Systematic Observations Financing Facility

June 2026

GBON National Contribution Plan of the Republic of Niger

Systematic Observations Financing Facility

Weather and climate data for resilience

GBON National Contribution Plan
Republic of Niger

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Module 1. National Target toward GBON Compliance

Table 1: GBON National Contribution Target

Type of station	WMO GBON Global Gap Analysis, June 2023				GBON National Contribution Target	
	Target	Reporting	Gap		To improve	New
			To improve	New		
	[# of stations]				[# of stations]	
Surface	32	1	14	17	14	17
Upper air	6	1	1	4	1	4
Marine	*When applicable					

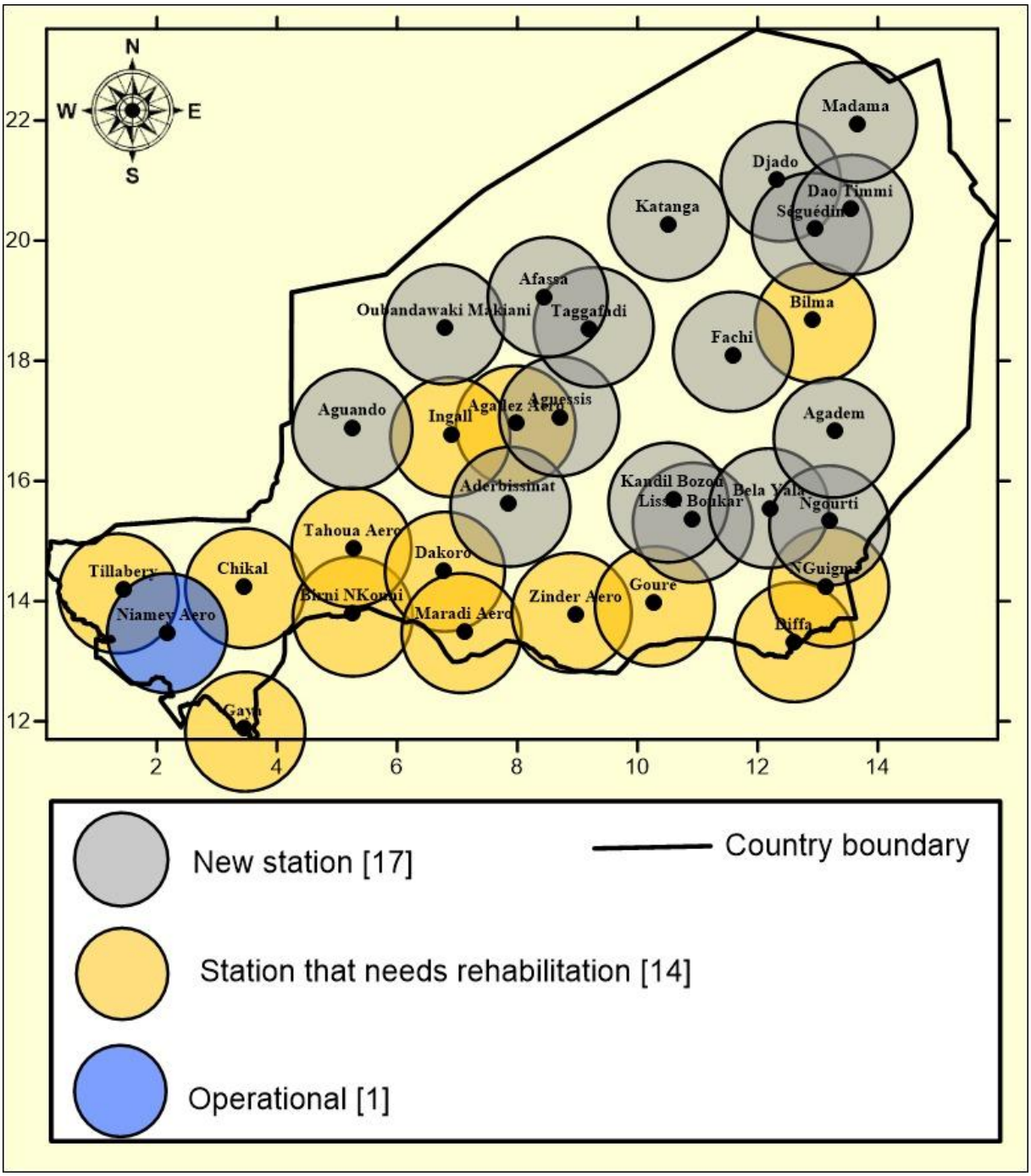

Figure 1: Map of existing and proposed surface stations with 200km horizontal resolution based on the GBON National Gap Analysis.

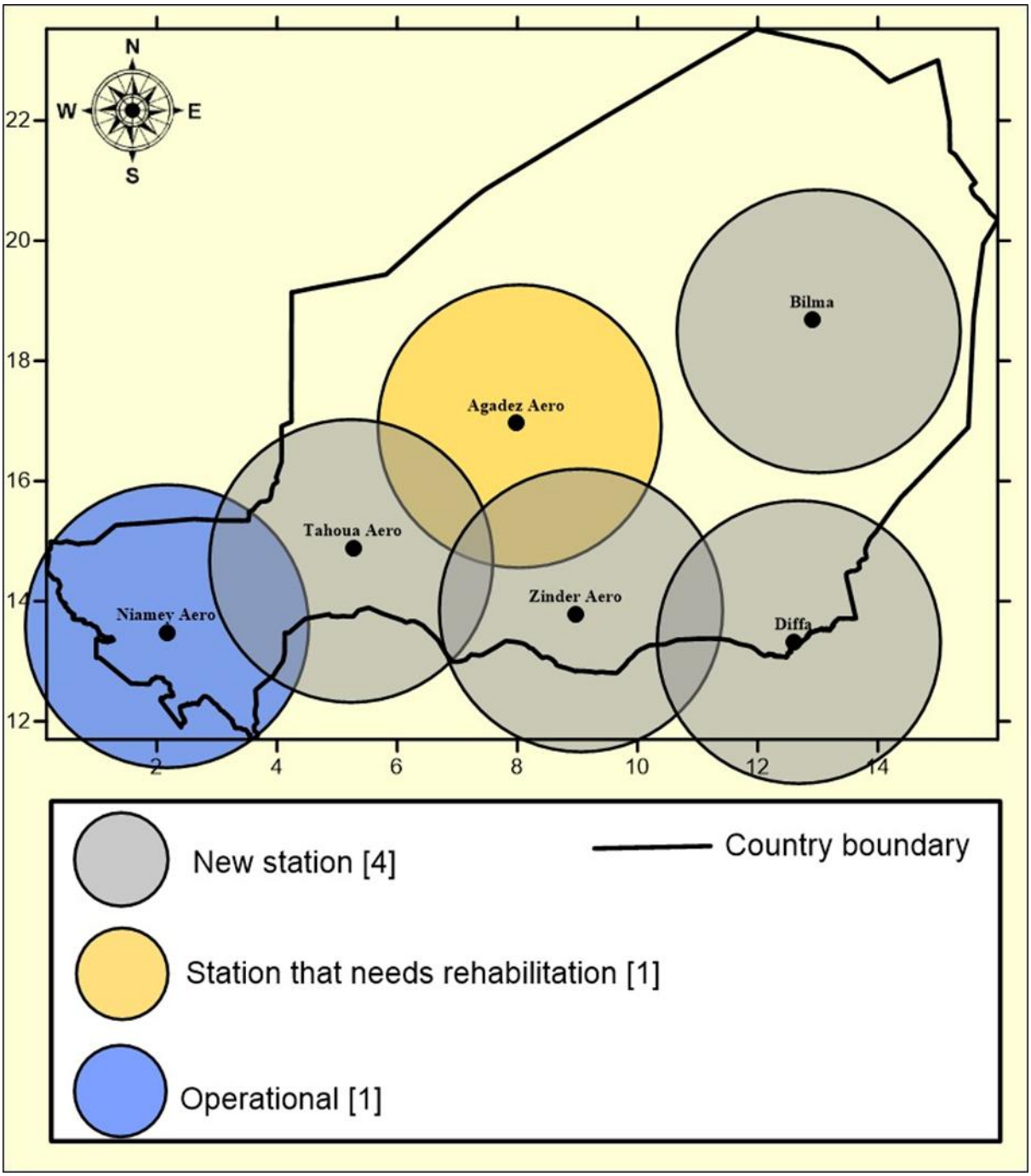

Figure 2: Map of existing and proposed upper air stations with 500km horizontal resolution based on the GBON National Gap Analysis.

Module 2. GBON Business Model and Institutional Development

2.1. Assessment of national governmental and private organisations of relevance for the operation and maintenance of GBON

The Direction Nationale de la Météorologie (DNM) is charged with the responsibility of operating and acquiring meteorological observations in the Republic of Niger. Its operation is backed by Decree 'le décret n'2025-242/ PRN/MTIAC du 16 mai 2025, portant organisation du Ministère des Transports et de l'Aviation Civile ; l 'arrêté n'00026/ MTIAC/SG/DL du 01 septembre 2025, portant organisation des Services de 'Administration Centrale Ministère des Transports et de l'Aviation Civile et déterminant les attributions de leurs responsables'. This replaces Decree No. 2023-080/P/CNSP/MTEQ of September 9, 2023 - Organisation of the Ministry of Transport and Equipment - ORDER N°0012/METQ/SG/SGA/DL OF FEB 12, 2024, which was in effect at the time of assessment in 2024. These D Among others, DNM is statutorily mandated with the following responsibilities:

i. Collect, record, control, process, validate, store and secure meteorological data while ensuring their integrity.
ii. Establish weather observation networks, in accordance with the standards of the World Meteorological Organisation (WMO).
iii. Develop and disseminate weather forecasts for the needs of users and aeronautical safety.
iv. Create awareness and inform the general public about behaviour and changes in the atmosphere.
v. Give warnings of impending extreme weather phenomena likely to cause damage to people and their properties.
vi. Identify and meet the needs of users in all development sectors (agriculture, livestock, water resources, forestry, energy, transport, health, wildlife, fishing, commerce, industry, tourism, public works, etc.) and assist with meteorological, climatological and agrometeorological data.
vii. Contribute to the implementation of the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol (KP), the Protocol on the Protection of the Ozone Layer and the Biodiversity and Desertification Conventions.

These functions and responsibilities are not carried out in isolation by the DNM. Other government and private sector stakeholders in the weather and climate value chain in Niger are actively involved in meteorological observations and data collation, which could support GBON compliance across the country. These institutions include the following:

- **ASECNA:** the Agency for Air Navigation Safety in Africa and Madagascar, and its local arm, the Activités Aéronautiques Nationales du Niger (AANN), has an existing partnership with DNM. ASECNA and AANN, as third-party operate and maintain 15 stations as part of this collaboration.

- **Ministry of Agriculture and Livestock:** The Ministry of Agriculture and the National Institute of Agronomic Research of Niger (INRAN) have partnered with the Direction Nationale de la Météorologie (DNM) in a project to install rain gauges at the village level and share agro-meteorological information about agricultural production and gardening sites. The project has installed over 100 rain gauges in 80 villages and provides farmers with relevant information and advice on the planting date and the amount of useful rain to sow. DNM, as part of this project, also trained two farmers in each project site to read rain gauges and gave them reporting sheets and mobile numbers to transmit rainfall data.
- Ministries of Environment, Hydraulics and Sanitation; Public Health and Hygiene; Defence and Interior: These ministries have existing partnerships with DNM that have allowed the Directorate to install weather stations in some of their facilities across the country.

2.2. Assessment of potential GBON sub-regional collaboration

The neighbouring countries to Niger, including Nigeria, Burkina Faso, Chad, Mali, Benin Republic, Algeria, and Libya, are all potential regional collaborators for GBON. Nigeria and Niger have a long history of collaboration for data exchange through the services provided by the Niamey information region. Both Burkina Faso and Chad are beneficiaries of SOFF and have also benefited from WMO WIS2.0 projects, aimed at enhancing their international data exchanges. The DNM will gain from knowledge sharing and skills exchanges with these countries. To optimise resources during the investment phase, these neighbouring countries should be considered as options for sourcing parts for station upgrades and maintenance. Sub-regional coordination could be established to facilitate best practices for procurement, network maintenance plans, and human capacity development as part of the implementation phase.

Potential Regional Collaborators – Organisations

- **Alliance of Sahel States (AES) and other regional bodies:** The DNM has a good partnership and working relationship with meteorological services within the region. They maintain an active membership of the African Ministerial Conference on Meteorology (AMCOMET) and regularly participate in the Regional Climate Outlook Forum (RCOF), which underscores their dedication to regional meteorological cooperation and advancement. These existing partnerships, relationships, and collaborations, if further strengthened, will contribute to improved service delivery for DNM.
- **AGRHYMET and ACMAD:** Niger plays host to both AGRHYMET (a Regional Climate Centre for West Africa) and the African Centre of Meteorological Application for Development (ACMAD - a Continental Climate Centre), which provide support and training to personnel of the DNM. The Directorate recently received training from ACMAD, specifically in developing a Weather Research and Forecasting (WRF) Model. DNM has operationalised the use of this model to produce weather forecasting and atmospheric simulations, in-house.

The GBON Gap Analysis carried out as part of the development of this implementation plan identified the need for 4 new upper air and 17 new land surface stations in Niger to cover the vast parts of the country that are currently without adequate observing stations. The focus during the investment phase will be to adopt a "phased approach" in project implementation,

starting with the rehabilitation of existing stations in the southern parts of the country and later moving to the installation of new stations from the central to the northern parts. It is expected that the new stations to be installed in the Sahara Desert regions will lead to improved observation data, that are important and beneficial not only to Niger but to other surrounding countries.

2.3. Assessment of a business model to operate and maintain the network

The observing network in Niger is currently funded by a combination of government grants, and donations from international organizations and climate projects. As of 2024, the total annual budget for DNM stood at USD 1,893,403.82. This budget covers the salaries of the employees (amounting to 62% of the available funds), the operational costs (28%), investments (10%), and others (0%). The revenue sources for the DNM consist solely of aeronautical fees (93.11%) and meteorological services (6.89%). The budget allocations and financial status of the DNM are not sufficient or sustainable to support the operations and maintenance of the GBON infrastructure.

It is therefore recommended that the observation network in Niger that are GBON-compliant continues to be publicly owned. ASECNA has, over the years, operated some of the stations that are designated for GBON. The good relationship and partnership between ASECNA and DNM should be encouraged and strengthened.

The partnership with the Climate Risk and Early Warning Systems (CREWS) in a project to improve the density of the observation network in Niger, which includes rehabilitating climate stations, creating eight regional centres for hazard observation, installing automatic stations, training forecasters and meteorologists, and recruiting new staff, should also be considered an integral part of the sustainability plan for all GBON stations.

2.4. Assessment of existing national strategies and projects related to observing networks

DNM and the Ministry of Agriculture have installed Automatic Weather Stations (AWS) in farming and pastoral settlements, increasing the number and density of observation data. The majority of these stations are located in the southern parts of the country, with a good spread from west to east. Meanwhile, the central and northern parts of the country, which include the Sahara Desert, account for the vast expanse of the landmass of Niger, with very few stations. The harsh weather, security challenges and few human habitations in these areas have made the installation of stations difficult. However, the Management of DNM is determined to put more stations in these locations, especially in the north-east axis, to help monitor locust movement.

DNM has no ongoing or planned meteorological project related to the observation network with partners at national level. However, there are some ongoing initiatives / projects (CREWS 2.0, PRIMESA, P2RS2, EW4All, Slapis- Sahel, PIDUREM) implemented between DNM and partners.

The DNM, in parts, can carry out the deployment, maintenance, calibrations and quality assurance of the observational network. The Directorate has an instrumentation and ICT unit dedicated to the installation and maintenance of its equipment, with the ASECNA providing additional support on some parameters, especially in the calibration of instruments. However, like all Meteorological Services, the DNM is also faced with challenges of maintaining, calibrating, funding, telecommunications and securing its vast network of stations. AWSs are equipped with solar panels and batteries that are attractive and valuable to people who may not appreciate the importance of the observations, thus attracting theft and other damages. The risk of inadequate human resources and spares for the AWSs is also a huge challenge.

Recommendations:

i. Sensitisation of host communities to key into the project and have a sense of ownership could encourage them to ensure that the equipment is protected from vandals.
ii. Procurement and installation contracts should include components for the training of staff on maintenance and supply of spare parts for the duration of a specified period.
iii. The DNM and SOFF implementing entity should have a strategy meeting before the commencement of the investment phase to harmonise all ongoing projects (if any), to avoid duplication.

2.5. Review of the national legislation of relevance for GBON

The Direction Nationale de la Météorologie (DNM) is charged with the responsibility of operating and acquiring meteorological observations in the Republic of Niger. Its operation are backed by Decree 'le décret n'2025-242/ PRN/MTIAC du 16 mai 2025, portant organisation du Ministère des Transports et de l'Aviation Civile ; l 'arrêté n'00026/ MTIAC/SG/DL du 01 septembre 2025, portant organisation des Services de 'Administration Centrale Ministère des Transports et de l'Aviation Civile et déterminant les attributions de leurs responsables'. This replaces Decree No. 2023-080/P/CNSP/MTEQ of September 9, 2023 - Organisation of the Ministry of Transport and Equipment - ORDER N°0012/METQ/SG/SGA/DL OF FEB 12, 2024, which was in effect at the time of assessment in 2024.

Article 4 of the "**Décret n° 2022-743/PRN/PM du 29 septembre 2022 portant Code des marchés publics et des délégations de service public"**, published in the **Journal Officiel de la République du Niger** on October 26, 2022, states :

- The rules for the procurement, approval, execution, regulation, and control of public contracts financed by external funds must comply with the provisions of the Code of Public Procurement, provided these rules do not conflict with the financing agreements.
- Such contracts may be subject to prior review by the donor agency if required by the financing agreement. In this case, they are not subject to the prior review of the administrative entity responsible for public procurement control.
- However, these contracts, along with the donor's "no objection" opinions and evaluation reports, must be submitted to the administrative entity for registration.

This ensures that donor-funded procurement aligns with both the donor's requirements and the national regulatory framework. Additionally, the DNM has been involved in several donor-funded projects in the past and has the requisite experience and expertise to guide the implementing entity through procurement, importation and customs processes. Such past projects include Climate Early Warning System (CREWS) (2016 – 2019), Conception Et Mise En Œuvre Des Services Climatiques Pour L'adaptation Au Changement Climatique (2020 – 2024), Projet de Développement de l'Information et de la Prospective Climatiques (PDIPC) (2014 – 2020), WISER Africa (2023), etc.

Module 3. GBON Infrastructure Development

3.1. Design the surface and upper air observing network and observational practices

SOFF investment phase projects are aimed at improving the output of global Numerical Weather Prediction (NWP) centres through improved meteorological observations via:

- Expansion of surface stations to cover areas significantly lacking weather observations.
- Rehabilitation of existing surface stations that are not GBON-compliant
- Installation/rehabilitation of upper-air stations
- Ensuring that observations (surface and upper air) are transmitted to Global NWP Centres for easy access.

The National Gap Analysis and Country Hydromet Diagnostics (CHD) reports for Niger have highlighted the status of the observational network in the country and shown the challenges being faced by the DNM.

Existing Surface Stations:

The existing weather stations in Niger are shown in **Figure 3.** These include staffed weather stations (Manual Stations) and automatic weather stations where SIAP + MICROS AWS are installed. Among the existing stations, only the station at Niamey Airport was fully GBON-compliant as of the time of the National Gap Analysis in 2024, while fourteen (14) stations require various rehabilitations and upgrades to become GBON-compliant **Table 2**. An additional three (3) stations have started transmitting data but, yet to become GBON compliant as of the time of the NCP validation workshop in June 2026.

DNM is currently connected to the WMO WIGOS Centre in Morocco. The National Meteorological Service of Niger has also benefited from several training activities by Morocco.

Recommendation:

1. There is a need for the implementing entity to access the existing instrument calibration centres, determine which of them would best serve the needs of DNM and establish a formal agreement for a specific period post installation.

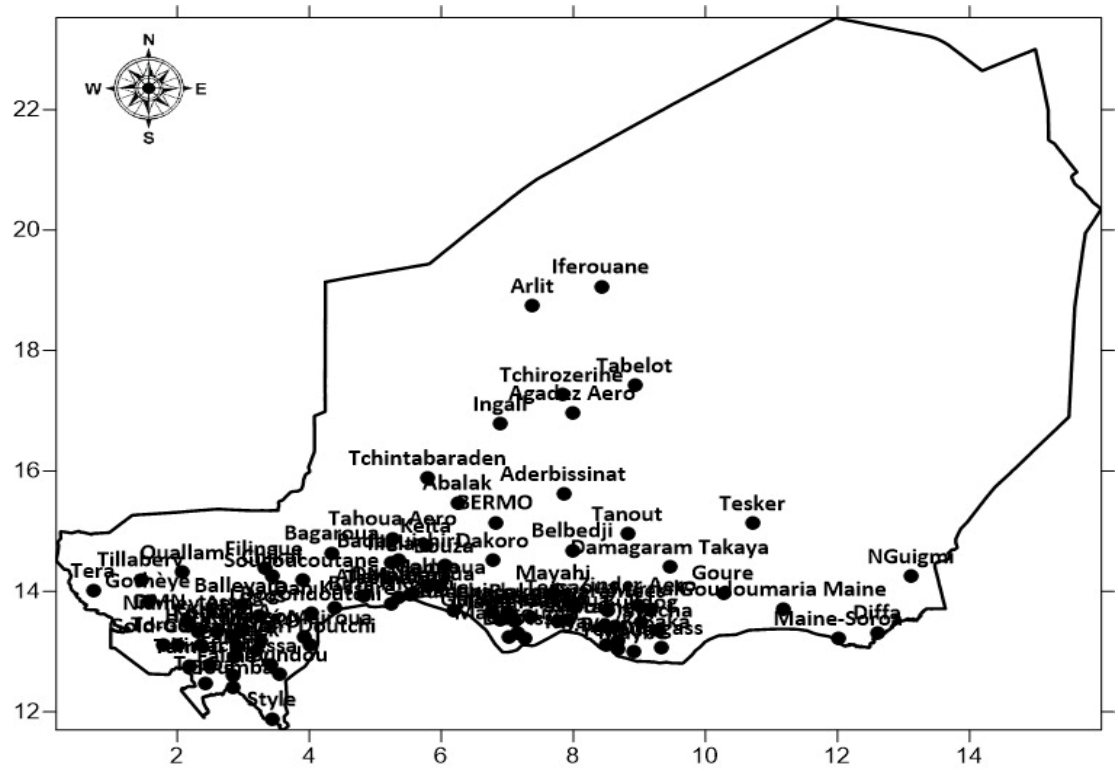

Figure 3: Map of existing surface stations in Niger

Table 2: Type and categories of existing instruments at DNM land surface stations

S/N	Instrument	Model
1	SIAP+MICROS	Station synoptique automatique
2	SIAP+MICROS	Station agrométéorologique automatique
3	SIAP+MICROS	Station agrométéorologique automatique 2

Equipment	Model	Serial Number	Date of Installation
Pluviographe	PLUVIOGRAPHE 3020/5 A AUGETS CONE 400CM2 RES.0,5MM-7J	24673	28/12/2021
Thermographe	VISIO II TAMBOUR THERMOGRAPHE AMBIANT - 15+65°C ;M.7J ;D23730	184939	28/12/2021
Barographe	Grand modèle9802-1050	64142	28/12/2021
Bac évaporation	CLASSE A INOX	N. A	02/09/2021
Psychromètre	PSYCHROMETRE FIXE	N. A	28/12/2021
Hygrographe	VISIO II TAMBOUR		28/12/2021

Pluviomètre	PLUVIO SPIEA MODIFIE METEO NAT R01-2050	N. A	28/05/2025
Anémomètre totalisateur	ANEMOMETRE TOTALISATEUR POUR BAC D'EVAPORATION	NSS2407	28/12/2021
Héliographe	HELIOGRAPHE DE CAMPBELL	N. A	28/12/2021
Baromètre numérique STATION	VAISSALA/PTB330	N3810927	28/12/2021
Baromètre numérique STATION AUTOMATIQUE	VAISSALA/PTB330	P1540562	02/09/2021
Thermomètres numériques	NAVIMET THN-01 NAVIMET THN-10		2023
Hygromètre numérique	NAVIMET H64		2023
Thermomètre numérique 4 voies	NAVIMET THN-09		2023
Thermomètre numérique sol	NAVIMET THN-07		2023
Générateur d'hydrogène	BP-MP 500-7-EC		2021
Capteurs température/humidité de la station automatique	Probe HMP155/VAISSALA	P3340194	2021
Capteurs vent	Lufft WS200	36708180811226	2021
Pyranomètre	CMP6	182878	2021

Table 3: Recommended existing stations for Rehabilitation

S/N	Station name
1	Agadez Aero
2	Bilma
3	Birni NKonni
4	Chikal
5	Dakoro
6	Diffa
7	Gaya

8	Goure
9	Ingall
10	Maradi Aero
11	NGuigmi
12	Tahoua Aero
13	Tillabery
14	Zinder Aero

Maintenance Plan for Existing and Improved Stations:

- Re-calibration of sensors.
- Orientation on basic cleaning of less sensitive but key parts by host communities.
- Quarterly routine station cleaning and servicing of sensors.
- Monthly cleaning of sensors.
- Monitoring operations to ensure immediate maintenance and replacement of parts, as well as preventive and corrective maintenance during quarterly servicing.
- Monitoring of stations' communication for preventive and corrective maintenance for optimal communication.
- Routine calibration of sensors should be performed as advised by the manufacturer and in accordance with system requirements.

Proposed Surface Stations

As per the GBON National Gap Analysis (NGA) carried out for the Niger Republic, using the GBON spacing criteria of 200km, an additional seventeen (17) new surface stations have been proposed for the country **Table 3**. Noting that most of the existing stations are located in the southern parts of the country, the NGA proposed the distribution of the new stations to cover the central and northern parts of the country **Figure 1**. A consideration was also given to the DNM's long-term plan to put more stations on the north-east axis of the country, to help monitor locust movement.

Table 4: Recommended new stations under SOFF intervention

S/N	Station name
1	Agadem
2	Lissia Boukar
3	Aguessis
4	Kandil Bozou
5	Bela Yala
6	Taggafadi
7	Aguando

8	Oubandawaki Makiani
9	Afassa
10	Fachi
11	Djado
12	Séguédine
13	Dao Timmi
14	Katanga
15	Madama
16	Ngourti
17	Aderbissinat

Technical Specification for New Instruments and Observing Systems

The technical specification for the AWSs which will be used for Niger's GBON network is given in **Table 4**. In addition, the stations must meet the technical specifications set out in TT-GBON approved technical specifications (TT-GBON approved material - World Meteorological Organisation) 6.1 – GBON Tender Specifications for AWS and 6.2 – Requirement document to be used as input to tender specifications for radiosonde-related procurements. In line with the GBON requirements and to specifications outlined in WMO No. 8, these measures are Sea Level Pressure, Temperature, Humidity, Wind, and Precipitation.

Table 5: Instruments and observing systems for planned GBON surface stations.

Instruments	• Resistance Temperature Device (RTD) dry bulb probe and relative humidity probe @1.25m – 2m. • Wind speed and direction sensors @10m. • Barometer • Standard 203mm (8-inch) tipping bucket rain gauge. • Other automated instruments (barometer, evaporation, solar radiation, soil temperatures, visibility sensor) as may be required. • AWS processor to collate data (preferably with a 7–30-day buffer) and send messages at the required intervals.
Structures	• Instrument shelter (Stevenson style), gloss white and double louvred, with a stand to achieve sensor height of 1.25-2m. • Tilting counterweighted 10m mast. • Post to 0.7m to support the rain gauge as may be required. • Fencing, adequate for the required security of the site. • Housing for the AWS processor, barometer and power supply, separate from other sensors

	• Geographical and environmental conditions of installation sites must be considered during procurement.
Facilities	• An observation enclosure sufficient to ensure the exclusion of obstacles impacting on readings (WMO 25 x 25m, BOM 18 x 18m). • Mains and/or solar power supply to the site. • Batteries to support solar, and/or to act as UPS for message transmission. • Signage to inform or deter the public
Communications	• Robust cellular, internet or satellite (preferred) communications to ensure regular, timely message transmission. • Redundant communications system where feasible. • For stations with manual operations, a communication software must be installed for data transmission.

Activities to Improve Land Surface Stations to Meet GBON Requirements:

Activity 3.1: An audit of all existing stations' equipment and facilities and AWS site had been carried out in the readiness phase. However, it may still be helpful to conduct a quick assessment at the start of the Investment Phase, as station conditions may have evolved over time, and may require update to confirm the most up-to-date baseline for implementation.

Activity 3.2: Assessment of the installed and working stations, to identify where maintenance and instrument calibrations are required.

Activity 3.3: Formally engage the communities around the existing stations for on-ground maintenance and security, including remuneration and capacity building.

Activity 3.4: Procurement contract to uplift the existing stations, as per the audit, to ensure they communicate reliably in real-time to GBON standards.

Activity 3.5: Regular inspection of stations to ensure their continuous operation in accordance with recommended best practices, after installation.

Upper-Air Stations:

There are two existing upper-air stations in Niger, one in Niamey (fully functioning as of the time of the assessment) and the other in Agadez (requiring rehabilitation to become functional). The GBON gap analysis has recommended six (6) upper air stations for the country, i.e., four (4) new stations to be added to the existing two **(figure 2).** The proposed locations of the four new upper-air stations are Tahoua, Zinder Aero, Diffa, and Bilma. The choice of these

locations is informed by the presence of airport staff for security and also spaced to cover most parts of the country.

As of the time of validation, a new upper-air station has been installed in Zinder, but yet to become GBON-compliant. This brings the total of new stations to be installed to three (3) instead of four (4), and two (2) stations to be rehabilitated instead of one (1).

Proposed instruments and observing systems for the stations are summarised in **Table 5.** Selection and installation of instruments will be compliant with WMO-No. 8 Guide to Instruments and Methods of Observation https://community.wmo.int/en/activity-areas/wigos/gbon/implementation-global-basic-observing-network-gbon/task-teams/task-team-gbon-implementation-tt-gbon/tt-gbon-approved-material

Table 6: Instruments and observing systems for planned GBON upper air stations.

Instruments/consumables	• Radiosondes (environmentally sustainable model) • Balloons (environmentally sustainable model) • 'Met' string (environmentally sustainable model) • Personal Protective Equipment (PPE) suitable for dealing with explosive environments.
Structures	• Balloon shed or remote balloon launcher where manually constructed balloon trains can be safely inflated and released. • Separate (or partitioned) Hydrogen generation shed (or storage shed if bottled H2 is available). • Fencing, adequate for the required security of the site. • Exclusion zones (painted lines), beacons/lighting and paths within the site.
Facilities	• An enclosure sufficient to ensure the exclusion of the public and obstacles that may impact or be impacted by balloon releases. • A power supply to enable H2 generation and monitoring, constant communication with the radiosonde and the transmission of coded messages. • A nearby building to house upper air consumables, cleaning materials, spare parts, various computer and communication systems supporting the upper air observations, and a workstation for the manual observer to assemble balloon trains.

	• A local display for the radiosonde profile and access to sensors for ground check data (T/RH/WS/WD/press). • A hydrogen generation system (HOGEN) and H2 storage facility to ensure adequate supply for the anticipated upper air program. • An uninterruptible power supply to ensure the above. • Supply of clean water for hydrogen generation. • Geographical and environmental conditions of installation sites must be considered during procurement.
Communications	• Communications systems integral to the upper air program (to receive sonde data, normally supplied with the Upper Air system). • Robust cellular, internet or satellite communications to ensure regular, timely message transmission.

Recommendation

1. It is recommended that the implementing entity, in collaboration with the DNM, explore new upper air technologies where there is a comparable advantage and meet WMO standards and specifications.
2. It is recommended that the implementing entity explore the equipment type suitable for countries with similar climatic conditions, e.g., the Middle East.
3. The procurement of vehicles adapted to the local field conditions for the project on-field work should be considered.

Activities to Improve Upper-Air Stations to Meet GBON Requirements:

Activity 3.6: Secure land access for the upper air stations at recommended locations.

Activity 3.7: Procure 3 upper air station equipment under a 'build and support' contract, including site works and all ancillary infrastructure.

Activity 3.8: Assess the station at Agadez and rehabilitate the station to become operational and GBON-compliant.

Activity 3.9: Assess the station at Zinder and optimise it for GBON-compliance.

Maintenance and inspection activities for land surface and upper air stations

- Basic tasks requiring consumables or parts may be carried out by technical personnel, local contractors, or observers. These tasks may include cleaning the Stevenson screen, changing the wet-bulb wick, cutting grass/ vegetation, attaching sondes/launching balloons, and changing hydrogen cylinders and devices.

- Technical tasks to be carried out by staff following established Standard Operating Procedures (SOPs) include the collection of station metadata, the replacement of sensors, and the verification of sensors' performance.

- Specialised maintenance activities to be performed by trained staff include replacing infrastructure, setting up/configuring new equipment/sensors, annual maintenance of an upper air system, and installation of a data communications system. These may require advanced knowledge and skill in troubleshooting.

- Specialised repair or replacement by the equipment manufacturer or their agents.

- Regular monitoring of the station environment to prevent obstruction and ensure data accuracy.

3.2. Design of the ICT infrastructure and services

All observation data from SIAP + MICROS AWS are currently stored and archived in a cloud server by the equipment manufacturers, and some of the stations are networked to a server hosted at the headquarters of DNM in Niamey **(Figure 4)**.

A communication system deployed in some of the stations managed by ASECNA enables the sharing of manual observations to the GTS and is also the route through which observations and other products are received from the GTS and used for forecasting.

The DNM has unrestricted access to this data via FTP and a real-time data transmission system from the Automatic Weather Stations to its local server at DNM Headquarters in Niamey. The DNM has a capable ICT unit dedicated to data collection, networking, storage infrastructure, and Clidata, but there is a need for a Meteorological Data Management System that is compatible with WIS 2.0 implementation for local and international data exchange.

Figure 4: DNM Server Room in Niamey

Target State and Activities:

A Data Management System (DMS) capable of ingesting and storing various types of weather observation data formats, including surface observations and upper-air radiosonde observations, is required by the DNM to achieve sustainable and reliable reporting to WIS at hourly frequencies from existing and proposed land surface stations and upper-air stations.
Currently, the DNM has a server (a cluster of 6 PowerEdge R930 servers) at its headquarters in Niamey; however, power supply and internet challenges have hindered the utilisation of the infrastructure. The installed solar and four (4) inverters (Inverter IVEM5048: Rated Power - 5000W; DC Input - 48VDC, 119A; AC Output - 230VAC, 50/60Hz, 21.7A) capacity is inadequate to provide cooling for the server room, and it is too expensive for the DNM to run a diesel generator. Clidata has been in use at DNM for many years, but only on manual operation.

Recommendations

- Modernising the electrical installation by deploying a standard network and providing backup networks
- The existing clidata platform should be upgraded for automatic operation and capacity building provided for DNM personnel.
- Strengthen the current solar system from 18 kWc to 60 kWc
- Increase the dedicated Internet bandwidth from 20 Mbps to 100 Mbps.
- Compatibility with the existing stations should be considered when procuring the server.
- An adequate cooling system must be considered while setting up the data management centre.

- Adequate measures must be put in place to prevent fire outbreaks.
- Cybersecurity measures should be included as part of the project implementation.
- A system should be put in place for data quality monitoring.
- A central storage facility for spare parts must be provided.
- Provision of a maintenance workshop.

Therefore, at the start of the investment phase, it is further recommended that a review of the power and ICT infrastructure for the Meteorological Data Management System (MDMS) that will be conducted to ensure it is compliant with WIS 2.0.

Key Components of the Proposed Data System:

i. **Observing station data collection:** As part of the upgrade of weather stations and the installation of new ones, all stations should be equipped with cellular, internet or satellite communications systems to ensure regular, timely message transmission. AWS should be configured to send data to the MDMS via a suitable data transfer protocol (e.g., MQTT or SFTP). The MDMS should have the ability for observers to supply all observations via e-mail in the existing SYNOP or METAR/SPECI format, as well as through more modern methods such as a web or mobile-accessible interface.

ii. **Data transmission to WIS 2.0:** The MDMS should have the capability to undertake basic real-time automated quality checks, then convert the data received from all stations to BUFR format before making the data available to WIS 2.0 through an HTTP service provided as part of the initial MDMS configuration.

iii. **Climate data management:** A Climate Data Management System (CDMS) to access data from the MDMS. The CDMS should be a cloud-based version or another suitable system selected in the procurement process. The CDMS should be compliant with WMO No. 1131 Climate Data Management Systems. The CDMS will be used to store, view, and extract all climate data and metadata collected.

ICT hardware and software for data transfer to WIS2.0.

- Minimum system specifications for WIS2.0 IT hardware given by WMO should be followed when procuring IT hardware.
- WMO support in implementing WIS2.0 for data sharing, including the associated capacity building of IT staff, will be required.

Table 7: ICT hardware and software for the implementation of WIS2.0

Requirements/ Detailed Items		**Minimum Specifications and suggested brand**
Hardware		
1	Server	Units of DELL R6525 • 2 x 64C/128T AMD 3rd GEN EPYC Processor • 256GB RAM • 2 TB SSD Storage

		• Dual Port SFP/SFP+/QSFP Pluggable 10G/25G NIC/Smart NIC
2	Central UPS	• Units of Easy UPS 3S 30 kVA 400 V 3:3 UPS for external batteries • Units of Easy UPS 3S Empty Modular Battery Cabinet • Units of 7.2 Ah battery modules • Inverter System with lithium batteries
3	Workstations	Units of Dell Precision T3460 SFF • CPU: 12th Generation Intel® Core™ i7-12700, 25 MB Cache, 12 Core, 2.1 GHz to 4.9 GHz, 65W • RAM: 32GB (2x16GB) DDR5 4800MHz, SO-DIMM, Non-ECC • HDD: M.2 1TB PCIe NVMe Class 35 Solid State Drive + 3.5-inch 2TB 7200rpm Hard Disk Drive • VGA: NVIDIA Quadro T1000, 4 GB GDDR6, 4 mDP to DP adapters. • NIC: LAN 10/100/1000 • Optical: 8x DVD+/-RW 9.5mm Optical Disk Drive CHASSIS: Tower • OS: Windows 11 Pro
4	Storage Server	Units of DELL R450 • Intel Xeon 8C/16T Processor • 32GB RAM • 1 TB SSD/HDD Storage • Dual Port SFP/SFP+/QSFP Pluggable 10G/25G NIC/Smart NIC Units of DELL R450 • Intel Xeon 8C/16T Processor • 32GB RAM • 1 TIB SSD/HDD Storage • Dual Port SFP/SFP+/QSFP Pluggable 10G/25G NIC/Smart NIC Units of DELL R740xd • Intel Xeon 24C/48T Processor • 2 x 1TB SSD in RAID-1 • 22 x 2.4TB HDD (NO RAID!) • Dual Port SFP/SFP+/QSFP Pluggable 10G/25G NIC/Smart NIC
Software		
1	OS	Ubuntu Server, Windows 11, PROXMOX
2	MS Office	Units of Microsoft 365 subscription
3	Security (Firewall)	FortiGate-80F Hardware plus (FortiCare Premium and FortiGuard Enterprise Protection)
4	Data collection software	Meteowiz, POLARIS, Messir-com, etc.

3.3. Design the data management system

The design for the data management system for GBON Networks in Niger has been described in section 3.2. There is a server in Niamey with the capacity to collect and enable access and management of the data from the AWSs. The DNM currently uses CLIDATA, and it is configured to collect the data from the manual station. The data of the AWSs is collected in a cloud server and also on a local server.

Activities to Uplift ICT and Data Management Systems:

Activity 3.10: Employ the services of experts for the review of power supply, ICT equipment, and data flows at the start of the Investment Phase, for the Meteorological Data Management System and WIS 2.0 implementation.

Activity 3.11: Procure and install a Meteorological Data Management System that is compatible with WIS 2.0 through a 'supply and support' contracting approach, including ongoing training and maintenance support. This should include user and administrator training.

Activity 3.12: Provide support targeted at improving the existing website for DNM, to ensure products and services are easily accessible to stakeholders and the public.

3.4. Environmental and sustainability considerations

SOFF projects are expected to contribute to the improvement of climate and weather services. However, the surface observing networks, infrastructure, and operations may have environmental impacts. Therefore, environmental and sustainability considerations should be included in the procurement process as a selection criterion for suppliers. This will enable the implementing entity (WFP) and DNM to consider opportunities for reusable instruments or biodegradable materials, such as:

- Biodegradable string for radiosondes.
- Reduction in the size of radiosondes, incorporating biodegradable materials where feasible.
- Environmentally sustainable packaging, such as cardboard and paper.
- Ensuring instruments do not contain mercury.
- Careful use and disposal of batteries to reduce toxic waste.
- Plan for safe removal of waste at the end of construction.

Environmentally sustainable approaches should also be adopted in the following aspects:

1. The use of solar as an alternative source of energy should be considered.
2. Where applicable and necessary, a GBON-compliant weather station is recommended to replace an existing AWS with civil infrastructure (e.g., electricity, wind mast, etc.) that

is reusable. Additionally, scheduled preventive maintenance and calibration should be adopted to lengthen the lifecycle of sensors.

3. GBON-compliant sounding systems are recommended to be located at sites with staff. The tender process should emphasise quality criteria related to composability in material selection, where applicable.
4. Raise awareness at all levels of governance about the critical importance of preserving meteorological equipment.
5. Enhance capacities for remote system diagnostics and alarms crucial to minimise maintenance trips, to reduce carbon footprint.

Phased-Approach

Niger is a large country covering a diverse climatic zone, with the existing stations mostly to the south. This NCP is recommending the rehabilitation of some of these stations in line with GBON standards and also the installation of new stations across the rest of the country. A phased approach is recommended for the rehabilitation of surface stations and the construction of new upper air stations in Niger. This approach could help if/where the total amount required to fund the entire project is not readily available. The available funding could be dedicated to a phase pending when more funds are available to embark on the execution of the remaining phase(s). In view of this and given the size of Niger, a two-phase implementation stage, as indicated in the following tables, is recommended.

Table 8: Rehabilitation and construction phases for surface and upper air stations

Rehabilitation/New Surface Stations	
Phase One	**Phase Two**
• Agadez Aero • Bilma • Birnin Konni • Chikal • Dakoro • Diffa • Gaya • Goure • Ingall • Maradi Aero • NGuigmi • Tahoua Aero • Tillabery • Zinder Aero • Aderbissinat • Oubandawaki Makiani • Fachi	• Lissia Boukar • Aguessis • Kandil Bozou • Bela Yala • Taggafadi • Aguando • Afassa • Djado • Séguédine • Dao Timmi • Katanga • Madama

• Agadem • Ngourti	
Rehabilitation/New Upper-Air Stations	
Phase One	**Phase Two**
• Zinder Aero • Agadez • Tahoua Aero	• Diffa • Bilma

Table 9: Timeframe for the phase approach implementation

Phase		**Timeline**	**Duration**	**Key Activities**
Phase One		Starting as soon as the funding phase is approved	2 Years	Rehabilitation of priority stations and establishment of new surface and upper-air sites in key operational areas, including integration with communication systems; staff training and maintenance planning.
Phase Two		To start when the compliance stage of phase one has been met	2 Year	Expansion to additional strategic locations through establishment of new surface and upper-air sites; including integration with communication systems; staff training and maintenance planning.

Module 4. GBON Human Capacity Development Module

4.1. Assessment of human capacity gaps

The DNM has a staff strength of 54 personnel, working in the different divisions of the Directorate, including Management Staff, Meteorologists, Meteorological Technicians (Observers), Engineers, Administrative and Finance Staff, etc. The categories of personnel are as follows:

Table 10: DNM staff by cadre

S/N	Cadre	Number of Staff
1	Stat &Eco /Ingénieur	3
2	Adm/cadre adtf	9
3	Informatique	3
4	Chauffeur	4
5	Météo/Agent	3
6	Auxiliaire/Planton	3
7	Météo/Ingénieur	13
8	Technicien météo	11
9	TP/M/Adjoint technique	5

Key gaps in human capacity necessary to ensure GBON compliance with observations are:

1. Most of the functional stations are managed by third parties due to inadequate personnel for DNM.
2. DNM stations outside Niamey and other major cities/towns are often manned by ill-trained auxiliary workers, without the requisite skills in weather observation and data transmission.
3. An inadequate number of instrument engineers and technicians to adequately carry out routine maintenance on the vast observation network across the country.
4. The DNM lacks the staff strength to effectively carry out 24/7 weather monitoring, observation and international data exchange.

4.2. Design capacity development activities for technical staff

The DNM may require the support of SOFF to recruit new observers and technical staff, as the current personnel are grossly inadequate. The proposed upper air stations will also need new staff with the required skill sets. This support will be required both during the Investment and Compliance phases.

Activity 4.1: Provide training in basic automatic and manual weather station verification and maintenance from the start of the Investment Phase through the Compliance Phase, for all DNM observers, engineers and partners who contribute to the management of stations.

Activity 4.2: Offer training leading to BIP-MT qualifications to all of DNM's observation personnel. This could be organised through the Nigerian Meteorological Agency, at the WMO RTC in Lagos.
Activity 4.3: Provide training to the ICT manager in network, database, security, and communications technology critical to WIS2.0, MDMS, and CDMS.
Activity 4.4: Provide training to all intended staff of the proposed upper air stations to support the new stations.
Activity 4.5: Provide comprehensive training in weather station maintenance and metadata collection for technical officers to provide backup support, both at the start of the Investment Phase and through the Compliance Phase.
Activity 4.6: Provide training in OSCAR/Surface, WIGOS and WDQMS operation to selected members of the Observations and Technical teams.
Activity 4.7: Provide training in the use of meteorological software, data analysis tools, and numerical models, including specialised training on satellite and radar technology for weather monitoring and analysis.
Activity 4.8: Technical English language training course for project implementation personnel.

4.3. Design capacity development activities for senior management

DNM have a broad and diverse range of responsibilities, and as the impact of climate change increases, demand for more and diverse services from them is also increasing. It is often assumed that capacity pre-exists at the management level, but this assumption may add a burden to DNM management and consequently put the SOFF investments at risk. In view of this, the following capacity development activities are recommended to address any identified gaps in management:
Activity 4.9: Provide a SOFF-funded program/project manager to oversee equipment procurement, installation, and commissioning during the Investment phase, with the position to ideally continue for the life of the equipment during the Compliance phase, funded with SOFF compliance funding.
Activity 4.10: Provide SOFF-funded training in finances, staff management, and strategic planning for the NMHS senior management team.
Activity 4.11: Offer specialised training on crisis and disaster management, preparing senior managers to respond effectively to weather-related emergencies and natural disasters.
Activity 4.12: Train senior management in effective communication strategies for engaging with internal and external stakeholders, including government agencies, international organisations, and the public.
Activity 4.13: Capacity building for project monitoring and evaluation for the senior management personnel.

4.4. Gender and CSOs considerations

There is a gender action plan in Niger Republic, domiciled under the Ministry of Population, Social Action and National Solidarity. However, the existing action plan is undergoing a review at the ministerial level. Evaluation of DNM staffing shows a good distribution of personnel

along gender lines, and gender equality ranks high in its operations and activity, including all the SOFF-related activities during the readiness phase.

In the implementation phase of the project, it is recommended that DNM adopt SOFF gender action plan that requires all the GBON National Contribution Plans to include gender considerations to promote gender equality and empowerment. In the Investment Phase, the DNM's implementing team is expected to have 50% participation of women in capacity-building activities and 50% participation of women in consultations with developmental partners. The following activities during SOFF implementation in Niger, as recommended by SOFF, are provided in **Table 8.**

Table 11: Gender considerations for SOFF activities in Niger

Activity	**Indicator**
Deliver capacity-building activities on gender-sensitive topics in the context of SOFF operations.	Report on technical capacity building workshop at DNM on gender-sensitive topics to mainstream the government strategies and development plans on gender concerns.
Organise stakeholder engagement workshops/consultations, including, where possible, developmental partners focused on women's empowerment.	Further stakeholders' engagement activities that involve developmental partners focused on women's empowerment are recommended in the National Contribution Plan.
Promote gender equality by establishing minimum thresholds for female participation in SOFF-related activities.	In an ideal situation, women should be represented at least • 50% of all participants in SOFF-related and supported training. • 50% of all participants in SOFF consultations, planning workshops, etc. • 50% of staff for operating and maintaining GBON stations. • 50% of decision-making and project management positions where applicable.
Conduct a gender assessment analysis as part of the human capacity assessment (including areas such as gender discrimination, harassment, gender balance, etc.) and provide recommendations accordingly.	Reports on the gender assessment analysis, highlighting findings and recommendations on affirmative action to bridge gaps where necessary.

Furthermore, the DNM should adopt the WMO Gender Action Plan for Members, which provides the following supporting guidance (*Gender-Action-Plan_2024-2027*):

- Increase the participation of women by: (i) identifying and nominating female experts from NMHSs or other national institutions to participate in the work of WMO governance bodies and their working structures and (ii) seeking equality in the composition of delegations to sessions (1.1.1(c) in WMO Gender Action Plan).
- Strive for gender balance, including in management and working structures (1.1.2(c) in WMO Gender Action Plan).

- Encourage and support female networks of experts (1.1.3(c) in WMO Gender Action Plan).
- Designate NMHS gender equality focal points (1.3.4(c) in WMO Gender Action Plan).
- Develop monitoring mechanisms at the national level by (i) adapting the WMO gender monitoring indicators or (ii) using an existing national framework (2.4.1 in WMO Gender Action Plan).
- Include gender equality (including the WMO Policy, GAP, link to online training and gender webpage, and information on key activities) in the induction of new PRs and NMHS staff (3.1.4(c) in WMO Gender Action Plan)
- Develop the capacity of NMHS staff on unconscious bias, inclusive leadership, gender mainstreaming, and gender-responsive service delivery through training and workshops (3.1.5(c) in WMO Gender Action Plan)
- Offer internships to young professionals, especially females, and secondments of staff from meteorological services on a rotational basis. (3.4.2(c) in WMO Gender Action Plan)
- Engage with international organisations' field offices, such as UN Women, UNDP, etc. (5.1.4 (c) in WMO Gender Action Plan)
- Conduct research and provide the Secretariat with case studies, stories, and examples of gender mainstreaming, including in-service provision, for the development of a compendium of good practices (5.3.3(c) in WMO Gender Action Plan).
- Develop and disseminate communication materials (i) highlighting the role of women in meteorology, hydrology, and climatology, (ii) promoting female role models, and (iii) advocating for gender-responsive weather, hydrological, and climate services (5.1.3(c) in WMO Gender Action Plan).

Module 5. Risk Management Framework

5.1 Assess the risks of the observing network and propose mitigation measures

Risk category and description	**Probability**	**Impact**	**Mitigation action**	**Monitoring & evaluation**
Physical damage or deterioration of observing infrastructure due to extreme weather events, natural disasters, or vandalism.	High	High	• Implement resilient infrastructure designs. • Install disaster-resistant weather infrastructure and enhance security measures; where it is possible, weather stations can be relocated to a more secure environment nearby. • Communal ownership of projects should be encouraged.	Quarterly evaluation of station status by the DNM
Location security/theft	Low to Medium	Medium	Improve site security (fencing, staff).	Monitor and adjust rehabilitation plans to maximize site security and reduce vulnerability to theft
Insufficient human resources or technical skills to install or maintain stations and ICT systems.	Medium	Medium	• SOFF to provide support for the training of technical and observing staff during the Investment and Compliance phase. • Build public and government support for DNM to ensure its budget is supported by:	Annual human resources audit.

			○ Improved visibility of observations through stakeholder dissemination via uplifted data management systems and webpage ○ Improved weather services through access to modelling centre products during the compliance phase	
Unreliable power leads to a communications outage and a delay in data transmission	Low to Medium	High	• Equip all stations with alternative, climate-friendly power sources.	Monthly review of WDQMS and GBON compliance.
Delayed equipment maintenance due to a lack of spare parts.	Medium	High	• Procurement of equipment under a 'supply and support' contract, including continuous supply of spare parts. • Maintain a local store of key spare parts.	Monthly spare parts inventory reporting
Lack of equipment maintenance due to funding challenges for travel and logistics	High	High	Establishment of a logistics fund to cover travel costs, vehicle maintenance or rental, and Daily Subsistence allowance (DSA) over the life of the equipment.	• Monthly reporting on logistics needs and activities. • Regular quality audits.
Lack of equipment maintenance due to inadequate technical know-how	Medium to High	Medium to High	Recruitment and training/retraining of technical officers throughout the investment and compliance phases	Quarterly reporting on maintenance visits
Poor internet connections lead to delays in data transmission	Medium	High	Equip all stations with redundant cellular, internet, or satellite communications	Monthly review of WDQMS and GBON compliance

Key observations are not traceable to a known standard	Low	Medium	• Develop a routine program and record keeping of field sensor verification and regular calibration of field transfer standards. • Develop a Standard Operating Procedure (SOP) for meteorological observation in DNM	Annual reporting of quality statistics
Sustainability	Medium	Medium	GBON SOFF efforts should guarantee sufficient resources and a post-SOFF sustainability plan.	To be considered an integral part of SOFF efforts, including spares, calibration capacity, transportation, etc.
Geography (insecure region)	Low	High	No GBON site is considered considerably insecure. No relocation actions will be required. Involvement of partners and communities in the security of station sites. DNM should ensure that there is a formal agreement with the local community association and government institutions for the protection of installations.	NMHS to monitor and evaluate the situation, including site security and sensor /instrumental functioning
Lack of synergy with SOFF complementary programs	Low	Medium	Coordination between SOFF and other developmental partners involved in the weather and climate value chain operating in the country is critical.	
Site Accessibility issues	Medium	High	All identified sites are managed/owned by trustworthy partners.	The DNM is to monitor and evaluate situations, including site security

Module 6. Transition to SOFF investment phase

The activities outlined in this National Contribution Plan will provide the basis for developing the Investment Proposal for Niger's National GBON Observation Network. The Investment Proposal will be developed by the Implementing Entity (World Food Programme (WFP)) and the DNM, with input from the Nigerian Meteorological Agency (NiMet).

It is recommended that, on approval of the Investment Phase Funding Request, a workshop including the DNM, WFP, and NiMet be arranged to review the outputs of the readiness phase and discuss the transition to the investment phase. Regular meetings, as were done during the readiness phase, should continue under the coordination of the Implementing Entity and should include the peer advisor wherever necessary.

Summary of GBON National Contribution Plan

Provide summary of GBON National Contribution Plan by filling this table

Components	Recommended activities
Module 2. GBON business model and institutional development	1. Sensitisation of host communities to key into the project and have a sense of ownership could encourage them to ensure that the equipment is protected from vandals.
	2. Procurement and installation contracts should include components for the training of staff on maintenance and supply of spare parts for the duration of a specified period.
	3. The DNM and SOFF implementing entity should have a strategy meeting before the commencement of the investment phase to harmonise all ongoing projects (if any), to avoid duplication.
Module 3. GBON infrastructure development	1. Undertake an audit of all existing but silent stations' equipment and facilities and AWS site, to identify all items that require procurement.
	2. Assessment of the installed and working stations, to identify where maintenance and instrument calibrations are required.
	3. Formally engage the communities around the existing stations for on-ground maintenance and security, including remuneration and capacity building.
	4. Procurement contract to uplift the existing stations, as per the audit, to ensure they communicate reliably in real-time to GBON standards.
	5. It is recommended that the implementing entity, in collaboration with the DNM, explore new upper air technologies where there is a comparable advantage and meet WMO standards and specifications.
	6. It is recommended that the implementing entity explore the equipment type suitable for countries with similar climatic conditions, e.g., the Middle East.
	7. The procurement of a project vehicle suitable for the local terrain should be considered.
	8. Employ the services of experts for the review of power supply, ICT equipment, and data flows at the start of the Investment Phase, for the

	Meteorological Data Management System and WIS 2.0 implementation.
	9. Procure and install a Meteorological Data Management System that is compatible with WIS 2.0 through a 'supply and support' contracting approach, including ongoing training and maintenance support. This should include user and administrator training.
	10. Provide support targeted at improving the existing website for DNM, to ensure products and services are easily accessible to stakeholders and the public.
	11. A two-phased approach is recommended for SOFF investment in Niger.
Module 4. GBON human capacity development	1. Provide training in basic automatic and manual weather station verification and maintenance from the start of the Investment Phase through the Compliance Phase, for all DNM observers, engineers and partners who contribute to the management of stations.
	2. Offer training leading to BIP-MT qualifications to all of DNM's observation personnel. This could be organised through the Nigerian Meteorological Agency, at the WMO RTC in Lagos.
	3. Provide training to the ICT manager in network, database, security, and communications technology critical to WIS2.0, MDMS, and CDMS.
	4. Provide training to all intended staff of the proposed upper air stations to support the new stations.
	5. Provide a SOFF-funded program/project manager to oversee equipment procurement, installation, and commissioning during the Investment phase, with the position to ideally continue for the life of the equipment during the Compliance phase, funded with SOFF compliance funding.
	6. Provide SOFF-funded training in finances, staff management, and strategic planning for the NMHS senior management team.
	7. Offer specialised training on crisis and disaster management, preparing senior managers to respond effectively to weather-related emergencies and natural disasters.
	8. Train senior management in effective communication strategies for engaging with internal and external stakeholders, including government agencies, international organisations, and the public.

Module 5. Risk Management	1. Install disaster-resistant weather infrastructure and enhance security measures; where it is possible, weather stations can be relocated to a more secure environment nearby.
	2. Communal ownership of projects should be encouraged.
	3. SOFF to provide support for the training of technical and observing staff during the Investment and Compliance phase.
	4. Equip all stations with alternative, climate-friendly power sources.
	5. Procurement of equipment under a 'supply and support' contract, including continuous supply of spare parts.
	6. Establishment of a logistics fund to cover travel costs, vehicle maintenance or rental, and Daily Subsistence allowance (DSA) over the life of the equipment.
	7. Develop a Standard Operating Procedure (SOP) for meteorological observation in DNM
	8. Involvement of partners and communities in the security of station sites.
	9. DNM should ensure that there is a formal agreement with the local community association and government institutions for the protection of installations.
	10. Coordination between SOFF and other developmental partners involved in the weather and climate value chain operating in the country is critical.
Module 6. Transition to SOFF investment phase	It is recommended that, on approval of the Investment Phase Funding Request, a workshop including the DNM, WFP, and NiMet be arranged to review the outputs of the readiness phase and discuss the transition to the investment phase. Regular meetings, as were done during the readiness phase, should continue under the coordination of the Implementing Entity and should include the peer advisor wherever necessary.

Report completion signatures

Peer Advisor signature

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Director General/Chief Executive Officer, and
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Beneficiary Country Signature

Dr. ADAMOU AISSATOU SITTA
Direction Nationale de la Météorologie
Director,
WMO Permanent Representative

WMO Technical Authority Signature

24.06.2026