectivity and maintenance
28.	Buchana City Hall	Rainfall	G. Bassa	Lack Internet Connectivity and maintenance
29.	Kmtc Klay	Rainfall	Bomi	Lack Internet Connectivity and maintenance
30.	Rainfall Senji UL	Rainfall	Cape Mount	Lack Internet Connectivity and maintenance

Annex 7 List of Hydrological Stations

The Liberia Hydrological Service is operating 15 manual water level hydrometric stations in 6 principal river basins. 11 of the 15 stations have an automatic water level logger in addition to the manual reading. 10 Manual rainfall stations. All stations have local observers trained by LHS staff and 13 observers employed by the Ministry of Mines and Energy. Two observers on a basic contract provided by the Rural Renewable Energy Agency (RREA). The observer goes to the river twice a day and records the water level and the rainfall gauge readings. The Liberia Hydrological Service was able to publish data on its website. www.lhsliberia.com

Station Name	Parameter(s) Measure	Challenges	Recommendation
Kolba City	River Water Level	➢ Power outage during the dry season ➢ Extremely difficult driving conditions in the rainy season from May to October ➢ Lack of internet connection ➢ Lack of funding to LHS to carry out hydrological work ➢ Lack of in-house ICT professionals	➢ Need IT support just in case of hardware failure and license for Aquarius software ➢ Establish hydrometric station on another river basin. ➢ Support the hosting of the website ➢ Assessment of all hydrometric stations
Mano River Kongo	River Water Level & Rainfall		
Mbaloma	River Water Level		
Lofa Bridge	River Water Level & Rainfall		
Haindii	River Water Level & Rainfall		
Piata_Paul	River Water Level & Rainfall		
Piata_Via	River Water Level		
Walker Bridge	River Water Level & Rainfall		
Frank Diggs	River Water Level & Rainfall		
Mount Findley	River Water Level & Rainfall		
Sokopa	River Water Level & Rainfall		
Gbedin	River Water Level		
ITI	River Water Level & Rainfall		
Saywoo	River Water Level & Rainfall		
Kitoken	River Water Level		

STATION METADATA:

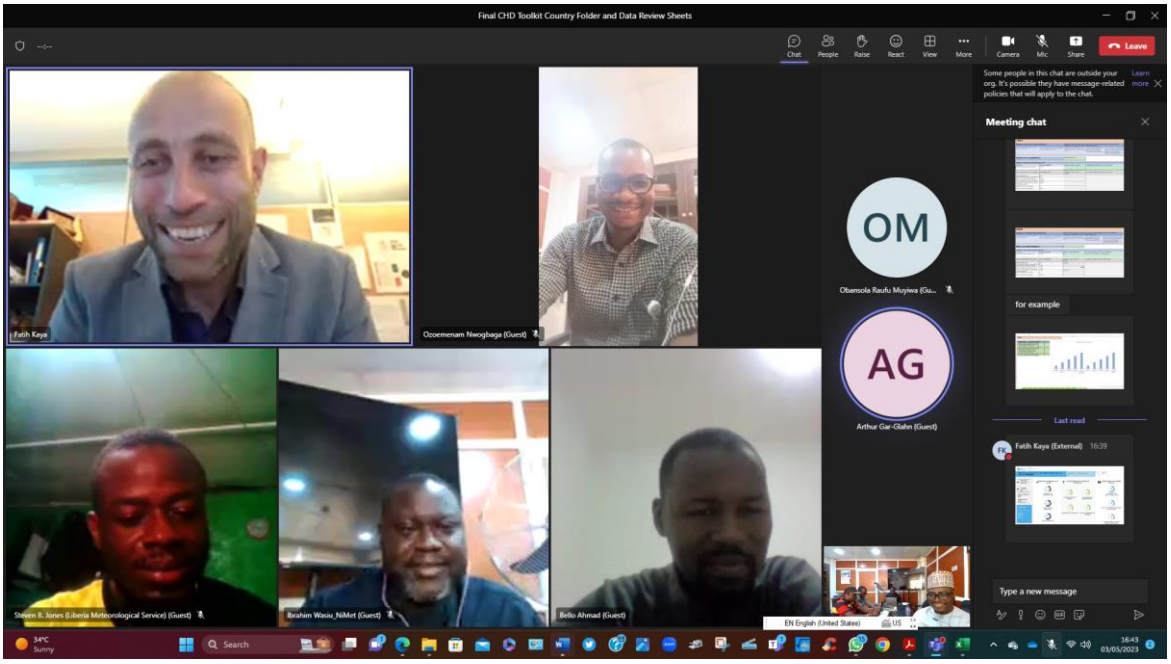
NO.	Station Names	Basin Names	River Names	Started Recording	Station Coordinates		Elevation (m)	Station Types
					Latitude	Longitude		
1	Kolba City, Lofa County	Mano	Kaiha	7-Jan-14	8.27773611	-10.0783333	466	Manual Water Level
2	Mano River Kongo, Grand Cape Mt. Co.	Mano	Mano	21-Dec-15	7.32752778	-11.1433333	89	"
3	Mbaloma, Lofa County	Mano	Kaiha	22-May-18	8.00271912	-10.2115176	450	"
4	Lofa Bridge, Grand Cape Mt. County	Lofa	Lofa	7-Jun-12	7.06719444	-10.8805556	78	"
5	Haindii, Bong County	St. Paul	St. Paul	26-Apr-12	6.90210556	-10.3616667	122	"
6	Piata, Bong County	St. Paul	St. Paul	16-Mar-13	7.20253056	-9.81861111	207	"
7	Piata, Bong County	St. Paul	Via	14-Mar-13	7.20745000	-9.81500000	213	"
8	Walker Bridge, Beyan Town, Lofa County	St. Paul	St. Paul	28-Jul-19	7.33741000	-9.49991000	274	"
9	Frank Diggs, Grand Bassa County	St. John	St. John	2-Mar-13	6.46555556	-9.52611111	165	"
10	Mount Findley, Grand Bassa County	St. John	St. John	8-Apr-13	6.09222222	-9.86972222	81	"
11	Sokopa, Nimba County	St. John	St. John	26-Jul-19	7.06407	-9.16327	244	"
12	Gbedin, Nimba County	St. John	St. John					
13	ITI, Rivercess County	Cestos	Cestos	29-Mar-14	5.61727778	-9.31888889	34	"
14	Saywoo, Sinoe County	Sinoe	Sinoe	22-Jun-18	5.11640904	-9.00467363	15	"
15	Kitoken, RiverGee County	Cavalla	Gee					

NO.	Station Names	Basin Names	Started Recording	Station Coordinates		Station Types
				Latitude	Longitude	
1	LHS, Montserrado County		18-Jul-07	6.28151667	-10.7563889	**Rainfall**
2	Mano River Kongo, Grand Cape Mt. Co.	Mano	23-Dec-15	7.32805556	-11.1416667	"
3	Lofa Bridge, Grand Cape Mt. County	Lofa	25-Jan-13	7.06747222	-10.8813889	"
4	Haindii, Bong County	St. Paul	24-Jan-13	6.90538889	-10.3633333	"
5	Piata, Bong County	St. Paul	21-Feb-13	7.18827778	-9.80305556	"
6	Walker Bridge, Beyan Town, Lofa County	St. Paul	6-Jan-18	7.33791667	-9.50194444	"
7	Frank Diggs, Grand Bassa County	St. John	17-Apr-17	6.465556	-9.526028	"
8	Mt. Findley, Grand Bassa County	St. John	11-May-13	6.08250000	-9.85638889	"
9	Sokopa, Nimba County	St. John	9-Jan-18	7.06202778	-9.16388889	"
10	ITI, Rivercess County	Cestos	20-Apr-17	5.62127778	-9.31611111	"

Annex 8 List of Abbreviations

ACMAD	African Centre of Meteorological Applications for Development
AfDB	African Development Bank
AFTN	Aeronautical Fixed Telecommunication Network
AGRYHMET	Agrometeorology and Operational Hydrology
AWS	Automatic Weather Stations
CAP	Common Alerting Protocol
CDMS	Clinical data management system
CDSF	Capacity Development Support Facility
CHD	Country Hydromet Diagnostics
CIS	Climate Information System
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DWD	Deutscher Wetterdienst
ECMWF	European Centre for Medium-Range Weather Forecasts
EPA	Environmental Protection Agency
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EW4All	Early Warning for All
EWS	Early Warning System
GBON	Global Basic Observing Network
GCF	Green Climate Fund
GEF	Global Environment Facility
GFS	Global Forecast System
GTS	Global Telecommunication System
HYDROMET	Hydrometeorological
ICAO	International Civil Aviation Organization
ICT	Information and Communications Technology
LAA	Liberia Airport Authority
LBS	Liberia Broadcasting Service
LDC	Least Developed Countries
LDCF	Least Developed Countries Fund
LHA	Liberia HydroMet Agency
LHS	Liberia Hydrological Services
LMS	Liberia Meteorological Service
METAGRI	Meteorological Assistance for Agrometeorological Services
MoT	Minister of Transport
NAP	National Adaptation Plan
NAPA	National Adaptation Program of Action
NASA	National Aeronautics and Space Administration
NCEP	National Centre for Environmental Prediction
NDMA	National Disaster Management Authority
NiMet	Nigerian Meteorological Agency
NMHSs	National Meteorological and Hydrological Services
NVE	Networked Virtual Environment
PRESAGG	Regional Climate Outlook Forum for the Gulf of Guinea Countries
PUMA	Preparation for the Use of Meteosat Second Generation in Africa
PWS	Personal Web Space
QMS	Quality Management System
RCC	Rail Control Centre
RCOF	Regional Climate Outlook Forum
RSMC	Regional Specialized Meteorological Centre
SIDS	Small Island Developing States
SOFF	Systematic Observations Financing Facility
SOP	Standard Operating Procedure
SWFDP	Severe Weather Forecasting Development Project
UK MET	United Kingdom Meteorological Office
UNDP	United Nations Development Programme
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization

Annex 9 Picture Gallery



CHD Initiation meeting: NiMet Team, WMO Secretariat and LMS Team

In-country Visit: The PR of Liberia interacting with NiMet Team led by the DG/CEO & PR of Nigeria with WMO

DG/CEO - NiMet:Prof Mansur Bako Matazu on a courtesy visit to the Deputy Minister for Administration & Insurance, Liberia Ministry of Transport:Hon. Sirleaf R. Tyler and the Assistant Minister for Administration & Insurance: Hon. Gertrude J.D. Williams

Stakeholders' Engagement: Participants at the end of the event

A cross-section of participants at the Stakeholders' Engagement

On-the-spot assessment of the station at Roberts International Airport

Validation Workshop: Participants at the end of the event

Visit to the Liberian Deputy Minister of Transport during the Validation Workshop

Representatives of NiMet SOFF Team during the during the Validation Workshop