COUNTRY HYDROMET DIAGNOSTICS

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

April 2025

Somalia Peer Review Report

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Executive Summary

Decades of conflicts and political instability have left Somalia with no NMHS governance and institutional structure. This lack of structure has affected the ability of the country to deliver a well-coordinated climate service for the public. Observation infrastructures donated by various projects from local and international partners are domiciled under different ministries. Thus, there is no Standard Operating Procedure (SOP) for meteorological observations (including data collation and transmission). There is also no dedicated budgetary allocation for providing weather and climate-related activities. The existing infrastructures were done on a project basis through government interventions and donations from various developmental partners.

Despite the challenges, there is an ongoing effort to institutionalise NMHS in the country. A proposal to set up an NMHS has been made, and a draft law is before the national legislature. However, this process has also been affected by political crisis and war that has continued to linger. The law was supposed to have passed its first phase and signed by the president in July 2023 but at the time of this report, the law's passage is still pending.

In the meantime, the Ministry of Environment and Climate Change (MoECC) has a Meteorology Unit, the Civil Aviation collects data of most of the active stations, and SoDMA has early warning unit as well. The government in the past also established the Hydro-Meteorological Working Group (HWG) domiciled in the MoEWR, an inter-ministerial working group overseeing weather and climate-related activities as part of their functions.

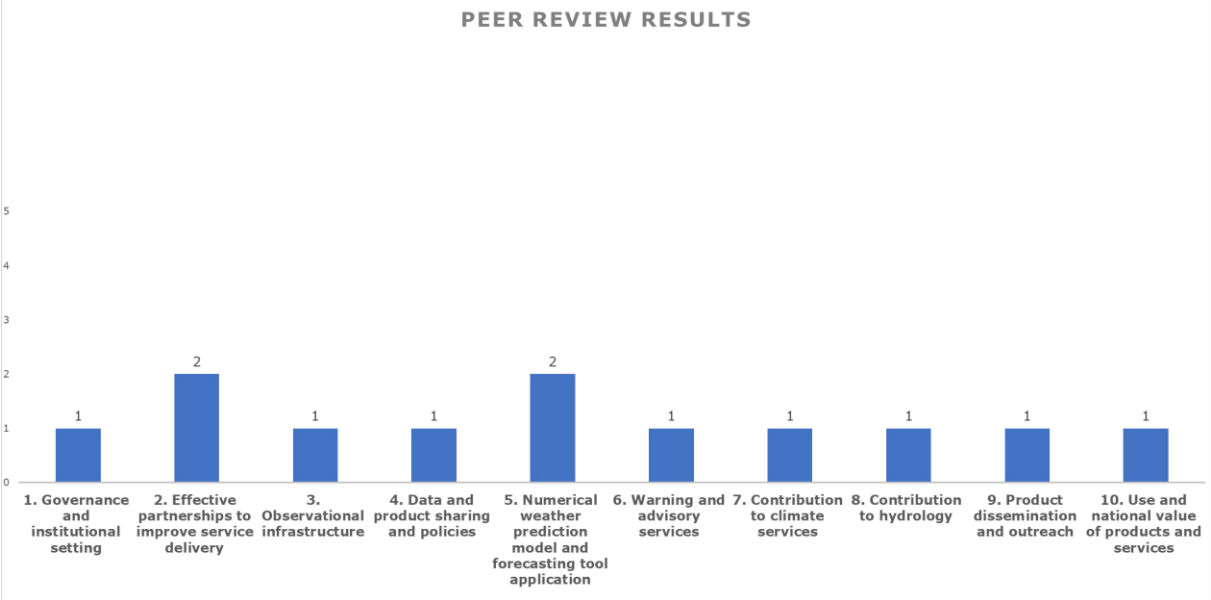
Meteorological observation stations are well spread across Somalia, all provided and managed by third parties, such as SCAA, FAO-SWALIM, MOAI, MOEWR, MOLFR, etc. There are no surface observation or upper air stations that are currently GBON-compliant. SCAA-managed stations exchange surface observation data internationally via AFTN for aviation purposes, thus the occasional sighting of observations from Somalia on WDQMS. There is a server installed at MOEWR where all AWS under the Ministry are networked. Data are streamed in its raw format to Sever, but there are no trained meteorological observers to code them into synoptic messages and there is no infrastructure/capacity for them to be exchanged internationally.

Individual considerations of each of the ten (10) CHD elements show that elements 1, 3,4,6, 8, 9, and 10 are all still basic at best and below basic in some instances, with a maturity level of one (1). Elements 2 and 5 are ranked at maturity levels of two (2), as there is a platform for partnership at the national level and with international development partners. The MoEWR and SCAA can access NWP model products from regional and global model centres. Even though there are existing observation infrastructures requiring just minor upgrades and training of personnel on international data exchange for them to become GBON-compliant, however, they all are owned by third parties. Note that the HWG is also providing some level of warning and advisory services for some hydrometeorological hazards including thunderstorms, flooding, tropical cyclones, riverine flooding, etc. However, element 7 is also assessed to be level 1 as there is no NMHS to provide full climate services. Only skeletal climate services are provided by third parties including different Ministries and Agencies such as the Ministry of Energy and Water Resources, Ministry of Environment, and Somali Civil Aviation Authority (SCAA), with aid from development partners such as the FAO.

Recommendations:

1. Fast-track the proposed law currently before the parliament seeking to establish an NMHS in Somalia.
2. Strong support from the WMO sub-regional and regional offices, for the take-off of the proposed NMHS.
3. The proposed NMHS should be encouraged to build on the existing informal partnerships between various MDAs and development partners.
4. Consideration for South-South cooperation for capacity development in institutionalizing the proposed NMHS.
5. Seek national and international support for the immediate closure of the infrastructural gap to aid easy access to products and their dissemination.
6. Security challenges should be given adequate consideration in choosing the stations to be rehabilitated or the locations for new stations under SOFF intervention. This may not necessarily be in line with GBON's horizontal resolution.
7. The proposed Meteorological Agency will be an independent institution but part of the MoECC. However, before its formation, capacity building can be considered for MoECC, SCAA and MoEWR to take advantage of their existing infrastructure for international data exchange when the Agency takes off.
8. Consider the installation of WIS2.0 and provide training to personnel, for the effective use of the Server at MoEWR for international data exchange, pending when the proposed NMHS takes off operations.
9. The NMHS when established will help resuscitate the climate database management systems to aid the development of products and services with socio-economic benefits.
10. There is a need to conduct regular awareness campaigns on weather and climate-related issues.

Summary of assessment rating for CHD elements



Element	Maturity level score
1. Governance and institutional setting	1
2. Effective partnerships to improve service delivery	2
3. Observational infrastructure	1
4. Data and product sharing and policies	1
5. Numerical weather prediction model and forecasting tool application	2
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

This CHD report was developed for Somalia. Somalia is located at 5.6°N latitude and 47.2°E in eastern Africa. Somalia is bordered by the Gulf of Aden to the north, the Indian Ocean to the southeast, and Djibouti, Ethiopia, and Kenya to the west. With a land area of 637,657 square kilometres, Somalia's terrain consists mainly of plateaus, plains and highlands. Its coastline is more than 3,333 kilometres in length, the longest of mainland Africa. It has been described as being roughly shaped "like a tilted number seven".

Cal Madow is a mountain range in the northeastern part of the country. Extending from several kilometres west of the city of Bosaso to the northwest of Erigavo, it features Somalia's highest peak; Shimbiris, which sits at an elevation of about 2,416 metres (7,927 ft). The rugged east-west ranges of the Karkaar Mountains also lie to the interior of the Gulf of Aden littoral. In the central regions, the country's northern mountain ranges give way to shallow plateaus and typically dry watercourses that are referred to locally as the Ogo. The Ogo's western plateau, in turn, gradually merges into the Haud, an important grazing area for livestock.

The population of Somalia in 2023 is estimated to be 18,143,378 people. Somalia's population has grown substantially over the last 50 years, from 4.13 million to 18.1 million persons. The natural increase in population in 2023 was 529,789 people, with 738,040 live births and 208,251 deaths. The number of males and females in Somalia as of December 31, 2023, were 8,533,559 and 8,672,140, respectively. Somalia became a member of the World Meteorological Organization (WMO) on March 31, 1964.

Figure 1: The Geographical Location of Somalia

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.

Reliable weather, climate and hydrological services are vital to avoid natural events becoming natural disasters and to build the foundation for sustainable development across the world. The World Bank estimates that a well-functioning hydromet value chain worldwide can increase the efficiency and productivity of many sectors of the economy leading to minimum potential benefits of 162 billion dollars per year, but the question is 'how can assistance be consistently given where the investment is needed most?'. The country hydromet diagnostics (CHD) has been developed by the Alliance for hydromet development. The diagnostics are an integrated tool and peer review approach to assist the maturity of hydromet services across 10 different critical elements; the process is innovative, quick and collaborative.

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 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 Somalia, WMO Early Warnings for All Rapid Assessment Report, and previous CHD report among others provided baseline data.

CHD methodology

As part of SOFF assessment for Somalia, the Nigerian Meteorological Agency (NiMet) agreed to carry out a comprehensive assessment of the critical elements of the hydro-meteorological value chain, using the Country HydroMet Diagnostics (CHD). To fulfil this agreement, NiMet embarked on data gathering from Somalia through a series of online meetings and a review of documents from WMO and other international organizations.

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 the PR and his team. 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.

To further assess and authenticate the accuracy of the information gathered from the above sources, an 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, Ministry of Energy and Water Resources (MoEWR), Ministry of Environment, Somali Civil Aviation Authority (SCAA), and other developmental partners. A stakeholders' engagement workshop was conducted, bringing together all those involved in the weather and climate services value chain in Somalia.

This report is presented along the ten most critical elements of the hydro-meteorological value 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 recommendations offered to aid uplifting maturity level.

Country Status

According to the World Bank climate change portal (https://climateknowledgeportal.worldbank.org>somalia), Somalia has a tropical climate that is generally arid, and the country is hot all year round, with very little rainfall, typical of a desert or semi-desert climate in vast areas. The wettest areas are occupied by the savannah. Somalia experiences two rainy seasons: the Gu from April to June and the Dayr from October to November. The average annual rainfall is about 200 mm in most parts of the country. Only the northern coastline receives significantly less rainfall (only up to 50 mm). Rainfall in the south is higher at approximately 400 mm and highest in the southwest with around 600 mm rainfall on an annual average. The winter season is from November to March. Drought usually occurs every two to three years in the Dayr and every eight to ten years in both the Dayr and the Gu.

Climate change is creating the 'new normal' in Somalia - with more arid landscapes, unstable water and food supplies, and more climate-induced displacement.

Somalia is the second most climate-vulnerable country in the world and one of the least ready to face the climate crisis, according to the global climate index ND-GAIN. Climate change in Somalia is characterized by recurrent drought and regular flooding which leads to failed crops, loss of livestock and Somalia's chronic food insecurity (Kiyomi de Zoysa and Stefanie Tye, 2023). Profiles of Adaptation: Somalia

Somalia Climate Risk Profile provides policymakers and practitioners in the field with an overview of projected climate parameters and related impacts on different sectors from now until 2080 under two different climate change scenarios. Such information is crucial to support decision-making towards a more climate-resilient and peaceful future. Long-term planning that promotes resilience in Somalia will also require understanding how climate change interacts with conflict and instability, to affect the lives of Somalians. Production of products/services on the various states of the climate and surface water resources requires adequate spread of the observation network of stations, 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

Somalia's natural and human geography is shaped by its harsh climate. Lying at the eastern extremity of the Sahel, Somalia has an arid to semi-arid climate. Average annual rainfall is under 200 millimeters in much of the country, although it is significantly higher in the northern highlands and the south. Mean daily maximum temperatures exceed 30°C

in most areas, although they fall much lower in the northern highlands and are tempered by cool offshore currents along the eastern seaboard. Most of Somalia's land area is covered in desert and semi-desert ecosystems, with sparse or seasonal grassland vegetation. Over 50 percent of the country supports only extensive, nomadic pastoralism; with just 13 percent suitable for cultivation, including seasonal agropastoralism and a much smaller irrigated agropastoralism zone located along the two main river valleys (Shabelle and Juba). These limited agricultural areas, and nearby or coastal cities, support most of the population.

Somalia is in the Horn of Africa, with both arid and desert climates and the longest coastline of any mainland African country. The landscape is characterized by plains in the south, highlands, and plateaus in the north, and a mountain range along the northern coast. Somalia experiences two rainy seasons, one in April-June and one in October-December and the Juba and Shabelle Rivers bring water through southern Somalia into the Indian Ocean[1].

From January 2021 to March 2023, Somalia faced its worst period of drought in four decades, killing 43,000 people, driving extreme food insecurity for more than 7 million people, and forcing more than 1 million people to leave their homes. The drought had amplified effects on women and girls, who faced increased risks of gender-based violence due to displacement and travel, and on pastoralists, many of whom lost their livelihoods[2].

Somalia also experienced several major cyclones from 2013-2020, such as Cyclone Gati in 2020, which affected 180,000 people and displaced 42,000. In the resilience zone (Mogadishu, Afgoye, Jowhar, Baidoa, Berdaale, Hudur, and Kismayo), the biggest climate hazards are prolonged droughts, flash floods, and erratic rainfall patterns, which significantly impact agricultural productivity and livestock health, exacerbate food and water shortages for the local communities, and may result in higher incidences of waterborne diseases like cholera, malaria, and dysentery (USAID/Somalia).These climate change impacts disproportionately affect women and youth, ethnic minorities, and other populations who have been marginalized as they may lack adequate resources to adapt, as well as face increased risk of internal migration, food insecurity, poverty, health issues, and violence that results from climate impacts[3].

Climate projections indicate expected increases in annual average temperature between 2040-2060, yielding an increase in average air temperature, very hot days, drought frequency, and drought intensity. Flood intensity and frequency are also expected to increase in Somalia, and rising sea level is expected to affect Somalia's coastal communities through coastal erosion, seawater intrusion into freshwater systems, and changes in marine habitat health. Resilience and food security investments in these locations must consider and adapt to changing conditions to reduce potential risks posed by climate change.

[1] Somalia Climate Change Analysis.docx (climatelinks.org)

[2] FEWS-NET Somalia Food Security Outlook for June 2023 to January 2024

[3] World Bank Document 2023

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

There is no NHMS in existence presently in Somalia. A proposal to set one up has been made, and a draft act is before the legislature. The process of establishing a fully functional NMHS has been impaired by years of political crisis and war in the country.

Weather and climate-related activities are presently being carried out by the Hydro-Meteorological Working Group (HWG), an inter-ministerial working group overseeing weather and climate-related activities as part of their functions. The Group is housed under the water sector coordination facility of the Ministry of Energy and Water Resources (MoEWR).

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

There are no defined strategic, operational and risk management plans in place. However, the Federal Government of Somalia (FGS), through its Permanent Representative (PR) to the World Meteorological Organization (WMO) with support of the World Meteorological Organization (WMO), the Food and Agriculture Organization of the United Nations (FAO) organised a workshop (10th–11th April 2025) on the National Strategic Plan for the Establishment of National Meteorological and Hydrological Services (NMHS) of Somalia. The workshop brought together stakeholders from the weather and climate value in Somalia (government and development partners), to deliberate on the future of weather and climate forecasting, and information dissemination. The two-day workshop produced a draft document with a comprehensive plan that defines long-term strategic goals, ensures sustainability, resource mobilisation, and capacity-building for the proposed Somalia's NMHS.

Note that a law is presently before the Somali parliament that seeks to establish an NMHS, focusing on Meteorology, Hydrology, Climatology and Aviation Meteorology for the country.

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

There is no NMHS, hence no budget allocation. All financial supports towards hydromet activities are domiciled in different MDAs (the Ministry of Energy and Water Resources, the Ministry of Environment, the Ministry of Livestock, Forestry and Range (MOLFR), the Ministry of Agriculture and Irrigation (MOAI), the Somali Civil Aviation Authority (SCAA), Somali Disaster Management Agency (SODMA), the Hydrometeorological Working Group (HWG)) and is funded through government interventions and various projects (SWALIM, IGAD/ICPAC, UNDP, etc).

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 training needs of NMHS.

There is none. However, the PR has six volunteer staff who are currently undergoing training through projects.

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

It is non-existent. However, the PR has experience in projects including HYCOS and WMO projects, such as

i. A developmental project funded by the Hydrometeorological Department under the Integrated Water Resources Management (IWRM) project. The project is supported by the Global Environment Facility (GEF) and the United Nations Development Programme (UNDP). It aims to develop hydro-met policies, facilitate the procurement of automatic weather and hydrology stations, provide capacity building to the staff members, and establish a hydro-met forecasting system, which is currently operational.

ii. The Somali Crisis Recovery Project (SCRP), funded by the World Bank, supports the strengthening of the Hydromet department. This project facilitates the procurement of hydrological modeling software and provides capacity building to the staff.

iii. FAO-SWALIM, UNDP, and IGAD/ICPAC are implementing weather and climate-related projects across Somalia.

Summary score and recommendations for Element 1

There is no established NMHS with the necessary legal backing in Somalia. The provision of weather and climate services is done by various government institutions and development partners. The HWG coordinated these efforts but there is no legislative backing assigning the role of NMHS to it. A limited human resource has also led to a lack of essential key competencies. The governance structure is not formalized. To this end, element one has been assessed to be at ***Level One - Weakly defined mandate; serious funding challenges; essential skills lacking; little formalized governance and future planning.***

This element can be improved, if/when the following recommendations are implemented:

i. Fast-track the proposed law currently before the parliament establishing NMHS in Somalia.

ii. Allocation of financial resources in the annual national budget, dedicated solely to proposed NMHS.

iii. Recruitment of skilled professionals and experts as staff for the proposed NMHS.

iv. Consideration for South-South cooperation for capacity development in institutionalizing the proposed NMHS.

v. Strong support from the WMO sub-regional and regional offices, for the take-off of the proposed NMHS.

vi. Consideration of gender balance in the recruitment of personnel for the proposed NMHS.

vii. Consideration for a "take-off grant" by the government of Somalia with support from the development partners for the smooth take-off of the proposed NMHS.

Element 2: Effective partnerships to improve service delivery.

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

There is no NMHS and thus no partnerships. However, there are inter-ministerial institutions responsible for developing and implementing data products and providing national meteorological and hydrological services.

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.

There is no NMHS to foster partnerships at any level. However, there are fragmented partnerships at national and international levels through MDAs and developmental partners including the World Bank, UNDP, FAO-SWALIM, AfDB, IGAD/ICPAC, etc.

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

None

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

There are third-party products and services like bulletins from SWALIM, and ICPAC - GHACOF (Great Horn of Africa Climate Outlook Forum), including the weekly bulletin from the HWG.

Summary score, recommendations, and comments for Element 2

There is no NMHS in Somalia. The HWG coordinates some aspects of weather and climate-related activities but does not have the capacity to promote and engage in robust partnerships aimed at improving service delivery. Therefore, element two is at a maturity of ***Level Two – Limited partnership and mostly excluded from relevant finance opportunities.***

Recommendations:

i. Fast-track the proposed law establishing NMHS.

ii. Urgently consider the development of a framework for formal cross-institutional partnerships.

iii. The proposed NMHS should be encouraged to build on the existing informal partnerships between various MDAs and development partners.

iv. Seek national and international support for the immediate closure of the infrastructural gap 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.

The existing ground observing stations are owned and managed by third parties such as ICPAC, Somalia Civil Aviation Authority (SCAA), MoEWR, etc. The stations are installed based on accessibility and the security situation within the location rather than the recommended horizontal resolutions.

There are no upper air stations at present.

S/N	Station Name	Ownership	Status
1	Abudwaq	ICPAC	Working
2	Adado	ICPAC	Not working
3	Badhan	ICPAC	Working
4	Baidoa	ICPAC	Not working
5	Beledwein	ICPAC	Working
6	Borama	ICPAC	Working
7	Bosaso	ICPAC	Working
8	Burao	ICPAC	Working
9	Dhobley	ICPAC	Working
10	Dhusamareb	ICPAC	Working
11	Dolow	ICPAC	Working
12	Erigavo	ICPAC	Working
13	Galdogob	ICPAC	Not working
14	Galkacyo	ICPAC	Not working
15	Garowe	ICPAC	Not working
16	Guriceel	ICPAC	Working
17	Hargeisa	ICPAC	Working
18	Hobyo	ICPAC	Working
19	Hudur	ICPAC	Working
20	Kismayo	ICPAC	Working
21	Mogadishu_Air	ICPAC	Working
22	Mogadishu_Min	ICPAC	Working
23	Qardho	ICPAC	Working

Note: All stations are owned and serviced by ICPAC and installed through SCAA with the exception of stations Baidao, Barawe,Galkacyo, Galdogob, and Adado which were installed through the Ministry of Energy and Water Resources are not currently in operation

3.2. Additional observations used for nowcasting and specialized purposes.

There are no additional observations available for nowcasting and specialized purposes.

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

There are no standard operating practices in place.

3.4 Implementation of sustainable newer approaches to observations.

None

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

The existing stations belong to third parties. All 23 hydro-met stations managed by HWG are automatic weather stations, with only one (Mogadishu Airport) transmitting data through AFTN. 100% of these existing stations are all AWS. There is a server at MoEWR where all the observation stations are networked. All the HWG members (ICPAC, Somalia Civil Aviation Authority (SCAA), MoEWR, etc) and development partners have access to the data on this server.

Summary score, recommendations, and comments for Element 3

There is no established NMHS in Somalia, coupled with the lack of operational resources and trained staff has further affected the maturity level of this element. It is therefore considered to be ***Level One - No or limited, basic surface observations and no upper-air observations.*** However, Somalia operates a basic observational infrastructural network through third parties.

Recommendations:

i. Somalia wishes to rehabilitate its existing stations and add new ones, to the density of the network of observing stations. However, the number of existing stations surpasses the recommended GBON target, but none of them meet GBON's requirements.

ii. Security challenges should be given adequate consideration in choosing the stations to be rehabilitated or the locations for new stations under SOFF intervention. This may not necessarily be in line with GBON's horizontal resolution.

iii. A phased approach is recommended for Somalia. This approach may include the following:

   a. Fast-tracking the passage of the law establishing NMHS to drive the coordination and operation of the observation network.

   b. Rehabilitation of the existing stations at the initial stage.

   c. Leveraging on the existing infrastructure in various MDAs, to make these stations GBON-compliant.

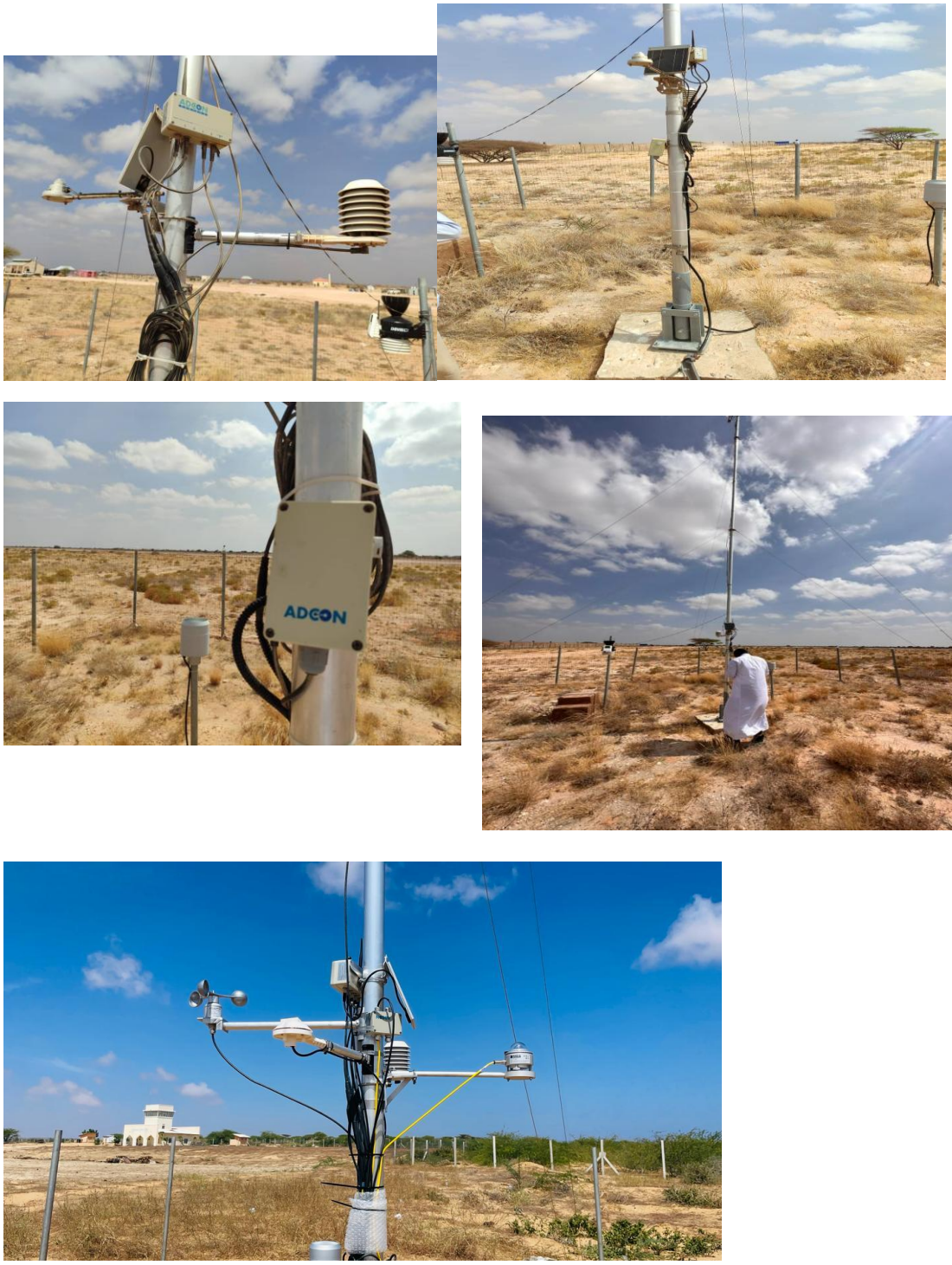


Figure 2: Some meteorological observation stations located across Somalia

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.

Somalia does not have surface observation and upper air stations that are GBON-compliant. The only functional surface observations are by third parties and are mostly located within the airports, and international data exchanges are done through AFTN. For national data collation, the data are transmitted by the stations to a server hosted in the Hydromet department of MoEWR but are presently not being exchanged internationally.

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

There is no formal policy in existence.

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

Model forecast data are accessed from Global and regional forecast centres like ICPAC, ECMWF, NOAA, etc. For MoEWR, Satellite data such as GEFS, CHIRPS, IMERG, and GloFAS is relied on to fill in any gaps and improve the quality of products. This data is primarily used to run an operational flood forecast model, also known as the rainfall-run-off model. The model is used to produce weekly streamflow forecasts for riverine communities.

Summary score, recommendations, and comments for Element 4

Though the MDAs have access to global and regional model products, there is no GBON-compliant station in Somalia and there is no formal data policy in place. Therefore, this element is assessed to be ***Level One - 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.***

Recommendations:

1. Rehabilitation of the existing stations to meet GBON requirements.
2. Development of a formal data-sharing policy alongside the establishment of the proposed NMHS.
3. Capacity building can be considered for SCAA and MoEWR to take advantage of their existing infrastructure for international data exchange, pending the establishment of the proposed NMHS.
4. Consider the installation of WIS2.0 and provide training to personnel, for the effective use of the Server at MOEWR for international data exchange, pending when the proposed NMHS takes off operations.

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.

None. However, SCAA, SWALIM, MoEWR, etc make use of model and satellite products from NOAA, ECMWF, ICPAC, SADIS, and PUMA. MoEWR's weekly forecast is based on the Global Ensemble Forecast System (GEFS), with additional weekly, monthly, and seasonal products provided by regional climate centres.

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

None.

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

None

Summary score, recommendations, and comments for Element 5

There is no existing structure for running models internally, however, the MoEWR and SCAA make use of various external model outputs for generating their products. Given the above, the element is assessed to be ***Level Two - Basic use of external model output and remote sensed products in the form of maps and figures, covering only a limited forecast time range.***

Recommendations:

1. Post-establishment of the proposed NMHS, investment towards capacity building and infrastructure for NWP should be considered.

Element 6: Warning and advisory services

6.1. Warning and alert service cover 24/7.

24/7 warning and advisory services do not exist presently for drought, flash floods, riverine floods, tropical cyclones and thunderstorms/squall lines. However, MofEWR provides weekly alerts and notifications based on streamflow and precipitation forecasts. In high-risk situations, such as riverine floods, the lead time is increased to 2-3 days. Similarly, aviation forecasts that include thunderstorms and squall lines are routinely carried out by SCAA.

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

There is no capacity for the provision of warning and alert services for any hydrometeorological hazard as there is no NMHS in place. There are however working groups within the Somali government such as the Somali Disaster Management Agency and third-party groups like FAO-SWALIM who provide such alerts and warnings.

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 common alerting protocol procedure in place.

Summary score, recommendations, and comments for Element 6

There are no warning and alerting services in place as there isn't a functional NHMS in Somalia. The third-party government and private bodies do not provide CAP alert services. This element is scored at ***Level One - Warning service not operational for public preparedness and response.*** However, the HWG and other government and development partners provide some alerts and warnings on weekly basis and at other times, when it becomes necessary.

Recommendation:

1. Capacity building and formalization of partnerships between all relevant stakeholders are highly recommended.

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 established NMHS in Somalia. 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 less than basic at present.

However, it should be noted that at present, skeletal climate services are provided by different Ministries and Agencies such as the Ministry of Energy and Water Resources, Ministry of Environment, and Somali Civil Aviation Authority (SCAA), with aid from development partners such as the FAO. 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 as ***Level one: Less than basic Capacity to provide Climate Services.*** Note that the existing skeletal weather and climates services are being provided by third parties.

Recommendations:

1. To raise this maturity level, there is a need to institutionalise the existing informal relationships among institutions.
2. The maturity level could be improved if the NMHS, whose act is presently in the Somali parliament is passed into law and the Agency established.
3. The NMHS when established will help resuscitate the climate database management systems to aid the development of products and services with socio-economic benefits.

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.

There is no routine production of standard products such as quantitative precipitation estimation and forecasts according to the requirements of the hydrological community.

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 Standard Operating Procedure (SOP). However, there is a law before the Somali Parliament for the establishment of NMHS and it is hoped that the law will 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 policy/agreement.

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

There is no NMHS to conduct joint projects. However, third-party project collaborations exist especially within the Hydrological Working Group.

Summary score, recommendations, and comments for Element 8

There is no SOP and no data-sharing policy, only third-party project collaborations exist. 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.***

Recommendation:

1. It is recommended that the proposed law for the establishment of NMHS should be accelerated to improve collaboration and coordination, thus raising 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?).

There is no dissemination of meteorological information via TV studios or a website as there is no NMHS. However, Hydro-meteorological bulletins are produced through HWG for dissemination using various channels including SMS, radio, TV, press releases, and emails. Informal communication channels like WhatsApp groups are also utilized to reach some communities.

9.2. Education and awareness initiatives in place.

None. Only third parties conduct education and awareness of weather and climate information, and services are done in partnership with the Somalia Global Water Partnership.

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

None

Summary score, recommendations, and comments for Element 9

There is no dedicated channel for the dissemination of weather information. There is no educational awareness and special measure in place to reach marginalised communities. 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.***

Recommendation:

1. There is a need to conduct regular awareness campaigns on weather and climate-related issues.

Element 10: Use and national value of products and services

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

There is no existing formalized platform for engaging users. In the past, National Climate Outlook Forums served as a platform for stakeholders to gather, exchange ideas and knowledge, and discuss seasonal forecasts (GHACOF), however, due to budgetary constraints, the platform has been stopped.

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

Somalia has no 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

There is no formal platform for stakeholders' engagement, no independent feedback survey mechanism and no QMS in place. Hence, the maturity level of this element is assessed as ***Level One – Service development lacks any routine stakeholder feedback practice.***

Recommendations:

1. There is a need to urgently establish the NMHS.
2. Provide funding for stakeholder engagement.
3. Post-establishment of NMHS, consideration should be made for the establishment of QMS, Competency, and cost recovery framework.

Annex 1 Consultations (including experts and stakeholder consultations)

UNDP

FAO-SWALIM

SODMA- Somali Disaster Management Agency

MOAI- Ministry of Agriculture and Irrigation

MoEWR- Ministry of Energy & Water Resources

MOLFR- Ministry of Livestock, Forestry and Range

SCAA- Somali Civil Aviation Authority

MU- Mogadishu University

SNU- Somali National University

MoECC – Ministry of Environment and Climate Change

Annex 2 Urgent needs reported

1. Fast-track the proposed law currently before the parliament establishing NMHS in Somalia.
2. Allocation of financial resources in the annual national budget, dedicated solely to proposed NMHS.
3. Recruitment of skilled professionals and experts as staff for the proposed NMHS.
4. Strong support from the WMO sub-regional and regional offices, for the take-off of the proposed NMHS.
5. Consideration for a "take-off grant" by the government of Somalia with support from the development partners for the smooth take-off of the proposed NMHS.
6. Rehabilitation of the existing network of stations across Somalia.
7. Investment towards capacity building and infrastructure.
8. Formalization of partnerships between all relevant stakeholders in the weather and climate-related value chain.
9. Provision of funds for stakeholder engagement.
10. Resuscitate the climate database management systems to aid the development of products and services with socio-economic benefits.
11. Capacity building for SCAA and MoEWR to take advantage of their existing infrastructure for international data exchange, pending the establishment of the proposed NMHS.
12. Urgently consider the development of a framework for formal cross-institutional partnerships.

13. Consider the installation of WIS2.0 and provide training to personnel, for the effective use of the Server at MOEWR for international data exchange, pending when the proposed NMHS takes off operations.

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
- WMO Early Warnings for All Rapid Assessment Report

Annex 4 List of materials used

i. GBON station data collection template.

iii. CHD_EW4All_Data Inventory and Review Sheet

iv. Station Checklist developed for Somalia

v. CHD-questionnaire

vi. Data from country-level stakeholders' engagement

i. Country hydromet diagnostics road-testing.

ii. Country Hydromet Diagnostics - Alliance for Hydromet Development (alliancehydromet.org).

iii. Somalia Climate Change Analysis.docx (climatelinks.org)

iv. FEWS-NET Somalia Food Security Outlook for June 2023 to January 2024

v. Final_Draft_BHA_RFSA_Somalia_Climate_Risk_Profile_2023-11-30.pdf

vi. World Bank Document 2023

Annex 5: Added Information

The MoEWR is also currently responsible for policy formulation, setting direction, and coordination of national water resources. It has developed a comprehensive National Hydromet Policy to provide the basis for establishing an effective and efficient hydromet service in Somalia. The objectives of the policy are:

4. Promote the Government's responsibility to lead the provision of effective Hydromet services towards Somalia's overall socio-economic growth and sustainable development.
5. Strengthen the legal and institutional framework for the management and effective delivery of quality and timely Hydromet services.
6. Support the continuous strengthening of Somalia's Hydromet network, systems, resources, and data to ensure quality and reliability in service delivery.
7. Strengthen and promote capacity building and public awareness of Hydromet services and risks.
8. Facilitate multi-disciplinary and multi-sectoral coordination for effective co-production, delivery, and uptake of products and services.
9. Ensure informed decision-making that underpins service delivery and information dissemination.

Annex 6: List of Acronyms

AfDB	African Development Bank
AFTN	Aeronautical Fixed Telecommunication Network
AWS	Automatic Weather Stations
BHA_RFSA	Bureau for Humanitarian Assistance_ Resilience Food Security Activity
CAP	Common Alerting Protocol
CHD	Country Hydromet Diagnostics
CHIRPS	Climate Hazards Group InfraRed Precipitation with Station data
ECMWF	European Centre for Medium-Range Weather Forecasts
EW4All	Early Warning for All
FAO	Food and Agricultural Organization
FEWSNET	Famine Early Warning Systems Network
GBON	Global Basic Observing Network
GEF	Global Environment Facility
GEFS	Global Ensemble Forecast System
GHACOF	Great Horn of Africa Climate Outlook Forum
GloFAS	Global Food Awareness System
HWG	Hydrometeorological Working Group
HyCoS	Hybrid Core-Shell
HYDROMET	Hydrometeorological
ICPAC	IGAD Climate Prediction and Applications Centre
ICT	Information and Communications Technology
IGAD	Intergovernmental Authority on Development
IMERG	Integrated Multi-satellite Retrievals for GPM
IWRM	Integrated Water Resources Management
MoECC	Ministry of Environment and Climate Change
MoAI	Ministry of Agriculture and Irrigation
MoLFR	Ministry of Livestock, Forestry and Range
MU	Mogadishu University
NiMet	Nigerian Meteorological Agency
NMHSs	National Meteorological and Hydrological Services
NOAA	National Oceanic and Atmospheric Administration
NWP	Numerical Weather Prediction
PUMA	Preparation for the Use of Meteosat Second Generation in Africa
QMS	Quality Management System

SADIS	Secure Aviation Data Information Service
SCAA	Somali Civil Aviation Authority
SCRP	Somali Crisis Recovery Project
SNU	Somali National University
SODMA	Somali Disaster Management Agency
SOFF	System Observations Financing Facility
SOP	Standard Operating Procedure
SWALIM	Somalia Water and Land Information Management
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WDQMS	WIGOS Data Quality Monitoring System
WIS	WMO Information System
WMO	World Meteorological Organization

Annex 6: Pictures

Dignitaries at the Stakeholders' Engagement Workshop

Group Photograph of Participants at the Stakeholders' Engagement

Cross-section of Participants During Stakeholders' Engagement Workshop

The Honourable Minister of Energy and Water Resources Received NiMet's Delegation in His Office

NiMet Team During a Visit to the MoEWR

Interactive Session with the Honourable Minister of Energy and Water Resources (MoEWR) and Other Staff of the Ministry

Group Photograph During a Courtesy Visit to UNDP

Interaction/Discussion with the Management of UNDP

Some Members of NiMet Team at a Visit to MoEWR

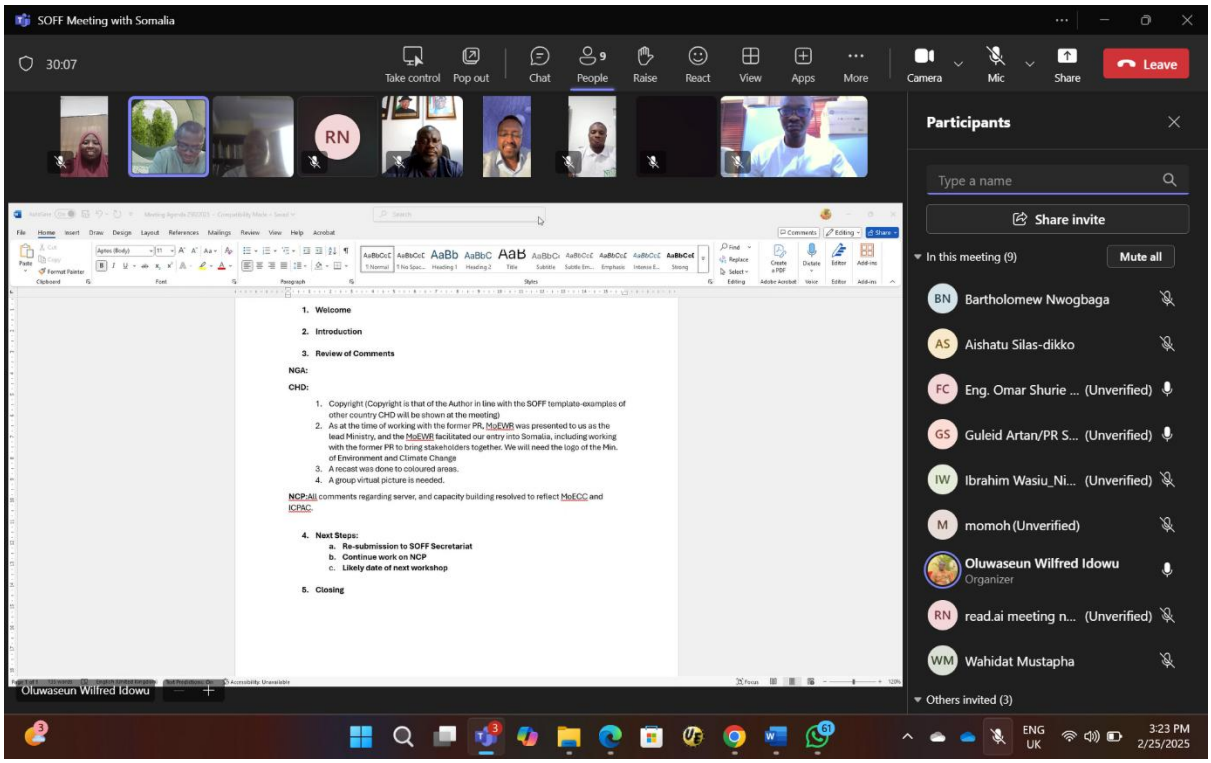
A field Visit to One of the Stations in Mogadishu

Interaction with Staff at the Server Room at MoEWR

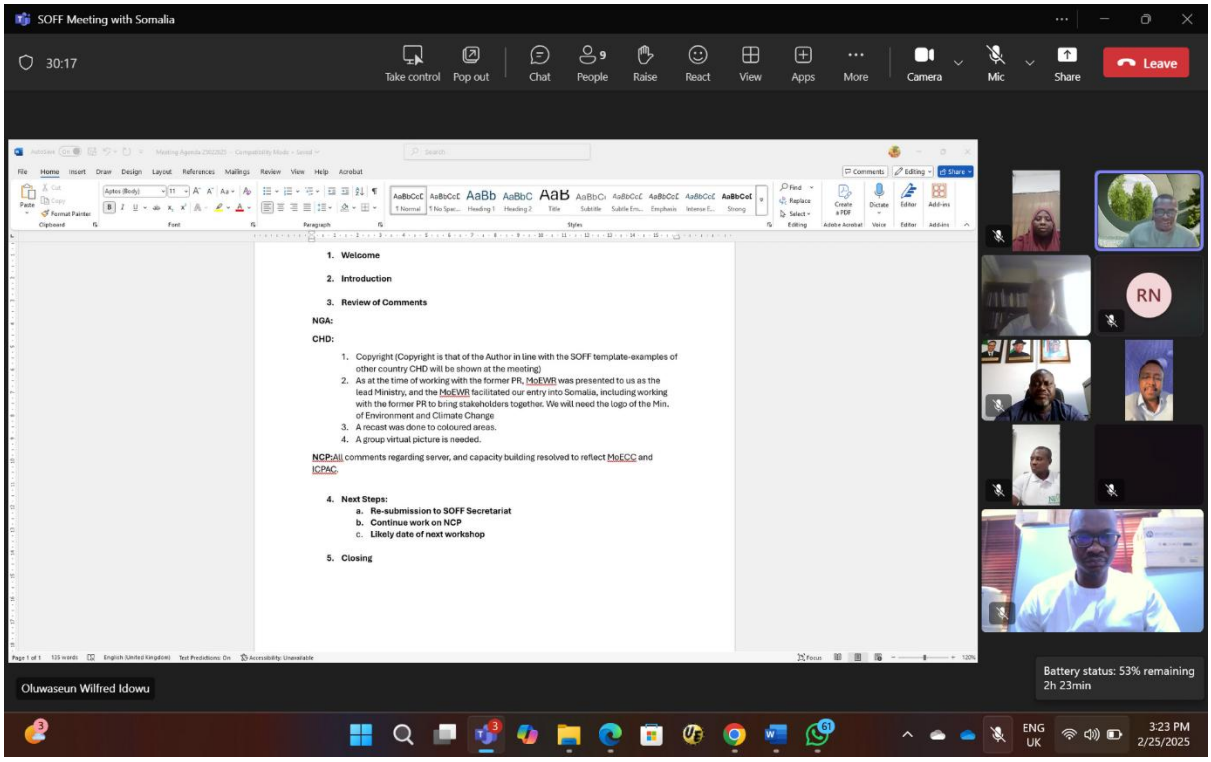
SCAA Office Complex at Mogadishu Airport

Group Photograph During Visit to SCAA

Inspection of Equipment at SCAA Forecast Office in Mogadishu Airport



Virtual Meeting between the NiMet Team, Somalia PR; Dr. Guleid Artan and the former PR; Engr. Omar Shurie – 25/02/2025



Virtual Meeting between the NiMet Team, Somalia PR; Dr. Guleid Artan and the former PR; Engr. Omar Shurie – 25/02/2025