

COUNTRY HYDROMET DIAGNOSTICS

Cote d'Ivoire 2021 peer review



Peer Reviewer

Direction Générale de la Météorologie (DGM)–Morocco



United Nations Development
Programme

COUNTRY HYDROMET DIAGNOSTICS

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



Côte d'Ivoire Report

May 2021

Peer reviewed by Direction Générale de la Météorologie (DGM)–Morocco

And

**Funded by the United Nations Development Programme (UNDP) a member of the Alliance for
the Hydromet development**

FINAL

LIST OF ACRONYMS

ACMAD	African Center of Meteorological Applications for Development
AFD	Agence Française de Développement
AGRHYMET	Centre régional pour l'Agriculture et Hydrometeorologie
ANAC	Agence Nationale de l'Aviation Civile
ANAM	Agence Nationale des Aéroports et de la Météorologie
ASECNA	Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar
AWS	AutomaticWeather Stations
BAD	Banque Africaine de Développement
CAP	Common Alerting Protocole
CHD	Country Hydromet Diagnostic
CIV	Côte d'Ivoire
CNRA	Centre Nationale de Recherches Agronomiques
DMN	Direction de la Météorologie Nationale
FIRCA	Fonds Inter-professionnel pour la Recherche et les Conseils Agricoles
GBON	Global Basic Observing Network
GDPFS	Global Data-Processing and Forecasting System
GTS	GobalTecomunication System
IRD	Institut de Recherche pour le Développement
MSG	Météosat Second Generation
NFCS	National Framework for Climate Services
MINEDD	Ministère de l'Environnement et du Développement Durable
ONPC	Office Nationale de la Protection Civile
PNCC	Programme National Changement Climatique
PROPACOM	Projet d'appui à la Production Agricole et à la Commercialization
QPE	Quantitative PrecipitationEstimates
QPF	Quantitative PrecipitationForecasts
RSTFA/SMT	Réseau de Service Fixe de Télécommunications Aéronautiques de l'ASECNA
SODEXAM	Société d'exploitation et de développement aéroportuaires, aéronautique et météorologique
SOP	Standard Operating Procedure
SWFDP	Severe Weather Forecasting Demonstration Project
UKMet	United KingdomMeteorology
UTC	Coordinated Universal Time
UNDP	United Nations Development Programme
UFHB	Université Félix Houphet-Boigny
VIGICLIMM	Vigilance Climatique et Météorologique
VIGICRUE	Vigilance de Crue
WMO	World MeteorologicalOrganization
WRF	WeatherResearchForecast

INTRODUCTION

The [Country Hydromet Diagnostics](#)(CHD) responds to the need for a standardized, integrated and operational tool and approach for diagnosing National Meteorological Services, their operating environment, and their contribution to high-quality weather, climate, hydrological and environmental information services and warnings. The CHD 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 aims to inform policy and investment decision-making, mainly guiding investments of the [members of the Alliance for Hydromet Development](#). The Alliance brings together significant development and climate finance partners behind a joint commitment to strengthen developing country hydromet capacity. Through Diagnostics, developing countries will benefit from better targeted and aligned financial and technical support.

The Country Hydromet Diagnostics is based on the ten most critical elements of the hydromet value cycle, grouped under four categories – enablers, observation and data processing system, service and product production and dissemination, user and stakeholder interaction. For each value cycle element, a limited number of standardized indicators is used, and each one uses explicitly defined data sources. Therefore, assessing these critical elements of the National Meteorological Service should lead to their maturity level. Note that Level 5 is the highest attainable maturity level in the CHD.

The Diagnostics draw as much as possible on primary data (self-reported and other quantitative data sources), but to inform the peer review requires additional data, particularly data from country user/client surveys. The Diagnostic is achieved through a questionnaire based on the indicators of the Diagnostics Tool. The WMO Community Platform provides the primary source of data information requirements for the Diagnostics, and the results of the Diagnostics will be integrated into the Platform adding substantial value.

In that context, WMO and representatives of the Alliance developed a draft prototype of the CHD. The Republic of Côte d'Ivoire, a developing country, has been identified to test drive it to improve it.

The Republic of Côte d'Ivoire (CIV) covers 322463 km² in West Africa with about 27 million soles. The CIV is in the transition area between the equatorial and tropical weather patterns. In the North, tropical conditions prevail, with precipitations averaging 1100mm annually. In the south, equatorial conditions with average rainfalls of 2000 mm prevail annually. Average temperature ranges between 25 and 30⁰ C and relative humidity between 71 and 85%.

To assist with the assessment of the critical elements of the value chain, the “Direction Générale de la Météorologie” of the Kingdom of Morocco has graciously agreed to play the peer reviewer role with support from a consultant hired by UNDP, an Alliance member. In addition to the Country information available in the WMO database, a questionnaire was developed based on the indicators of the CHD and staffed to the DMN focal point, who coordinated inputs from various branches of the organization. In addition, the consultant reviewed multiple reports related to Côte d'Ivoire hydromet capacities for information of interest to help with this peer review process. Note that the focus of this report is essentially on the DMN (i.e. Meteorological services) as the CHD Tool currently focuses on Meteorology only.

It is worth noting that the Government of Cote d'Ivoire (CIV) and "l'Agence Française de Développement (AFD)" have earmarked a 28M Euros investment for the modernization of the DMN under the project VIGICLIMM. VIGICLIMM, a three-year project (2022-2024), aims to improve the system of vigilance, weather warnings, and climate services. The Project involves, for example, the installation of 27 additional automatic stations, one Weather Radar and the creation of a meteorological forecasts and warnings centre as well as of a regional maintenance and calibration center for meteorological instruments and equipment. An International tender for proposals has been issued.

A summary of Peer Review results and key recommendations to lift the Maturity Level, where necessary, is presented in Annex 1. People consulted are in Annex 2, and References are available at Annex 3.

I. GOVERNANCE AND INSTITUTIONAL SETTING

In Côte d'Ivoire, hydrometeorological services are provided by two Services: Meteorological services are provided by la "Direction de la Météorologie Nationale (DMN)", a Direction/Department of the "Société d'exploitation et de développement aéroportuaire, aéronautique et météorologique (SODEXAM)" which is under the purview of the "Ministère des transports". Hydrological Services are under the purview of "la Direction de hydraulique", a Direction /Department of the "Ministère de l'Hydraulique".

1.1 Act or Policy: In 1997, through the Decree N^o 97-228/1997 (16 April 1997), the "Société d'exploitation et de développement aéroportuaire, aéronautique et météorologique (SODEXAM)" was created with authority over the "Direction de la météorologie nationale (DMN)". It is worth noting that, before 1982, meteorological services in CIV were provided by ASECNA then were moved to the new Agence Nationale des Aéroports et la Météorologie" (ANAM) until 1997. With the creation of SODEXAM, the Meteorological services were kept under the purview of the SODEXAM. At the same time, civil aviation authority was given more visibility by establishing the "Autorité nationale de l'aviation civile (ANAC)". As per the Decree of creation of the SODEXAM, the DMN has the following responsibilities:

- to ensure the coordination of observation, study and forecasting activities in meteorology on the national territory;
- to provide meteorological assistance, in particular, to transport (air, sea, land, etc.), agriculture, public works, the environment;
- to design:
 - the training, supervision and development policy for personnel in the fields of meteorology, climatology, agrometeorology, hydrometeorology and the environment;
 - the policy of collaboration with universities and national and international study and research institutes in the areas of forecasting, meteorology, climatology, agro-meteorology, hydrometeorology and environment;
 - an awareness-raising policy for the institutions of the Republic, the authorities and the technical staff of deconcentrated or decentralized local authorities to take the meteorology component into account in their development policy;
- to manage practical networks;
- to ensure the harmonization of study and work programs;
- to ensure the realization of a permanent consultation between the users of meteorology and the organizations of observation, forecast and research;
- to promote the use of meteorology;
- to provide long-term monitoring of the state of the atmosphere;
- to ensure the representation of Côte d'Ivoire with the World Meteorological Organization (WMO);
- to fulfil the obligations of Côte d'Ivoire under the terms of the World Meteorological Organization (WMO) Convention and to serve national interests by participating in WMO programs and activities;
- to ensure better prevention and improve the quality of the environment and contribute to the regular monitoring of certain fundamental indicators of the state of the environment;
- to monitor the meteorological activities of ASECNA

Resolution 26 of 13th WMO Congress(1999) called for *“Members to mandate the NMS as the official voice in issuing weather warnings for public safety to help minimize risks to the health and safety of citizens as well as the primary national authority and official source of information and policy advice on the present and future state of the atmosphere and other aspects of national weather and climate, in support of policy development”*. Although the mandate of the DMN covers most activities, it comes short of meeting the letters of this important aspect of this resolution. Considering the above Resolution, there is room to strengthen the role and responsibilities of the DMN.

1.2 Strategic & Operational Plans:The DMN has an operational plan (2020-2023) linked to the SODEXAM strategic plan,which is being updated for 2021-2025. In addition, the DMN is involved in the National Drought Plan 2021-2025, with specific responsibilities assigned for the issuance of bulletins for wildfire and climate watch. It also plays a leading role in developing and implementing the National Framework for Climate Service (NFCS). The 2016-2020 NFCS has been developed with some activities implemented through national and international projects.The NFCS 2021-2025plan was developed with support from UNDP.

1.3 Budget Allocation:The DMN has a budget of about \$2 million, representing about 15% of the budget of its leading organization, SODEXAM. The salary envelop of the DMN represents 70% of its budget. When the operational cost is included, only 10% of the budget is left for investments making it difficult for the DMN to innovate and introduce new services.

1.4 Staff:The DMN has a complement of124 employees, including 15 women (12% of staff). Recently, it has hired, trained and posted 41 technicians to address the upcoming issue of retirements: ¼ of staff will retire by 2025. The number of operational forecasters, eight, is currently limitingthe capacity to cover the foreseen needs of at least three operational desks to cover marineand climate services.Therefore, there is a requirement for an additional 7 to 8 forecasters to meet the demands. Training of forecasters is highly dependent on the availability of WMO scholarship and the budget to hire them when they have completed their studies. Concerning IT support, the DMN draw from a pool ofSODEXAM informaticians used by all the divisions. However, this staff is not familiar with the requirements of operational meteorological services such as data management and the development of meteorological applications. This situation does not favour the capacity of the DMN to innovate. The DMN, nonetheless, operates one desk on a 24/7 basis to cover for severe weather situations and provide weather bulletins in support of the public, agriculture, and marine meteorology.

1.5 Experience in International Projects Implementation:The DMN has contributed to various international projects, basically, as a third-party participant. For examples, it participates in the World Bank project PARU (“Projetd’Assainissement et de RésilienceUrbaine“) for the development of an Early Warning System (EWS) and also on the projects of the Authority of Volta Basin and the Authority of Basin of Niger for monitoring and provision of hydrometeorological information in these basins. In addition, theVIGICLIMM project, a loan by the Governmentandfunded by AFD, will be implemented by the DMN.

Considering the above, the Governance Element of the hydromet value cycle is set at the **Maturity Level 2** principally because of the soft mandate of the DMN, budgetaryand human resources limitations.

II. EFFECTIVE PARTNERSHIPS TO IMPROVE SERVICE DELIVERY

2.1 Partnership with other government entities: The SODEXAM/DMN has established a partnership with several government entities such as with Civil Protection for the issuances of warnings; Port of Abidjan for marine meteorological information; PROPACOM (“Projet d’appui à la production Agricole et à la commercialization Extension”) for the provision of agrometeorological information to small producers for their adaptation to climate change. The DMN also collaborate with various Ministries/Agencies in the National Framework for Climate Services (NFCS), for examples: Environment and sustainable development, Agriculture, health, Energy, Food security.

2.2 Partnership with private sectors, research centres and Universities: The SODEXAM/DMN has established and maintained partnerships with the University of Felix Houphouët-Boigny (UFHB) for the use of High-Performance Computer (HPC) acquired in 2017. Some technical/administrative issues have prevented, so far, the use of the HPC by the DMN for its WRF model. There is a strong partnership with ASECNA (“Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar”) which transmits DMN data to GTS, operates the two upper air sites and train staff at the EAMAC¹ in Niger.

The SODEXAM/DMN has recently signed (March 2021) a collaboration agreement with the University of MAN to take advantage of training for its personnel and to participate in research and scientific/technological innovation activities offered by the University.

A number of collaboration agreements exists between the SODEXAM/DMN and research institutions such as the “Centre national de recherche agronomique” (CNRA), World Agroforestry (ICRAF), “Fonds Inter-professionnel pour la Recherche et le Conseils Agricoles” (FIRCA) and the “Institut de Recherche pour le Développement” (IRD). These agreements allow the DMN to access observing stations data of these institutions when available and assist some students of these institutions with their work related to meteorology and climate. The DMN signed an Agreement with [HD Rain](#) (a French Company) to use a new satellite-based technology to infer rainfall amount and forecast from the attenuation of satellite broadcast signals by rain. This technology is being experimented in the city of Abidjan with 20 receptors systems installed and exploited by the DMN.

The DMN has also signed an MOU with the private company “Weatherforce” to produce and disseminate climate services for agriculture. An MOU is also under discussion with EARTHNETWORK to access lighting, severe weather forecast and nowcasting information. In addition, an MOU has just been signed with the Côte d’Ivoire Energies which deals with biomass, hydro and gas energy.

2.3 Partnerships with International Climate and Dev Finance partners: Except for the Project VIGICLIMM funded by AFD, the SODEXAM/DMN has no direct partnership with International funding agencies. SODEXAM/DMN receives UNDP assistance for some of its activities, such as updating the NFCS plan (2021-2025).

SODEXAM has established a partnership with the Ministry of Environment and Sustainable Development (MINEDD) through the National Climate Change Program (PNCC) to collaborate closely on issues related to adaptation to climate change. This partnership made it possible

¹ The African School of Meteorology and Civil Aviation is a public African administrative establishment created in 1963 and located in Niamey which trains aeronautical engineers, aeronautical technicians and air traffic controllers.

to endow the National Meteorological Department of SODEXAM with six automatic agro-climatic stations and an information system on financing the Special Climdev Africa Fund managed by the African Development Bank (AfDB). Currently, SODEXAM and the United Nations Development Program (UNDP) are collaborating on the development of a multi-risk climate early warning project in Côte d'Ivoire.

2.4 New products & services from partnerships: There are no new products and services or new techniques resulting from these partnerships for the time being. The DMN provides information, bulletins and data that it has already.

The maturity level for effective partnerships to improve service delivery is set at **Level 3** as it usually acts as a third party in climate financing initiatives.

III. OBSERVATIONAL INFRASTRUCTURE

3.1 Surface and upper-air observing sites resolutions: The observational infrastructure of the DMN can be summarized as follows, taking into account the successful arrangement it has with partners to access their stations' data:

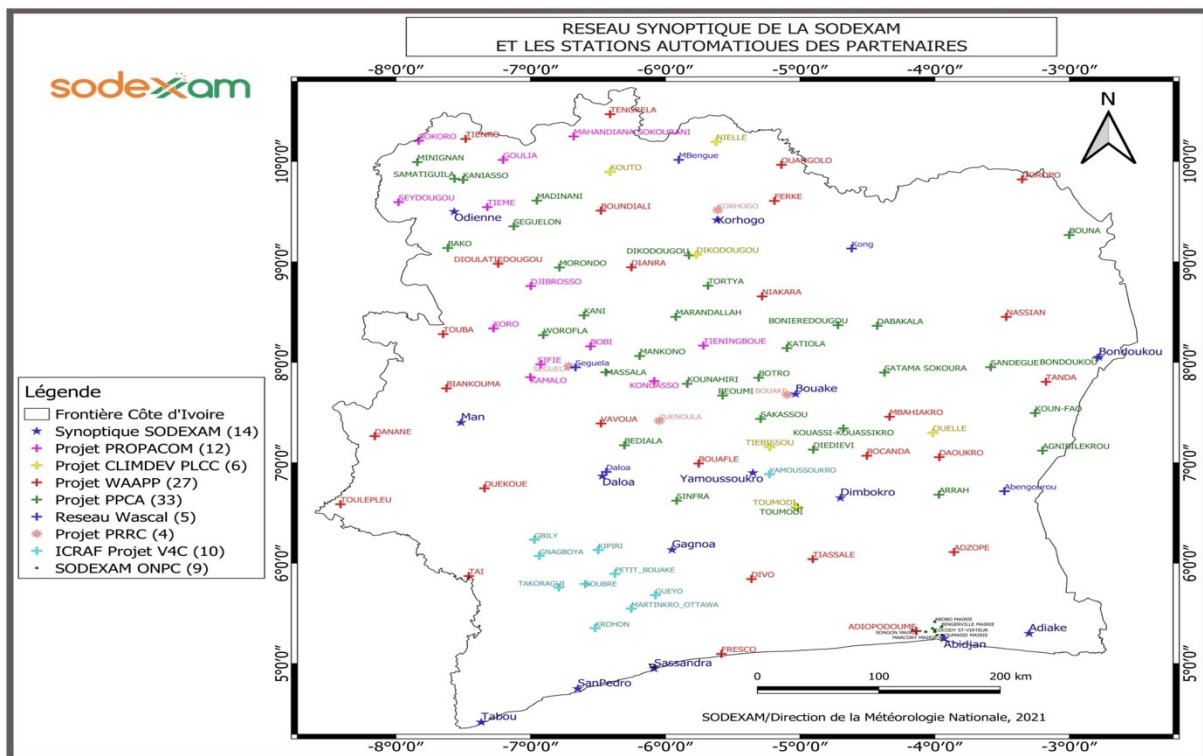
a) Surface observations (see map below):

- 14 synoptic observing sites, including 10 recently upgraded into Automatic Weather Stations (AWS). 3 of the stations use the newly installed RSTFA/SMT² to transmit their data directly through GTS without going through the ASECNA system. The intention is to upgrade all 14 observing sites into AWS and to transmit the data through RSTFA/SMT.
- 106 operational AWS accessible to the DMN
- 91 rain gauges, including 14 in the district of Abidjan
- Considering the area of 322,463 km², the 14 stations transmitting on the GTS cover, each, an area within a radius of 85 km
- The DMN does not possess any weather buoy along the CI coastline to assist with sea state forecast nor a weather radar to assist with nowcasting

b) Upper-Air.

- The DMN has access to 2 upper-air sites located in Abidjan in the south and Man in the west. ASECNA owns and manages these sites, which operate twice a day: 00 and 12 UTC.

²RSTFA/SMT: Réseau de Service Fixe de Télécommunications Aéronautiques de l'ASECNA pour la transmission sur le Système mondiale de télécommunication.



3.2 Additional observations for nowcasting and specialized products: There is no radar in operation in CIV (although one is planned through the VIGICLIMM project). Information is inferred from satellite images available through the Meteosat Second Generation (MSG) satellites for nowcasting.

3.3 Standard Operational Procedures (SOP): There is a Standard Operating Procedures (SOP) for deployment, maintenance, quality assurance and calibration of the equipment. However, the DMN has no vehicle dedicated to the installation and maintenance of the equipment noting that four vehicles will be acquired under the VIGICLIMM project. Liaison vehicles are available currently at the SODEXAM for use by all Divisions. Therefore, their availability doesn't always correspond to DMN plans for maintaining the observing equipment. In addition, only 3 staff are dedicated to this task, which is insufficient considering the size of the country and the increasing number of AWS planned through the VIGICLIMM project and the demands of partners for maintenance of their stations.

3.4 Percentage of automatic surface observations: 71% of DMN stations transmitting on the GTS are of AWS type (see section 3.1). When considering partners stations, the percentage of AWS increases to about 89%.

Considering the above, the maturity level is set at **Level 2** due to lack of efficiency for timely maintenance of the equipment (lack of dedicated vehicles and personnel and lack of high-resolution data for nowcasting (Radars)).

IV. DATA AND PRODUCTS SHARING AND POLICIES

4.1 Global Basic Observing Network (GBON): Considering the area of 322,463 km² and the number of observing stations transmitting on the GTS, WMO has determined the following for compliance to GBON:

- a) Surface level observations:
 - GBON minimum requirement (a resolution of 200 km) is 9 stations for CI. With 14 stations reporting, CI surpasses the minimum requirement for GBON compliance
 - GBON conditional requirement (a resolution of 100 km) is 33 stations. Considering the 14 stations transmitting on GTS, there is a gap of 19 stations to meet the GBON conditional requirement. The implementation of the VIGICLIMM project will address this deficiency with the additional 27 stations. Another alternative is to transmit partners data if they agree and if these stations carry the basic information required for transmission.
- b) Upper air observations: WMO has determined that for the size of CI, 2 upper-air sites are necessary for GBON compliance. Through ASECNA, two upper air sites are available, therefore meeting the GBON upper-air observations requirement.

4.2 Data exchange Policy: The DMN has no data exchange policy. Data are shared freely with research institutions. They are provided on-demand based on the availability of personnel and on a first-come, first-served basis. There is a cost recovery mechanism in place for data and climate service except for aviation.

4.3 External Data/Products: Through its partnerships with various research institutes, the DMN can access their observing sites data. It also accesses information from global and regional Numerical Weather Prediction (NWP) models from the WMO Global Data Processing and Forecasting Centres (GDPFS) and also from satellites through the Meteosat Second Generation Satellites (MSG). Climate information from ACMAD and AGHRYMET³ are also available to the DMN. It contributes and receives data for the “[Cadre Harmonisé](#)” for food and nutrition insecurity situation analyses (current and projected)

The maturity level of the Data and Products Sharing and Policies is assessed at **Level 2** mainly due to the lack of a data-sharing Policy and mechanism.

³ ACMAD: African Center of Meteorological Applications for Development, a WMO Regional Climate Centre providing weather and climate information and promoting sustainable development of Africa (notably within the context of national strategies for poverty eradication), in the fields of agriculture, water resources, health, public safety and renewable energy.

AGHRYMET: A centre of excellence for support to food security, enhancement of Agricultural production and to assist with training and the improvement of natural resources management in the Sahel and the CEDEAO (“Communauté Economique et de Développement des Etats de l’Afrique de l’Ouest”)

V. NUMERICAL MODEL AND FORECASTING TOOL APPLICATION

5.1 Numerical models and remote sensed information:The DMN has access to Météosat Second Generation (MSG) satellites data and to some WMOGDPFS Centres models (regional and global) outputs. This information facilitates the production of forecasts.

5.2 Local models: There is no operational in-house numerical model at the DMN. DMN attempted to run an adapted version of the Weather Research and Forecasting (WRF) Model, a mesoscale numerical weather prediction system. However, theProject is on hold pending fixing access issues of the High-Performance Computer (HPC) at the “Université Félix Houphouet-Boigny” (UFHB). Furthermore, the DMN did not take advantage of guidance and models outputs products available on the Severe Weather Forecasting Demonstration Project (SWFDP) website hosted by the WMO Regional Centre of Dakarbecause it was not assigned a password. This situation prevented the DMN to take advantage of the cascading forecasting process of the SWFDP. In addition, It did not have access to the UKMet Tropical 4 km resolution model becauseof the non-availability of the password. Arrangements will be made to address these issues to allow DMN to access high-value information for its forecasting activities.

5.3 Probabilistic forecasts: DMN has not yet implemented the probabilistic forecast approach.

The maturity level for this component is assessed **at Level 2**, mainly because of the limited use of Regional and Global NWP.

VI. WARNING AND ADVISORY SERVICES

6.1 Warning & Alert: The DMN operates on a 24/7 basis to provide forecast and warning services, including flood and wildfire warnings. There is one forecaster desk and 8 forecasters, insufficient to cover more than one forecaster desk to address services to other sectors.

6.2 Hydromet hazards supported forecasts: Supported hydromet hazards forecasts include severe weather (heavy precipitations, Drought, Thunderstorms, hail, gale, high/low temperatures), flood (river and cities). Weather forecasts for different periods (24h, 48h and 72h) are issued daily. Warning thresholds were developed in collaboration with the National Office of the Civil Protection (ONPC), providing feedback on severe weather events. However, limitation on staffing prevents consistent integration of feedback into the operational system to improve forecasts and warnings for efficient decision-making. In addition, the limited number of operational meteorologists prevents DMN from addressing services to specific sectors of the economy, such as transports, tourism, agriculture, energy and construction.

6.3 Common Alerting Protocols and Impact Based Forecasting: The DMN has not adopted the Common Alerting Protocols (CAP), but it is working toward it. A focal point is assisting with the integration of CAP in its operational processes.

This component is assessed at **Maturity Level 2**.

VII. CONTRIBUTION TO CLIMATE SERVICES

7.1 Climate services:The DMN led the assessment of NFCS 2016-2020 and the development of NFCS 2021-2025 with financial support from UNDP. It can exploit the information provided by ACMAD and AGHRYMET as well as information on its climate database (Clidata) for the provision of monthly bulletins on the state of climate (comparative analysis of the previous month with normal) and of seasonal forecasts (up to 3 months). Unfortunately, Clidata still has to carry the rest of the archived data to be complete. The DMN also issues a bulletin evaluating interannual variability to assist with assessing impacts of events like El Nino) and provides decadal bulletins in support of agriculture activities. In addition, it also offers tailored products for domestic aviation, agriculture, water and energy sectors but not yet to the health sector due to a lack of demands from this sector. The DMN participates in two regional forums (PRESAGG and PRESASS⁴) in West Africa to produce seasonal precipitation forecasts. Climate data are collected and kept on a database system (Clidata). Many paper archived data (about 50 years) still need to be integrated into the database, after digitization, for ease of exploitation, noting that the 2002-2011 period of tensions in the country resulted in gaps in observations data in the northern part of the country.

The maturity level is assessed at **Level 3**. However, the maturity level could be improved if climate services are provided systematically to other sectors such as tourism, road transports and marine.

⁴ PRESAGG : Forum for seasonal forecast of precipitations in Golf of Guinea Countries

PRESASS: Forum for seasonal forecast of precipitations for Soudano-Sahelian Countries

VIII. CONTRIBUTION TO HYDROLOGY

8.1 QPE and QPF: The DMN has no process in place to exchange QPE and QPF with Hydrology Department at the "Ministère de l'Hydraulique" and to the Direction de la Gestion et de la Protection des Ressources en Eau - Ministère des Eaux et Forêts ". Note an agriculture bulletin based on QPE is available.

8.2 Standard Operating Procedures (SOPs): There is no Standard Operating Procedure (SOP) to exchange information between the DMN and the Division of Hydraulic.

8.3 Joint projects/initiative Met/Hydro: Some collaboration does exist for the issuance of the VIGICRUE Bulletin: The VIGICRUE bulletin is a decadal bulletin developed by the DMN in cooperation with the "Direction de l'hydraulique" and transmitted directly to users.

Considering the above, the maturity level is assessed as **Level 1**.

IX. PRODUCT DISSEMINATION AND OUTREACH

9.1 Communication channels:The DMN doesn't have a TV studio, and it disseminates its information through Radio, emails, TV, SODEXAM website. A few visits to the website turned out to be not successful as the only products available were the Ephemerides table and weather forecasts in the form of maps. Moreover, the website was not updated in real-time.

9.2 Outreach:The DMN doesn't have an outreach program perse but take advantage of organized visits of DMN by schools and other groups interested in meteorology to convey its messages. It also organizes occasionally sensibilization seminars.

9.3 Outreach to marginalized communities, youth and elderly:There is no specific program to reach out to the marginalized due to budget and personnel limitations.

Considering the above, the maturity level is assessed at **Level 1** due to no availability of a dedicated website.

X. USE AND NATIONAL VALUE OF PRODUCTS AND SERVICES

10.1 Engagement with users for improved services: The DMN has a Section for Studies, Development and Environment (DEDE) with the task of understanding users needs, particularly in the economic sectors, and designing products and services to meets these needs. This mechanism and the awareness seminars with stakeholders help with the improvement of services to users. However, more effort is required to address the needs of economic sectors such as tourism, transports, energy.

10.2 Users Surveys: The DMN is certified ISO 9001/2015 until 2023. In conformity with the ISO 9001/2015, it conducts every year a survey of its clients. A survey of 132 clients (Students, private, public institutions, researchers, members of the general public) was conducted in 2020 and provided the following results:

- 53% responded
- Raw meteorological data are the highest in demand, 50.7%
- Weather bulletins come second with 26.1% and
- Max amount of rain is third with 21.7%
- On the satisfaction level, 60.9% are satisfied with the raw data, while 50% are satisfied with weather bulletins. 68% of clients are happy with products variety, and 35% are unhappy with the cost of the products

The survey clearly indicates that there is room for improvement in the variety of products/bulletins, data sharing policy and packaging.

The maturity level of this element is assessed as **Level 2**. This level could be upgraded if the staff of DEDE is increased, regular dialogue with users is established, and there is a strong commitment to addressing emerging needs.



Reviewer: DG Météorologie, Morocco



Endorsement: Directeur, DMN CI

SUMMARY OF THE RESULTS OF THE PEER REVIEW AND KEY RECOMMENDATIONS TO LIFT THE MATURITY LEVEL - CÔTE D'IVOIRE

Element No	Element of the hydromet value cycle	Maturity Level	Key Recommendations
1	Governance and institutional setting	2	<ul style="list-style-type: none"> • Develop and enact a Legislation on Meteorology to clarify the role and responsibilities of the DMN as per Resolution 26 of the 13th WMO Congress (1999) and to make it more visible (this may be achieved by making it a semi-independent organization that serves all economic sectors and the public) • Consider developing and implementing regulations for commercial services and conduct Activity-Based Costing (ABC) to map out pricing • Increase the budget to: <ul style="list-style-type: none"> ○ Hire and train staff to efficiently respond to users needs and to ensure the maintenance of equipment, ○ Hire dedicated IT experts in data management and meteorological applications
2	Effective partnerships to improve service delivery	3	<ul style="list-style-type: none"> • Establish an Evaluation and Guidance Committee (EGC) of partners/users as a systematic consultation mechanism for efficient service delivery (example of Morocco) • Establish strong partnership with DGM Morocco, particularly in the area of capacity building and technical expertise (scientific, commercialization)
3	Observational infrastructure	2	<ul style="list-style-type: none"> • Strive to work with partners to make their stations' data available on GTS • Consider the implementation of rain cell mechanism for rainfall estimates (in collaboration with Hydrology Dept and cell phone providers) • Ensure to transmit on GTS the additional 27 AWS data from the VIGICLIMM project • Acquire and install 3 marine radars to support ports operations and fisheries • Acquire and install 2 buoys • Expand HDRAIN technology to the rest of the country

4	Data and product sharing and policies	2	<ul style="list-style-type: none"> • Consider developing and implementing a data sharing policy and mechanism • Establish a direct link with the WMO Global Information System Centre (GISC) Casablanca (Morocco) for sharing with and accessing data from international communities
5	Numerical model and forecasting tool application	2	<ul style="list-style-type: none"> • Arrange for access to the regional centre for severe weather forecasting in Dakar website for use of other models and guidance products available for the sub-region, therefore benefiting from the cascading forecast process • Arrange to access the UKMET Tropical model 4km resolution available for Africa area north of Equator for short term forecasting – Contact: international@metoffice.gov.uk • Arrange with DGM Morocco for access to the ALBACHIR NORAF model (covering West Africa with a resolution of 10km)
6	Warning and advisory services	2	<ul style="list-style-type: none"> • Update/set warning thresholds with ONPC and users • Consider implementing the Flash Flood Guidance System (FFGS) to address the flash flood issue • Increase the number of forecasters and dedicated IT experts for full operational capability in serving all economic sectors (i.e. Energy, Construction, Agriculture, tourism)
7	Contribution to climate services	3	<ul style="list-style-type: none"> • Integrate paper archived data into the Clidata database for a fulsome database to provide quality climate services • Develop tailored climate products and services to key economic sectors (Tourism, transports, Agriculture, Forestry, Health and Water Management)
8	Contribution to hydrology	1	<ul style="list-style-type: none"> • Seek to establish a data-sharing mechanism with Hydrology and water resources Divisions in relevant Ministries • Consider a pilot project for implementing Satellite radar altimetry for measuring water levels of rivers (European Space Agency & IRD)
9	Product dissemination and outreach	1	<ul style="list-style-type: none"> • Develop and implement a dedicated website with automatic upload of meteorological data and products. • Consider putting in place an outreach program to raise awareness of DMN products and services and to increase visibility

			<ul style="list-style-type: none">• In collaboration with cell phone providers, implement a weatheradio system for reaching out to elderly, marginalized/remote communities with warning information in their local languages so they can take timely actions to save their lives and properties.
10	Use and national value of products and services	2	<ul style="list-style-type: none">• Put in place a mechanism to address weaknesses pointed out by the annual survey.








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REFERENCES

- [WMO Country Profile Database...](#)
- Questionnaire développé pour guider le diagnostic
<https://elioscloud.wmo.int/share/s/GTaXgrnxRdu4q8xCpSZRCQ>
-  Diagnostic et recommandations pour un de renforcement des services météorologiques et climatiques de CI :
<https://drive.google.com/file/d/1osKsALi3b4OwAZU-ufHc5MxkN825vhc4/view?usp=sharing>
-  Une vision nouvelle pour les services météorologiques et climatiques en Afrique, UNDP
https://www.undp.org/content/dam/undp/library/Climate%20and%20Disaster%20Resilience/WeatherAndClimateServicesAfrica_FR.pdf
-  Plan National de sécheresse de Côte d'Ivoire 2021-2025
https://knowledge.unccd.int/sites/default/files/country_profile_documents/PNS_Version%20finale_sept2020.pdf
-  Manuel du Cadre harmonisé
https://www.fsinplatform.org/sites/default/files/resources/files/CH-manuel-2.0_Fr-finalWeb%20%281%29.pdf
-  13th WMO Congress (1999). https://library.wmo.int/doc_num.php?explnum_id=6019
-  Rapport de l'Enquête de satisfaction client 2020. https://drive.google.com/file/d/1OkmrCGIGHh0dKEia9TVxo4plg_2Zgk-V/view?usp=sharing
-  Plan stratégique 2020-2023 de la DMN CI :
https://drive.google.com/file/d/1OkmrCGIGHh0dKEia9TVxo4plg_2Zgk-V/view?usp=sharing