



# AGRHYMET Regional Centre

## A capacity assessment



**Report**  
February 2022

## ACRONYMS AND ABBREVIATIONS

ACMAD	African Centre of Meteorological Application for Development
AfDB	African Development Bank
ARC	AGRHYMET Regional Centre (see also RCC)
API	Application Programming Interface
AU	African Union
ECOWAS	Economic Community of West African States
CDBMS	Climate Database Management System
CH	<i>Cadre Harmonisé</i> (English: Harmonized framework for the identification and analysis of areas at risk and food and nutritionally insecure populations in the Sahel and West Africa ( <i>usually not translated</i> ))
CILSS	Permanent Interstate Committee for Drought Control in the Sahel (French: <i>Comité permanent inter-États de lutte contre la sécheresse au Sahel</i> , abbreviated as <i>CILSS</i> )
CIMA	Centro Internazionale in Monitoraggio Ambientale (English: <i>International Environmental Monitoring Centre</i> )
DMC	Drought Monitoring Centre
DRR	Disaster Risk Reduction
DPC	Directorate of Civil Protection
ECOAGRIS	ECOWAS Integrated Regional Agricultural Information System
ECOWAP/ PDDAA	Agricultural policy of the Economic Community of West African States
EU	European Union
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
EWS	Early Warning System
FAO	Food and Agriculture Organization of the United Nations
FANFAR	Operational flood forecasting and warning system in West Africa
FCS	Food Consumption Score
GFCS	Global Framework for Climate Services
GIS	Geographic Information System
GPC	Global Protocol for Community-wide Greenhouse Gas Emission Inventories
IDP	Internally Displaced Person
IGAD	Intergovernmental Authority on Development (IGAD) in Eastern Africa
ICPAC	Climate Prediction and Applications Centre of IGAD
ICT	Information and communication technologies
IDA	International Development Association (subsidiary of the World Bank)
IFRC	International Federation of Red Cross and Red Crescent Societies
IPC	Integrated Food Security Phase Classification
IPCC	Intergovernmental Panel on Climate Change
ISACIP	Institutional Support to African Climate Institutions (alternate acronym: <i>AfriClimServ</i> )
ISS	Institute for Security Studies in Africa
LCBC	Lake Chad Basin Commission
MESA	Environmental and security monitoring in Africa

MWG	Multidisciplinary Working Group
NASA	National Aeronautics and Space Administration of the United States
NBA	Niger Basin Authority
NCOF	National Climate Outlook Forum
NDVI	Normalized Difference Vegetation Index
NGO	Non-governmental organization
NHS	National Hydrological Services
OMVS	Organization for the Development of the Senegal River
PAM	World Food Programme
PRESAGG	Seasonal forecast in the Gulf of Guinea coastal countries
PRESASS	Seasonal forecasting in Sudano-Saharan Africa
RCC	Regional Climate Centre (EU ClimSA programme)
RCOF	Regional Climate Outlook Forums
RCSI	Reduced Coping Strategy Index
RPCA	Food Crisis Prevention Network
SMHN	National Meteorological and Hydrological Services
SMN	National Meteorological Services
SNMH	National Meteorological and Hydrological Service
SPRC	Regional Steering, Programming and Monitoring Committee
SRGBD	Regional Database Management System
UNDP	United Nations Development Programme
UNDRR	United Nations Office for Disaster Risk Reduction
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
USAID	United States Agency for International Development
VBA	Volta Basin Authority
WASCAL	West African Science Service Centre on Climate Change and Adapter Land Use

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## EXECUTIVE SUMMARY

The Western Sahel is a semi-arid zone – one of the poorest and most ecologically degraded in the world – that stretches from the Atlantic Ocean to Chad in the east, separating the Sahara Desert in the north from the Sudan savanna in the south. Droughts and associated flood disasters are a chronic problem in all the countries of the region, which are particularly vulnerable to climate change because of heavy reliance on rain-fed agriculture for food security and livelihoods, compounded by a variety of other factors such as rapid population growth, epidemics and recurrent humanitarian crises amidst socio-political conflicts and violence.

The AGRHYMET Regional Centre was established in 1974 as a specialized institute of the Permanent Inter-State Committee for Drought Control in the Sahel (abbreviated CILSS in French). This is a public inter-state institution based in Niamey, Niger with legal personality and financial autonomy. It currently comprises 13 States, including eight coastal countries (Benin, Côte d'Ivoire, Gambia, Guinea, Guinea-Bissau, Mauritania, Senegal, and Togo), four land locked (Burkina Faso, Mali, Niger, and Chad) and one island State (Cape Verde). A cooperation agreement signed in 2020 between ECOWAS and CILSS designated AGRHYMET as the Regional Climate Centre for West Africa and the Sahel. The immediate effect of this agreement was to extend AGRHYMET's geographical area of competence to all ECOWAS Member States, in the medium and longer term, it raises the question of AGRHYMET's capacity to fulfil its new mission as a Regional Climate Centre, which is the subject of this evaluation.

The Centre's main mission is to strengthen food security and increase agricultural production in member countries; it also contributes to improved natural resource management in the Sahel region, providing training and information to stakeholders and development partners in the field of agroecology in the broadest sense (agroclimatology, hydrology, crop protection). AGRHYMET is the region's leading authority on science and technology as applied to agriculture, rural development, and natural resource management.

This capacity assessment was undertaken in 2021 under the auspices of the Sahel Resilience Project implemented by the United Nations Development Programme (UNDP) with the financial support of Sweden. The report provides a comprehensive overview of AGRHYMET partnership opportunities and development prospects at national, regional, and international levels, in accordance with the mandate assigned by Member States. This evaluation also reviews the institution's activity so far as Regional Climate Centre for West Africa and the Sahel (since 2020), which involves climate data collection, information processing and dissemination. This includes an in-depth evaluation of information exchange capacities and existing databases, together with upgrading needs if the Centre is effectively to turn into the full-fledged regional climate and disaster risk data centre for the Sahel and West Africa as mandated under the CILSS-ECOWAS agreement.



The capacity assessment report charts the progress made in recent years, while pointing out shortcomings based on a SWOT (strengths, weaknesses, opportunities, and threats) analysis of the legal, institutional, structural, technological, and human resources fields.

The objective is to propose well-defined guidelines to accelerate the institutional reforms undertaken from 2019 onwards. This report also envisages how best to strengthen the capacities of the Centre with a view to setting up a regional platform connected to the national databases of the seven partner countries of the Sahel Resilience Project (Burkina Faso, Chad, Mali, Mauritania, Niger, Nigeria and Senegal).

The assessment was carried out through a literature review, interviews with national disaster risk management, meteorological and hydrological agencies, and a mission to AGRHYMET in Niamey.

The Centre's experience in information technology, database management and existing application systems represents a substantial asset for the sub-region. However, the gaps identified must be filled if the Centre is to play its full role at regional level.

Among these needs is a strengthening both the financial contributions of the Member States and the Centre's close cooperation and data sharing with national institutions. Infrastructure has a crucial role to play, and the Centre needs to upgrade its IT equipment, acquire new servers, and improve its Internet bandwidth to offer better services for data processing. Since regional data exchange is of the essence, national governments must also modernize their own data collection chains and train staff accordingly.

The Centre employs competent experts but in insufficient numbers. Human resources are unstable due to high dependence on the budgets of the different projects they are involved in. It is therefore recommended that resource mobilization specialists be recruited to ensure the Centre's financial stability and ensure the employment of experts in the medium and longer terms.

The myDEWETRA application – available for each country on request thanks to an agreement between the Italian Civil Protection Department and the World Meteorological Organization – is recommended for regional data processing. This is an open-source Web-based system for real-time monitoring and forecasting of natural hazards such as floods, landslides, and fires.

The application is designed as a single point of access to a wealth of information and data available at global, regional and local levels, provided by multiple authoritative institutions and agencies, such as the West Africa Flood Forecasting and Warning Operational System (FANFAR), agrometeorological bulletins and those of the *Cadre Harmonisé* (Harmonized Framework for the Identification and Analysis of Areas at Risk and Food and Nutritionally



Insecure Populations in the Sahel and West Africa), in conjunction with the Integrated Food Security Phase Classification (IPC).

# 1. INTRODUCTION

## 1.1. Background

The Sahel region of West Africa stretches from the Atlantic Ocean to Chad in the east, separating the Sahara Desert in the north from the Sudan Savanna in the south. About 75 per cent of the region is arid in the north and semi-arid in the south. This is one of the poorest and most ecologically degraded regions in the world. The Sahel region is also one of the most vulnerable to the effects of climate change, on account not just of specific biophysical features but also of a variety of man-made factors including environmental degradation, poverty, food insecurity, rapid population growth, gender inequality, political instability, and conflict. Climate change further exacerbates these existing vulnerabilities.<sup>1</sup>

This climatic vulnerability is due to the region's heavy dependence on rain-fed agriculture and on natural resources for food security and livelihoods. Livestock rearing is the main activity of families, with a significant proportion of the 20 million herders on the move during the dry season. Pastoralists in the Sahel have always adapted to the climate: they move southwards to coastal countries in search of moisture and then northwards during the rainy season. Cattle provides many environmental and economic services in a region where affordable sources of protein are scarce, where any.<sup>2</sup>

Vulnerability to climate vagaries is compounded by other factors such as rapid population growth, chronic humanitarian crises, socio-political conflicts and violent extremism, epidemics, and the COVID-19 pandemic. The recent health crisis and strict government-imposed mitigation measures have exposed the already destabilized Sahel to the risk of further socio-economic hazards as early as 2020.<sup>3</sup>

If they are to achieve sustainable resilience in the face of these multiple and interconnected challenges, Sahel countries must cooperate and develop an integrated development approach based on risk knowledge, evidence, and impact analysis.

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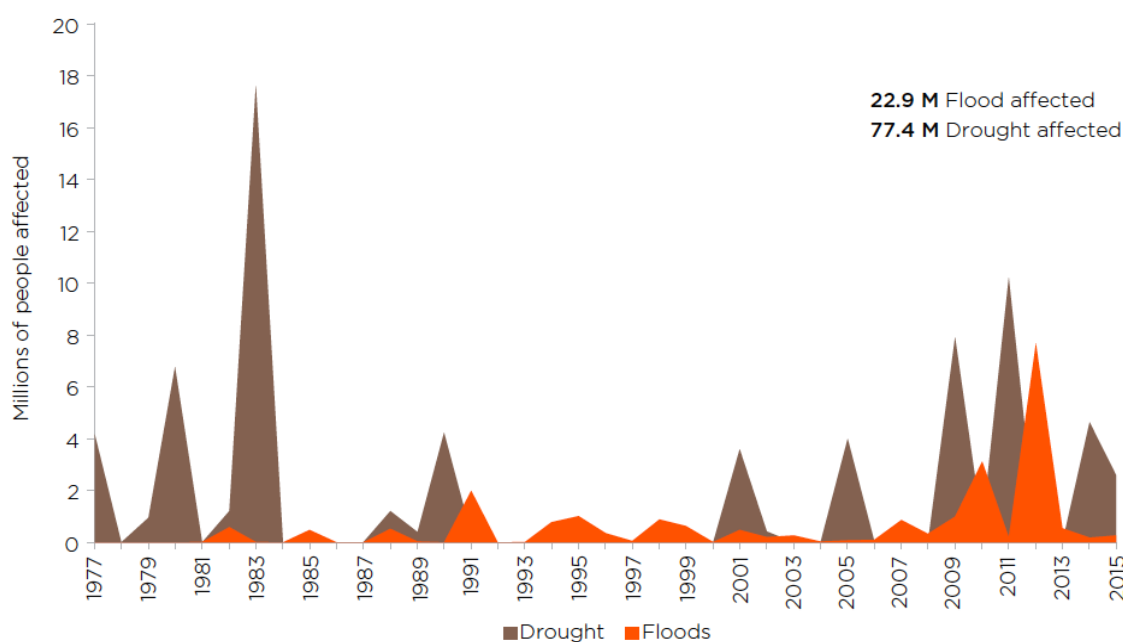
<sup>1</sup> <https://www.alliance-sahel.org/rapport-dactivite-2020/changement-climatique/>

<sup>2</sup> <https://blogs.worldbank.org/fr/dev4peace/en-mouvement-les-communautes-pastorales-au-sahel-sadapent-aux-changements>

<sup>3</sup> Impact of COVID-19 in the Central Sahel: Niger, Mali, and Burkina Faso, see: [https://www.policycenter.ma/sites/default/files/2021-01/PB-20-67\\_0.pdf](https://www.policycenter.ma/sites/default/files/2021-01/PB-20-67_0.pdf)

## 1.2. The risk profile of the West Africa region

Analysis of West Africa's climate profile shows that the region is particularly vulnerable to climate change due to heavy reliance on rain-fed agriculture and natural resources for food security and livelihoods.<sup>4</sup> Indeed, over the past three decades, extreme weather and climate change-related disasters have increased in frequency and severity. Floods and droughts remain the dominant and most devastating catastrophic events.<sup>5</sup> Figure 1 shows that these two types of events affected 77.4 million and 22.9 million people respectively between 1977 and 2015, with increased frequency since 2010.<sup>6</sup>



**Figure 1.** Frequency and impact of floods and droughts in West Africa (ECOWAS, 2016) – brown: drought, vermilion: floods

According to the sixth report of the Intergovernmental Panel on Climate Change (IPCC) on extreme weather conditions, West Africa could be exposed to a temperature increase of 1.5 to 3°C by 2050.<sup>7</sup> A decrease in rainfall is expected in the western part of the Sahel, while the central part will experience an increasing trend. Across the Sahel as a whole, rainfall is projected to increase by 10-45 per cent, with a higher frequency of heavy rains. Additional extreme conditions to be expected include protracted heat waves, rising sea levels (10 cm to 45 cm between 2020 and 2050), as well as delays in the onset of the rainy season.<sup>8</sup> Table 1 summarizes the economic losses due to flooding alone, as estimated between 1966 and 2018 in selected ECOWAS countries. These figures are derived from post-disaster needs assessments (PDNAs) in Burkina Faso (2009), Senegal (2009), Togo (2010), Nigeria (2010), Nigeria (2013) and Ghana (2015). Cumulative losses to

4 <https://www.climatelinks.org/resources/climate-risk-profile-west-africa>

5 EM-DAT (Emergency Events Database), 2017. International disaster database. Centre for Research on the Epidemiology of Disasters. Catholic University of Leuven, Kingdom of Belgium

6 ECOWAS (Economic Community of West African States). 2006. ECOWAS Disaster Risk Reduction Policy. Abuja, Nigeria

7 IPCC, 2021. Summary for Policymakers. In: Climate Change: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate. Cambridge University Press. In Print

8 IPCC, 2021, op. cit

flooding from 1966 to 2018 range from \$54 million in Senegal to \$922 million in Nigeria. It is noticeable that these losses are greater in the Sahel (Nigeria, Niger, Burkina Faso, and Senegal) than in coastal countries. In 2019, the damage suffered in individual countries ranged from \$80,000 to \$1 million. In terms of gross domestic product (GDP), however, Niger pays the highest price, with damage estimated at more than 500 times GDP per capita.

**Table 1. Total flood damage in the ECOWAS region**

Country	Total damage 1966-2018 (million \$)	Total damage 2019 base (\$)	Damage to GDP per capita 2019 base (\$)
Nigeria	922,422	1,056,874	68
Niger	272,039	315,872	569
Burkina Faso	181,176	212,395	274
Ghana	163,629	662,035	300
Senegal	54,435	81,219	56
Togo	38,200	44,787	66
Sierra Leone	33,600	48,391	96
Benin	8,315	18,256	15
Cape Verde	4,100	9,134	-

*Source: EM-DAT database (1966-2018), as well as NADP and other assessments for Burkina Faso (2009), Senegal (2009), Togo (2010), Nigeria (2010), the United States (2010), Nigeria (2013) and Ghana (2015)*

### 1.2.1. Droughts

The Sahel region experienced its worst droughts between 1970 and 1990; the most severe occurred in 1983 and affected nearly 18 million people. Since 2009, the phenomenon has become increasingly frequent in the region and could continue to affect water levels in hydroelectric reservoirs. Droughts therefore lead to a decrease in electricity production and consequently affect overall economic growth and the well-being of populations.<sup>9</sup> Persistent water deficits result in severe water shortages, low crop yields, food insecurity, desertification and the decimation of livestock and wildlife. The impacts of droughts have increased dramatically over the past two decades and are expected to worsen in future.

### 1.2.2 Flooding

In West Africa, the frequency of extreme weather conditions associated with heavy rainfall has increased, leading to more frequent flooding over the past two decades. There are three types of flooding: flash floods, riverine floods, and urban floods.<sup>10</sup> These types of flooding have all been observed in West Africa. Due to rising sea levels, flooding in coastal areas also poses a significant threat to the region's populations and natural riparian ecosystems.

<sup>9</sup> IPCC, 2021, op. cit

<sup>10</sup> [https://www.iclr.org/wp-content/uploads/2021/07/ICLR\\_Flooding\\_F\\_2021.pdf](https://www.iclr.org/wp-content/uploads/2021/07/ICLR_Flooding_F_2021.pdf)

### 1.2.3. *Rising sea levels*

The West African region is threatened by rising sea levels. Research points to an upward trend of 3.31 mm/year, or a total of 7.9 cm over the altimeter period 1993-2016 in West Africa; this is the result of anthropogenic global warming as well as substantial interannual fluctuations in sea levels, which in some years display very significant peaks.<sup>11</sup>

The same study also found that the rise in water levels is not uniform along the West African shoreline. It becomes more significant as it moves southwards into the Sudan and Guinea zones, where trends are higher than those for the region and the world. Strong sea-level rise trends are also noted near the coasts of the Gulf of Guinea, the Cape Verde Islands, Mauritania and southern Senegal, which are, therefore, the areas of the West African coastline most affected by this phenomenon.

### 1.2.4. *Risk of socio-political conflict*

Since 2007, climate change has increased the risk of insecurity and conflict in West Africa and the Sahel. Climate change is seen as a risk or threat multiplier that exacerbates existing problems, including violence, terrorism, civil war and forced displacement, particularly in vulnerable regions where poverty, violence, injustice, and social insecurity are already widespread.<sup>12</sup>

Climate change is turning into a major factor behind migration across West Africa, threatening livelihoods and forcing displacement to areas with better weather conditions.

Although many of the conflicts in Sahel countries are primarily political in origin, competition for natural resources combines with population growth and climate-induced changes in livelihoods to foster tension across the agropastoral zone of West Africa.<sup>13</sup>

Competition between farmers and herders is intensified by changing environmental conditions and livelihood strategies. Pastoral populations are migrating southwards due to drought, lack of fodder and expansion of agricultural land. This causes increasing numbers of conflicts over cultivated land, grazing areas and water points.<sup>14</sup>

The vulnerability of populations to climatic shocks is exacerbated by humanitarian crises together with the chronic food insecurity linked to rapid population growth, epidemics, and the recent COVID-19 pandemic, as well as locust invasions.

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11 OCDE, 2010. Incidences sécuritaires du changement climatique au Sahel (SICCS), voir : [47234529.pdf \(oecd.org\)](#)

12 Jürgen, S., Peter, M., L., and Janpeter, S., 2019. Climate and Conflict in Africa. Oxford Research Encyclopedia of Climate Science, see: <https://oxfordre.com/climatescience/display/10.1093/acrefore/9780190228620.001.0001/acrefore-9780190228620-e-557;jsessionid=143EEB97BE942991E23A36D010020E42>

13 Cabot, C., 2017. Climate Change and Farmer-Herder Conflicts in West Africa. *Climate Change, Security Risks and Conflict Reduction in Africa* (pp.11–44)

14 Bukari, *et al*, 2017. Farmer-herder relations in Ghana: Interplay of environmental change, conflict, cooperation, and social networks

### 1.2.5. *Landslides*

Landslides are the result of the combined effects of heavy rainfall, erosion, poorly controlled urban expansion, and inadequate waste management. The population of the Sahel is threatened by landslides (mudflows, destruction of habitat) because they settle in low-lying spots or the dried-up beds of watercourses. Housing is often made of unsuitable materials.

### 1.2.6. *Epidemics and pandemics*

Epidemics remain one of the leading causes of death in West Africa. Eight out of 10 medical consultations are for diseases whose emergence factor is linked to environmental conditions.<sup>15</sup>

Climate change is likely to exacerbate malnutrition, especially among children, as well as endemic diseases such as malaria, and the morbidity of meningococcal meningitis. Other factors include inadequate access to clean water and sanitation, food insecurity, and limited access to health care and education.

### 1.2.7 *Food and nutrition insecurity*

Agriculture in the Sahel is essentially rain-fed and remains vulnerable to climatic factors such as drought and floods, with attendant soil degradation; in addition to ambient insecurity, the sub-region is plagued by locusts and army worms. As a result, the Sahel is under constant threat of food and nutrition insecurity.

The latest research (October-November 2020) conducted under the *Cadre Harmonisé* (Harmonised Framework for the Identification, Analysis of Areas at Risk and Food and Nutritionally Insecure Populations in the Sahel and West Africa) showed that nearly 16.7 million people were acutely food insecure (HF Phase 3 to 5 | IPC).<sup>16</sup>

Coupled with a relentless rise in civil insecurity (particularly in the tri-border area between Burkina Faso, Mali, and Niger, known as the Liptako Gourma), food insecurity has made living conditions ever more precarious for Sahel populations. The effects of civil insecurity, with its multiple consequences on markets and livelihoods (particularly agricultural and pastoral), combine with climatic shocks and COVID-related sharp rises in food prices to further intensify the vulnerability of local populations.

### 1.2.8. *Risks of gender-based inequality*

In the Sahel region, women make up 80 per cent of the agricultural workforce. They are disproportionately affected by food insecurity, so-called natural hazards, water shortages, migration, and climate and socio-political conflicts. Disasters such as floods, which have

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15 <https://www.allodocteurs.africa/en-afrique-de-louest-le-changement-climatique-menace-toujours-plus-la-sante-7120.html>

16 [https://www.food-security.net/wp-content/uploads/2021/03/Note\\_v8\\_FSNWG\\_mars2021\\_Francais.pdf](https://www.food-security.net/wp-content/uploads/2021/03/Note_v8_FSNWG_mars2021_Francais.pdf)

almost doubled in the past five years, have degraded 80 percent of agricultural land, in the process reducing food supplies by a considerable amount.<sup>17</sup>

While men migrate to the cities to find work, women are kept to the sidelines. On top of food insecurity, they are also overburdened with work in the fields and at home. Women are, therefore, at the forefront of the effects of climate change in pastoralist communities: they are, often unsupported, left to face drying-up water points and decreasing agricultural yields. The socio-economic consequences of the COVID-19 pandemic have combined with various discriminatory practices and beliefs to exacerbate these inequalities.

### 1.3. Rationale for the assessment

Any risk analysis of the region must be approached holistically, considering existing capacities, understanding the hazards and the nature of risks, sensitivities, and vulnerabilities, with a view to providing high-quality, objective evidence on disaster risks and impacts. The analysis aims to improve disaster prevention, preparedness, mitigation, management, response, and recovery plans.

In addition, there is an urgent need to develop an integrated development approach based on knowledge of gender-sensitive risks in the Sahel region, analytical work, and objective data to understand the differential impacts by gender, age and disability, so that no one is left behind.

Given the multidimensional nature of the current crisis, West Africa and the Sahel need an integrated regional information platform, with easy access by Member States, as well as a regional institution with the capacity to collect, analyse, and process data on climate-related risks and disaster threats.

This recognized need led CILSS and ECOWAS to designate the Niger-based AGRHYMET Centre as the Regional Climate Centre for West Africa and the Sahel. The agreement was concluded in 2020 and covers the period 2020-2025.

Hosting the regional information platform on climate-related risks and disaster threats is a logical enough step for AGRHYMET given its experience in a variety of related fields: agrometeorological and hydrological monitoring, agricultural statistics, crop surveillance as well as management and dissemination of information on natural resources in the Sahel.

Still, its new role as regional climate centre, with the attendant expansion of its geographical ambit to all ECOWAS countries, has consequences for AGRHYMET, calling for additional resources (funding, skills, and equipment), highlighting the need for two-way data exchange with Member States if its multidimensional information and information and warning functions are to be effective.

The AGRHYMET Regional Centre is an inter-state public institution with legal personality and autonomous financial management, established in Niamey, Niger. It currently

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<sup>17</sup> <https://www.theiwi.org/gpr-reports/women-in-sahel>



comprises 13 countries, eight of which are coastal (Benin, Côte d'Ivoire, Gambia, Guinea, Guinea-Bissau, Mauritania, Senegal, and Togo), four landlocked (Burkina Faso, Mali, Niger and Chad) and one island State (Cape Verde).

Following the agreement with ECOWAS, UNDP (through the Sahel Resilience Project) and AGRHYMET decided to conduct an in-depth assessment of the Centre's capacity to (1) collect, analyse, process and disseminate information on climate and disaster risks, and (2) serve as a single access point for data provided and used by national agencies in the Sahel, as well as UN agencies (UNOCHA, FAO, WFP), regional agencies specialized in these two areas, and non-governmental organizations. This report therefore sets out to provide an in-depth assessment of AGRHYMET's capacity to fulfil its new role as Regional Climate Centre for West Africa and the Sahel.

#### 1.4. Objectives of the assessment

The assessment of the technical, structural, and institutional capacities of the AGRHYMET Centre and its technical support needs as a regional information platform included the following five phases:

- An appraisal of the data collected, and products disseminated, by the Centre, identifying the tools, applications or other platforms used in relation to climate change and disasters
- Analysis of the policy, legal, institutional, and functional frameworks of the Centre
- Analysis of the technical, human, and institutional capacities of both the Centre itself and the Sahel partner States with regard to the collection and use of data on climate change and disasters (including man-made disasters such as conflicts)
- Recommendations on the needs for strengthening the technical, human, and functional capacities of the Centre, as well as on the institutional modalities enabling the platform to fulfil its mission
- A roadmap to mobilize resources and implement the recommendations of this report, fully taking in the potential for synergies with other ongoing initiatives

#### 1.5. Structure of the report

This report comes in six sections. The specific Sahel background and the rationale behind the report are set out in the first section and the next one details the methodology used for the evaluation. The third section reviews the AGRHYMET Centre: mandate, output, services and capacities, complete with an assessment of cooperation between the Centre and national and regional structures as well as ongoing initiatives. The analysis of the capacities, gaps, strengths and weaknesses, risks, and opportunities specific to the AGRHYMET Centre occupies the fourth section. The fifth and sixth sections detail decisions to be taken and recommendations to be followed to strengthen the Centre's capacity. The seventh section offers the conclusions of the report.

## 2. METHODOLOGY

The methodology was participatory, qualitative, and interactive. The mission involved various stakeholders in its successive phases, namely: (i) literature and document review (ii) information gathering (guided interviews) (iii) visit to Niamey, (iv) aggregation, analysis, and interpretation.

### 2.1. Framing of the study

The scoping of the study benefited from discussions between the consultant and the sponsors, as well as with experts from the Centre itself and from UNDP, in an effort to better define the objectives, the expected results and the available documentation, while at the same time providing an opportunity to exchange views on the present methodology. This preparatory phase resulted in a preliminary document setting out the methodology of the evaluation, its practical implementation, and a timetable.

### 2.2. Data collection

#### 2.2.1. Literature review

The elements necessary for the literature review were collected and the resulting concept note was validated. This note presented the state of research as well as an inventory of gaps and factual elements to be completed in the following stages. National data collection structures (disaster risk reduction agencies, meteorological, hydrological, early warning, and humanitarian services). The document review also allowed for the capitalization of the results of previous reports (mandate, products, services, ongoing projects) concerning the Centre.

#### 2.2.2. Semi-structured interviews

Semi-structured interviews with stakeholders helped to better understand the gaps identified by the literature review. The interchange took the form of guided interviews, with the aim of analysing the entire information processing value chain. Representatives of national agencies and civil protection services in the seven partner countries of the Sahel Resilience Project (Burkina Faso, Chad, Mali, Mauritania, Niger, Nigeria, and Senegal) were interviewed, as well as other stakeholders such as organizations involved in the processing and use of data on disaster risk reduction and security conflicts.

#### 2.2.3. Visit to the Centre in Niamey, Niger

The field mission to the Centre took place from 4 to 10 July 2021 in Niamey, where the consultant also visited regional institutions – the African Centre of Meteorological Applications for Development (ACMAD) and the Niger Basin Authority (NBA) – as well as some national bodies such as the Coordination Unit for Early Warning Services, the

National Meteorological Directorate, and the Directorates of Hydrology and of Humanitarian Affairs. This mission enabled the consultant to complete and validate the desk review and to assess *in situ* information technology capacities at the AGRHYMET Regional Centre.

### 2.3. Data aggregation, analysis, and interpretation

The document review and interviews with key stakeholders resulted in a SWOT matrix for AGRHYMET. During the preparation of the evaluation report, the consultant benefited from frequent dialogue with UNDP and the main partners, ensuring consistency in information. The report was then proofread by UNDP before validation by the AGRHYMET Regional Centre itself and the stakeholders.

## 3. ANALYSIS OF THE CENTRE'S CAPACITIES

### 3.1. Institutional, structural, and functional capacities

Created in 1974 as a specialized agency of the CILSS, the AGRHYMET Centre is a public inter-state institution based in Niamey, Niger. Placed under the authority of the Director General, it is governed by four higher decision-making bodies: the Summit of CILSS Heads of State, which is held every two years; the Council of Ministers of the Member States, which meets twice a year; the Regional Steering, Programming and Monitoring Committee (CRPS), which meets once a year, and the Governing Board, which meets twice a year.<sup>18</sup>

#### 3.1.1. Mandate and scope of competence

The mandate of the Regional Centre is to strengthen food security and increase agricultural production in member countries; a related objective is better management of natural resources in the Sahel, t providing training and information to relevant stakeholders and partners in the field of agroecology (agroclimatology, hydrology, crop protection). The Centre stands as an institution specializing in sciences and techniques as applied to agriculture, rural development, and natural resource management.

As a specialized agency of CILSS, the Centre serves 13 Member States (Benin, Burkina Faso, Cape Verde, Chad, Côte d'Ivoire, Gambia, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Senegal, and Togo). Under the five-year cooperation agreement signed on 7 July 2020 with ECOWAS, which designates AGRHYMET as Regional Climate Centre for West Africa and the Sahel, this geographical scope has been extended to all 15 ECOWAS Member States, in the process including Ghana, Liberia, Nigeria and Sierra Leone, which were not members of CILSS.

AGRHYMET has now become an ECOWAS technical centre for the implementation of hydrometeorological projects and programmes and climate-related capacity building. This

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<sup>18</sup> <https://agrhymet.cilss.int/index.php/presentation-du-centre-regional-agrhymet-2/>

cooperation consolidates the institutional role and mandate of the Centre in West Africa and justifies the decision to make it a regional information centre for the processing and dissemination of climate and disaster data.

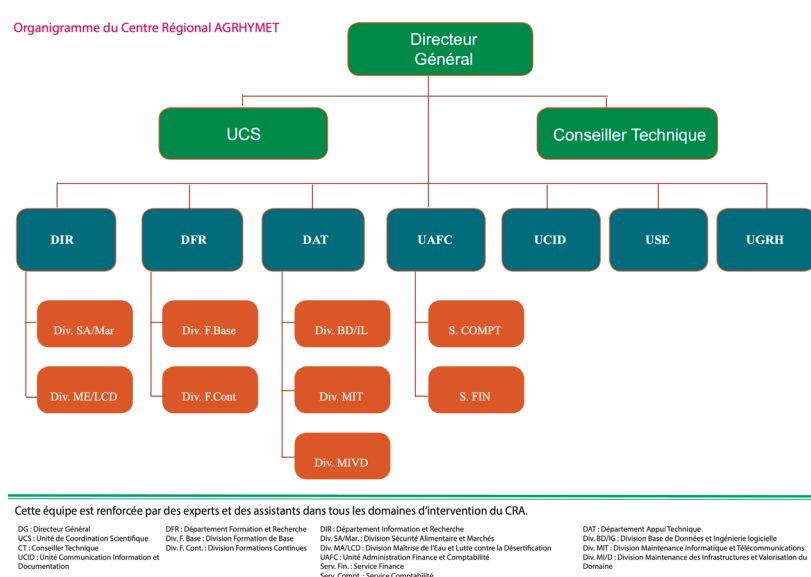
The World Meteorological Organization (WMO) has also begun to establish regional climate centres around the world, and as such has also recognized AGRHYMET as Regional Climate Centre for West Africa. The Centre receives financial support from the European Union through the ClimSA project.<sup>19</sup> AGRHYMET's general management is supported by auxiliary services (administration, finance). At the heart of operations are three technical departments:

- The **Information and Research Department** oversees the collection, analysis and management of biophysical and socio-economic data, the transfer of methodological tools, and the processing and dissemination of information on food security, markets, water control, natural resource management and the environment. It includes a 'food security and markets' division and another one for water control and the fight against desertification.
- The **Training and Research Department** focuses on capacity building in CILSS member countries in areas related to food security, water control, natural resource management and combating desertification. The training division (complete with degree course) focuses on agrometeorology, plant protection, food security, hydrology, climate change and meteorological instruments and measurements. Continuing education is provided by this specialized division.
- The **Technical Support Department** provides internal IT services, including the development of methods and applications. It is comprised of three divisions: databases and software development; computer maintenance and telecommunications; maintenance, network management and optimization of the computer park.

**Administrative services** include five units reporting to the Director General (see Figure 2): administration, finance, and accounting; communication, information, and documentation; monitoring and evaluation; scientific coordination; human resources management.

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<sup>19</sup> <https://www.climsa.org/media/news/une-plateforme-digitale-pour-une-meilleure-capitalisation-de-linformation-climatique-en-afrique-de-louest>



**Figure 2:** Organization chart of the AGRHYMET Regional Centre

The Information and Research Department brings out alert bulletins and, more generally, coordinates information processing, the *Cadre Harmonisé* and seasonal forecasts with Member States.

### 3.1.2. Human resources

The Centre employs about 60 staff with a wide range of expertise – agrometeorology, hydrology, climatology, plant protection and agronomy – as well as specialists in information technology, maintenance, and network management. In addition, the Centre employs a meteorologist, a climatologist and an assistant, an expert in climate modelling, three hydrologists, two experts in pastoralism, one in the *Cadre Harmonisé*, one in market monitoring, one in geographic information systems, six computer scientists and two communication specialists. However, it is important to note that staff numbers are insufficient. Most experts are attached to external projects and teaching programmes, and there are few staff dedicated to information processing and dissemination.

### 3.1.3. Funding

The primary, statutory source of funding for the institution's formal mandate is Member States. Although most do pay their contributions, albeit unpredictably over the course of any given financial year, these cover only a fraction (about 10 per cent) of the total budget. The second source of funding comes from technical and financial partners through the projects implemented by the Centre. This is, in fact, the main source, contributing about 90 per cent of the AGRHYMET budget, often in the form of grants that only go so far as the life cycle of the projects. The salaries of experts, missions, and support activities to Member States, as well as a large part of the Centre's operations, are therefore essentially based on this second source of funding.

## 3.2. Structural and functional gaps

The need for a regional climate centre in the Sahel is undeniable, affected as the area is by the vagaries of meteorology while concentrating the security crises that shake the sub-region. However, AGRHYMET's capacity to fulfil its new mission as regional climate centre, and even its very viability, remain permanently undermined due to the following shortcomings:

*Human resources:* The main difficulties faced by the AGRHYMET Centre are down to lack of permanent staff. The Centre is compelled to assign in-house experts to individual projects, which pay for over 90 per cent of the staff. Inadequate funding also makes it difficult to retain qualified and experienced staff over time. These conditions are the structural reforms that are underway to turn AGRHYMET into a regional climate centre as per the 2020 agreement.

*Infrastructure:* the IT infrastructure lacks the capacity to collect and disseminate information and alerts to Member States. Another concern is the difficulties in data transmission to the focal points in national institutions responsible for risk monitoring.<sup>20</sup>

It is difficult to see how a regional climate centre can fulfil its role (information, early warning) for the benefit of Member States based on fragmentary data. Modernization of data collection tools in the field is an imperative that has been emphasized by all the focal points of the national disaster risk management platforms, as well as by the various stakeholders in the Sahel countries.

*Data collection methods:* The seven partner countries of the Sahel Resilience Project still rely on paper questionnaires and lack electronic databases or some alternative secure storage system for the information collected. In addition to creating many difficulties, such as the loss and deterioration of information (especially due to environmental conditions), this situation complicates data sharing and dissemination and causes delays in information processing and decision-making.

*Staff training:* All stakeholders during the evaluation mission mentioned the need to build capacity and expertise in the various phases of data collection, processing, analysis, and dissemination. Stakeholders deplore that some of the platforms put in place do not allow for easy sharing of information with other users, which makes it difficult for them to take ownership of the information.

*Funding:* The AGRHYMET Centre lacks the financial resources required to operate some of the platforms that had been set up for the purposes of projects that have now run their course. The same applies to the operation of the regional information platform.

## 3.3. Recommendations

The prime recommendation is to strengthen the Centre's human capacities and infrastructures. Establishment of a regional information platform for warning and risk management requires capacity-building of existing staff, coupled with a strategy that

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<sup>20</sup> Source: interviews with country focal points

stabilizes staffing levels and retains acquired skills. Specifically, to deploy the information platform, the Centre will need additional staff in the information and research functions – whose recruitment and emoluments need to be provided for – namely (i) an expert in climate resilience; (ii) an expert in communication (information dissemination); (iii) three IT specialists in maintenance, database, and network management.

It is also recommended that the data collection tools in use by Member States be gradually modernized, and that pressure be put on governments to ensure that the costs of data collection and tool replacement are integrated into national budgets, in order to ensure the sustainability of all these operations over time.

As for annual financial contributions from Member States, it is recommended that these be increased substantially if AGRHYMET is to meet the operating costs involved in its role as Regional Climate Centre, rather than remaining dependent on other ongoing projects. In addition, technical and financial partners could provide regular support over longer periods of time – five to ten years – for the sake of better synergies with the gradual increase in member State contributions.

Alternatively, the AGRHYMET Regional Centre could seek annual funding through joint resource mobilization with ECOWAS, which would then sustain the Regional Climate Centre's operations.

### 3.4. Data collection, storage, processing, and dissemination

#### 3.4.1. *Infrastructure and equipment for data collection and processing*

The climate information platform was set up in 2021 by the Regional Climate Centre for West Africa and the Sahel, based on the model developed by the University of Santa Barbara with the World Meteorological Organization.

The Centre has acquired the equipment and tools that enabled it to launch the demonstration phase of meteorological services for national and regional users.<sup>21</sup> On top of that, the Centre has undertaken the renovation of its entire electrical and telecommunication cabling network for optimal access to the various servers, pending reinforcement of the protection and security of the network.

The AGRHYMET Centre has 110 computers, 29 laptops and three servers, as well as a supercomputer that can be used as a backup storage server. The electrical relay system consists of three intelligent inverters and a 10kVA generator to compensate for grid instability and frequent power cuts.

However, most of the equipment and IT tools need updating to meet the requirements of a proper Regional Climate Centre. In particular, the Centre's fiber optics bandwidth,

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<sup>21</sup> <https://www.climsa.org/media/news/une-plateforme-digitale-pour-une-meilleure-capitalisation-de-linformation-climatique-en-afrique-de-louest>



currently of 25 Mbps, must be increased to at least 100 Mbps if the expanded needs of the new regional platform are to be met.

The Centre holds extensive property with a large array of offices, teaching and conference rooms, and laboratories.

#### 3.4.2. *Products and services*

The Centre's products and services take the form of climate information that is collected, evaluated, and aggregated in various formats as required. These include weather forecasts and climate models and scenarios. Climate information is produced at national, regional, and international levels.<sup>22</sup>

The products developed by the AGRHYMET Regional Centre are mainly used in the agriculture and food security, water resources, climate, and disaster risk reduction sectors. The range of products includes seasonal and agroclimatic forecasts. The Centre also provides a wealth of monitoring functions, including hydrology, flood risk, locusts, drought, and desertification. On top of these come food security advisory and information dissemination services.

The final products are developed in close cooperation with the technical structures of Member States and transmitted to users in the form of bulletins. The main such product is the decadal agrometeorological bulletin for the monitoring of agricultural seasons, which is disseminated every month through the Multidisciplinary Working Group platform. Special bulletins are produced in the event of a crisis to guide decision-making. Early warning bulletins on food security are produced through the *Cadre Harmonisé* (CH) and as part of seasonal forecasts. The forecast bulletins are produced at the beginning of the rainy season for both the Gulf of Guinea and the Sahel regions.

The fourth regular bulletin, which is produced monthly, is devoted to monitoring the agricultural season, based on seasonal forecasts for coastal States (PRESAGG) and those in Sudano-Saharan Africa (PRESASS), and is intended for climatologists, hydrologists, and other users of agricultural information. The multi-sectoral data required for the bulletins is collected by the various platforms such as technical working groups, the Regional Forecasting or CH, and is integrated into the Centre's database.

Climate information services increase the ability of policy makers and other types of users to assess, prevent and prepare for the potentially adverse effects of climate or weather events.<sup>23</sup>

Additional services provided by AGRHYMET to Sahel States include the development of decision support tools and capacity building in various specialties (climatology, agrometeorology, hydrology, crop protection, geomatics, and remote sensing).

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<sup>22</sup> <https://www.uneca.org/fr/centre-africain-pour-la-politique-en-mati%C3%A8re-de-climat/services-d%27information-climatique>

<sup>23</sup> <https://www.afdb.org/fr/documents/services-dinformation-climatique>

The users of these products are the following:

- The national meteorological and hydrological services of the 17 CILSS and ECOWAS member countries
- The food security early warning services of the government departments in charge of agriculture in member countries
- National Water Agencies in member countries
- National disaster risk reduction agencies in member countries
- Inter-State institutions in the sub-region (ECOWAS, CILSS, basin authorities, CBLT and international organizations such as UNDP, WFP, FAO, UNOCHA, and NGOs including the Red Cross and Red Crescent societies

The Internet is the main channel for dissemination of the Centre's products and services, in the form of e-mails (distribution lists to over 1,000 addresses), the Centre's website and social networks (Facebook and Twitter).

#### *3.4.3. Gaps in equipment and infrastructure*

*Internet connection:* The Centre has a fiber optics Internet connection with a speed of 25 Mbps, which no longer meets the extended needs of a regional information platform.

*Security and data storage:* Given its new responsibilities, the Centre must increase its computer storage and processing capacity for data from Member States. In addition, the Centre lacks a reliable system for secure data storage, which can act as a disincentive to suppliers of basic data.

*Power supply:* The Centre has a 10kVA generator and three smart inverters to compensate for frequent power outages. Access to the data servers and permanent connections to the platform require an improved network and more secure power supplies.

### **3.5. Recommendations**

To optimize the Centre's services and fulfil its new role of Regional Climate Centre, the following actions are recommended:

- Improve the Internet connection and increase bandwidth beyond 25 Mbps
- Acquire at least three new servers to improve data processing and information production
- Secure support from technical and financial partners for renew and updating of equipment
- Strengthen and revitalize effective cooperation between AGRHYMET/CILSS and ECOWAS if the Centre is to be duly modernized

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## 3.6. Databases

The AGRHYMET Regional Centre manages the following databases:

- **CLIDATA** (climatology): climate database management and processing<sup>24</sup>
- **HYDROMET** (hydrology): strengthening of national and regional hydrological services
- **TDBASE** (demography, agriculture, and livestock): statistical storage and analysis in these three areas
- **PHYTOBASE**: phytosanitary database<sup>25</sup>
- **ECOAGRIS** (agriculture): dynamic monitoring tool for agricultural policies in West Africa (ECOWAP/SADCAP) with 12 indicators of diffusion subsystems for the ECOWAS region.<sup>26</sup>

These databases have been set up with support from technical and financial partners and are in good working order. However, the Centre deplores delays in data updates from national (member State) institutions.

In this respect, the Centre helps Member States build the capacity of the institutions involved in the multi-dimensional platform in a variety of ways, including deployment of FTP servers transferring files from automatic stations and online field data entry platforms, technical support for satellite receiving stations, development of mobile applications (Agromet Toolbox, eAgrimet), and implementation of the FANFAR platform (West African Flood Forecasting and Warning System).<sup>27</sup>

Since 2020, the Centre has also launched the development of a climate station in collaboration with the ClimSA programme under the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT).<sup>28</sup>

In addition, data are collected through workshop sessions with Member States, such as those of the Multidisciplinary Working Group. Member States facilitate these sessions and have included the costs in national budgets. These working sessions are vital to appropriation of tools and methods by national authorities. More details will be found in the section on collaboration with other institutions.

### 3.6.1. CLIDATA

**CLIDATA** is a hydrometeorological database management system developed in the Czech Republic by the local Hydrometeorological Institute in cooperation with ATACO (a Czech

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24 <https://www.clidata.cz/>

25 <https://agrhymet.cilss.int/index.php/2019/11/27/12-cadres-formes-a-lutilisation-du-systeme-de-gestion-de-base-de-donnees-phytosanitaire-phytobase/>

26 [http://www.plateforme-ecoagris.net/index.php?option=com\\_content&view=article&id=22&Itemid=81&lang=en](http://www.plateforme-ecoagris.net/index.php?option=com_content&view=article&id=22&Itemid=81&lang=en)

27 <https://fanfar.eu/fr/a-propos/>

28 [https://www-cdn.eumetsat.int/files/2022-10/2021\\_AnnualReport\\_FR\\_FINAL\\_Online.pdf](https://www-cdn.eumetsat.int/files/2022-10/2021_AnnualReport_FR_FINAL_Online.pdf)

IT system development company).<sup>29</sup> This is a client/server architecture based on a database management system (DBMS) engine, Oracle, and a client interface with the database (CLIDATA Client) developed in Java. This type of data was previously entered in Excel. Deployment of CLIDATA software has enabled the setup of climate databases in member countries. Operation and maintenance of the software are the responsibility of national (member State) meteorological services, which have full control over the database.

Deployment of CLIDATA has resulted in the use of one and the same data management system across the CILSS-ECOWAS area, in the process also harmonizing the collection of climate data. However, it is important to note that the mechanism for two-way climate data flows between Member States and the regional centre is not fully functional. At present, data exchange protocols in the areas of climate, hydrology and food security are still not formalized.

Training as provided so far in member countries has been limited to the management of data from manual stations, although CLIDATA makes it possible to manage data from automatic stations. Therefore, the Regional Centre should ensure that automatic station management training in members countries includes the management of automatic station data.

Finally, it is necessary to revitalize the process of adopting and signing the data charter, which is an essential tool for the Centre to collect, manage, process, and disseminate climate information in the CILSS-ECOWAS region. This charter must be endorsed by all Member States if effective implementation is to be secured.

### 3.6.2. *HYDROMET*

**HYDROMET** is an application for hydrological data management launched in June 2015 with joint support from the World Bank Group, the Global Facility for Disaster Reduction and Recovery (GFDRR) and the African Development Bank (AfDB). It includes all data (time series) that are in the form of pairs (time points, values): (i) hydrometry (water levels, flows); (ii) rainfall (rainfall, intensity), (iii) meteorology (temperature, wind speed and direction, humidity, solar radiation), (iv) water quality (pH, conductivity, dissolved oxygen, etc.), (v) sedimentology (particle flux, concentrations), (vi) piezometry (monitoring of wells, measurement of groundwater levels). The Centre acquired the HYDROMET system with support from a scheme known as Adaptation to Climate Change in West Africa through Improved Climate Information (ACCIC), funded by the Danish Government.

HYDROMET has been deployed in all 17 countries of the CILSS-ECOWAS area and is also used by most basin organizations. However, data collection levels vary from one country to another due to the state of development of the local hydrological network and

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<sup>29</sup> [http://agrhyomet.cilss.int/wp-content/uploads/2019/11/Resume\\_Clidata\\_Agrhyomet-1.pdf](http://agrhyomet.cilss.int/wp-content/uploads/2019/11/Resume_Clidata_Agrhyomet-1.pdf)

the resources dedicated to its maintenance. Deployment of a legal framework, assisted by consultations and incentives, would facilitate sharing of hydrological data.

### 3.6.3. The regional database management system

The Regional Database Management System (RDMS) covers the 17 countries of the CILSS-ECOWAS region and integrates data provided by measurement networks, field surveys and satellites. Indeed, the Centre deemed it necessary to integrate all the databases into a single regional one in order to secure optimal use. The deployment phase is ongoing under the care and responsibility of the Centre's experts.<sup>30</sup>

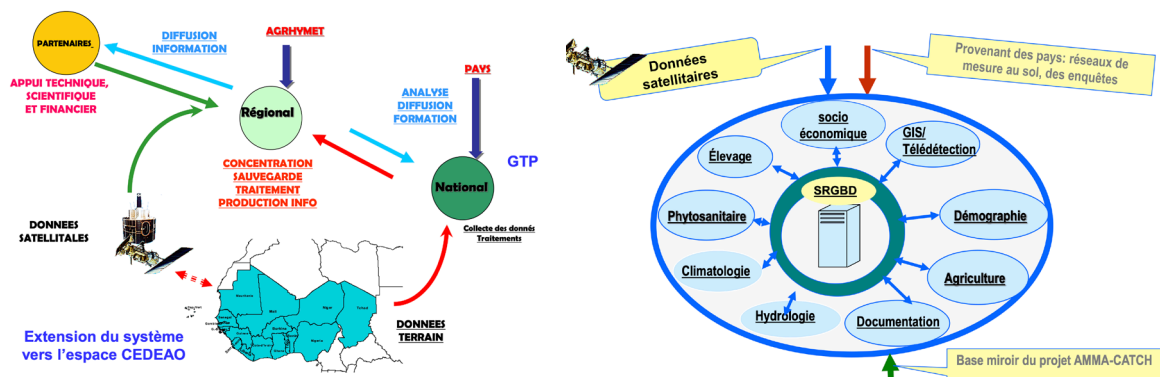


Figure 2. Architecture of (a) the data collection/exchange network and (b) the unified DBMS under construction

### 3.6.4. Socio-demographic databases

AGRHYMET's socio-demographic database includes the following indicators: food consumption score (FCS), household dietary diversity score (HDDS), reduced coping strategies index (rCSI), household hunger scale (HHS), survival deficit and livelihood protection deficit (HEA), livelihoods-based coping strategies index, and nutritional indicators (global acute malnutrition, weight/height, or brachial girth).

The main sources of data are food security surveys, household economic analyses and annual SMART (Standardized Monitoring and Assessment of Relief and Transitions) nutrition surveys. These field surveys benefit from funding from the FAO, which supports the implementation of the CH on food security.

Some surveys are conducted remotely to include the food and nutrition conditions in hard-to-reach areas as well as the impact of COVID-19 in urban areas.<sup>31</sup> Since the outbreak of the pandemic, analyses have been strengthened with the monitoring and evaluation of the agropastoral campaign and pastoral conditions, food prices, market operations, civil

<sup>30</sup> [https://agrhymet.cilss.int/wp-content/uploads/2019/11/Presentation\\_SRGBD\\_Agrhymet.pdf](https://agrhymet.cilss.int/wp-content/uploads/2019/11/Presentation_SRGBD_Agrhymet.pdf)

<sup>31</sup> FAOSTAT, 2021. Food and Agriculture Organization of the United Nations, Database. 2021; see: <https://www.fao.org/faostat/en/#home>

insecurity or humanitarian food assistance. The data collected by the national information systems and partners are entered into a harmonized Excel file for all countries.<sup>32</sup>

### 3.6.5. *The Humanitarian and Disaster Risk Reduction Database*

These data are collected by the national platforms in charge of disaster risk reduction in Member States. Data on migration and internally displaced persons is the responsibility of national humanitarian agencies. Unfortunately, there is no established collaboration between the Regional Centre and these agencies.

The tools for collection and storage of humanitarian data – survey sheets, data entry masks – are not standardized across countries, making them difficult to use on a regional scale, although the Centre and national structures could use DesInventar – the open-source software made available by UNDRR, UNDP and the Apache Software Foundation for managing information on losses caused by disasters associated with natural hazards.

### 3.6.6. *Other databases*

The AGRHYMET Regional Centre has other specialized databases in the agriculture and food security sectors.

**TDBASE** is a thematic data management system for storage and analysis of agricultural, livestock and demographic statistics collected in Member States. It is used to monitor the agricultural season and assess crop yields.

**PHYTOBASE** is one of the links in the phytosanitary information and monitoring function of the early warning and food security system in CILSS-ECOWAS countries. This tool facilitates the collection of data on threats to crops and their projection on a Google map, which in turn results in phytosanitary information at national and regional levels.

**ECOAGRIS**, the ECOWAS Integrated Regional Agricultural Information System, was set up with financial support from the European Union. It aims to strengthen information systems at local, national, and regional levels for the benefits of monitoring food and nutrition security, vulnerability analysis and decision support, with a view to anticipating famine-related crises and targeting interventions.

Covering the 17 countries of the CILSS-ECOWAS area, ECOAGRIS provides decision-makers with reliable and up-to-date data and analyses for better formulation and monitoring of agricultural development policies and strategies.

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<sup>32</sup> FAO, 2019. Main results and metadata by country (2006-2015). World Programme for the Census of Agriculture 2010. FAO Statistical Development Series No. 17, Rome.

ECOAGRIS can also promote trade relations among all agricultural stakeholders (public and private). It can therefore be seen as an instrument at the service of the West African region, a source of reliable indicators and data that can be used to strengthen the analytical and intervention capacities of all regional actors in the agricultural and agri-food sectors.

ECOWAS Member States have set up national committees that are responsible for updating the data in the platform's portal. The platform is operational, although it has slowed down somewhat after the end of the project that had established it in the first place.

### 3.7. Gaps

*Heterogeneous databases:* The Centre still lacks a functional regional database that would integrate all these systems and thereby improve data exploitation and decision making. The Regional Database Management System (RDMS), which is currently being set up, will enable standardization of data storage methods, but implementation of the information technology infrastructure necessary for its operation has been delayed due to lack of financial resources.

On top of this lack of uniformity, data captured to date does not include reports and information collected by national disaster risk reduction platforms and agencies. In addition, migration of the regional centre and Member States to more efficient data collection systems require upgrading of collection methods and technologies at national level, which entails costs.

*Lack of uniform database and quality control:* The Centre has various data collection systems and platforms, each with its own database (HYDROMET, CLIDATA, ECOAGRIS, etc.) but only two of these systems (CLIDATA and HYDROMET) enable Member States to carry out uniform quality controls. The RDBMS, which is currently under development, will integrate all these databases to process data set in a multidimensional way.

*Inaccessible data:* The Centre has no access to disaster impact data, humanitarian security data, or data on migration and IDPs. This is due to a lack of cooperation between the regional centre, national data collection and disaster management structures. The Centre needs access to this data if the multidimensional platform is to provide impact-based information.

*Lack of uniformity in data collection and storage protocols:* National meteorological and hydrological services have a standardized database management system with CLIDATA and HYDROMET. Similarly, early warning services collect data in an Excel file. However, national emergency management and civil protection agencies have developed different systems for each country. Some countries use the DesInventar platform, but they do not transmit their data to the regional centre.



*Irregularity of data transmission:* Data transmission by Member States, where any, is unpredictable or late. This cannot be more at odds with the timely, regular data transfer required for rapid decision-making at local, national, and regional scales.

*Obsolete IT equipment:* The Centre has acquired three servers in the past through initiatives such as Institutional Support to African Climate Institutions (ISACIP), Monitoring Environment and Security in Africa (MESA) and Satellite and Meteorological Information for Disaster Risk Reduction (SAWIDRA). However, these servers do not currently support a multi-dimensional platform.

Consequently, the regional centre needs a new, higher capacity server together with three high-performance computers for the production and processing of multidimensional data.

In addition, security must be strengthened, both in terms of protection against cyber-attacks and SSL traffic, and this should be achieved through new generation processors such as FortiGate 400F (the Centre currently uses a 300D processor), which allow for encryption of communications between a client and a server, mainly between Web browsers and Internet sites/applications.

*Outdated data collection tools:* Member State agencies continue to collect data using paper questionnaires and then enter them manually into the databases. These successive steps increase the risk of error in data entry, cause delays in transmission and do not allow for efficient data feedback to the regional centre.

### 3.8. Recommendations

Data collection, storage, processing, and dissemination are crucial steps in establishing a functional regional platform. The collection tools used in Member States need to be upgraded including with tablets and training in digital tools. It is recommended to move to digital data collection using software such as KoBoToolbox.<sup>33</sup> In addition, there is a need to harmonize data collection methods on disaster risk reduction in Sahel countries.

### 3.9. Partnerships and collaborative frameworks

This section assesses the institutional arrangements and collaborative frameworks developed between the Centre and national and regional institutions that are relevant to the implementation and management of the regional information platform.

#### 3.9.1. Regional and international collaboration frameworks

The regional centre collaborates with three types of institutions:

- 1) Inter-state institutions, such as the ECOWAS Commission and the West African Scientific Service Centre on Climate Change and Adapted Land Use (WASCAL)

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<sup>33</sup> <https://www.kobotoolbox.org>

- 2) Regional institutions such as the Niger Basin Authority (NBA), the Volta Basin Authority (VBA) and the Lake Chad Basin Commission (LCBC)
- 3) Multilateral organizations and international cooperation agencies, namely UNDP, FAO, WFP, UNOCHA, the World Bank, the African Development Bank, WMO, the European Union and USAID.

Individual Member States as such cooperate with regional institutions and commissions with three objectives: technical assistance for national hydrological services; the collection, management, and communication of hydrological data; and the forecasting of floods and drought events. This cooperation provides national governments with an effective network for collection of hydrological data and sharing with the basin organizations and the AGRHYMET regional centre for the purposes of flood and drought management.

The Centre maintains close relations with NBA and VBA to build the capacity of their experts, support project implementation and strengthen early warning systems. This includes regular participation of hydrologists from each river basin in platforms where seasonal and hydrological runoff is analysed and/or forecast.

As mentioned above, the ECOWAS Commission and CILSS have signed a Memorandum of Understanding for cooperation on hydrometeorological policies and capacity building. The MoU establishes the AGRHYMET Centre as the Regional Climate Centre for West Africa and the Sahel, with the mandate to provide technical services, capacity building, data sharing and policy alignment.

The regional centre also cooperates with international institutions that provide technical and financial support as part of various projects and programmes: technical capacity building in Member States, financial support to staff remuneration for the purposes of smoother operations, renovation of the computer park and replacement of equipment, improvement of the speed of the Internet connection. The African Development Bank's ISACIP<sup>34</sup> and SAWIDRA projects<sup>35</sup> play an important role in this regard.

FAO and WFP, in turn, support the Centre in the development and use of products, such as seasonal forecasts and food security vulnerability bulletins, for subsequent dissemination among partners, member country government departments and regional institutions.

### *3.9.2. Recent and ongoing programmes and projects*

The AGRHYMET Regional Centre has implemented the Monitoring for Environment and Security in Africa (MESA) programme with financial support from the European Union (€2.5 million, 2014-2019). The scheme provided Member States with satellite-data

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<sup>34</sup> <https://www.cilss.int/index.php/programme-isacipafriclimserv/>

<sup>35</sup> [https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Projet\\_d\\_information\\_satellitaire\\_et\\_m%C3%A9t%C3%A9orologique\\_pour\\_r%C3%A9duction\\_risques\\_de\\_catastrophes\\_SAWIDRA-AO\\_-\\_APPROUVE\\_002\\_.pdf](https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Projet_d_information_satellitaire_et_m%C3%A9t%C3%A9orologique_pour_r%C3%A9duction_risques_de_catastrophes_SAWIDRA-AO_-_APPROUVE_002_.pdf)

reception equipment as well as the training of experts in the climate, hydrology, and environment areas.<sup>36</sup>

The Centre is now involved in the Food System Resilience Programme (FSRP) for West Africa, which is being implemented in two phases.<sup>37</sup> The second phase was launched in 2022 with financial support from the World Bank and its affiliate the International Development Association (IDA). This investment programme (\$645 million) strengthens the resilience of the food system in West Africa. Under this strategic approach, three regional organizations (ECOWAS, CILSS and the West and Central African Council for Agricultural Research and Development (CORAF)) join efforts to enhance agricultural productivity through climate-smart practices and build regional capacity for agricultural risk management.<sup>38</sup>

The AGRHYMET Centre was also involved in another scheme, known as the Institutional Support to African Climate Instances Project (ISACIP/AfriClimServ) funded by AfDB (\$30 million, 2010-2017). The African Centre for Meteorological Applications (ACMAD), the IGAD Climate Prediction and Applications Centre (ICPAC) and the Drought Monitoring Centre (DMC)<sup>39</sup> were other beneficiaries of this project.<sup>40</sup>

As Regional Climate Centre for West Africa, AGRHYMET is implementing the WMO's four-year [Global Framework for Climate Services \(2020-2023\)](#) with €8 million in financial support from the European Union. The objective is to strengthen the value chain of climate services. This support should, in the long term, better assert the Centre's role in the climate sector and its intervention capacity, enhancing products and services and the capacity to develop new tools for the benefit of the Sahel and West African populations.<sup>41</sup> The project covers the 17 member countries of ECOWAS and CILSS.

Another ongoing project is the \$170 million IDA-supported Regional Support to the Sahel Irrigation Initiative (PARIIS, 2017–2024) which AGRHYMET is conducting on behalf of CILSS. The scheme improves the capacity of stakeholders in the Sahel to develop and manage irrigation and increase the area under irrigation under a regional solution-based approach.<sup>42</sup>

The Centre is currently implementing the \$14 million SERVIR regional project on behalf of CILSS, with joint funding from NASA and USAID. An initial, five-year phase was completed in 2020, and the second phase of the same duration is ongoing. The rationale is to build the capacity of regional institutions in geo-spatial techniques with three related

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36 <https://www.inter-reseaux.org/ressource/afrique-de-louest-lancement-officiel-du-programme-de-surveillance-de-lenvironnement-et-de-securite-en-afrique-mesa/>

37 [https://reca-niger.org/IMG/pdf/niger\\_cpr\\_p172769\\_fsrp\\_26july2021.pdf](https://reca-niger.org/IMG/pdf/niger_cpr_p172769_fsrp_26july2021.pdf)

38 <https://www.banquemondiale.org/fr/news/press-release/2022/07/29/world-bank-scales-up-its-financing-for-food-security-to-strengthen-the-resilience-of-food-systems-across-west-africa>

39 <https://projectsportal.afdb.org/dataportal/VProject/show/P-Z1-CZ0-003?lang=fr>

40 <http://acmad.net/new/isacipen/>

41 <https://agrhydet.cilss.int/index.php/projet-intra-acpgfcs/>

42 <https://pariis.cilss.int/presentation-du-projet-dappui-regional-a-linitiative-pour-lirrigation-au-sahel-pariis/>

objectives: improved resilience to the impacts of climate change, more sustainable land management and reduced greenhouse gas emissions.<sup>43</sup>

AGRHYMET carried out the \$2.4 million FANFAR project (Operational flood forecasting and alert in West Africa) funded by the European Union (2018-2020). The objective was to provide key stakeholders with reliable and timely access to [operational forecasts and warnings](#), adapted to regional conditions and managed by West African institutions.<sup>44 45</sup>

FANFAR is an open-source application, which is robust to the frequent power and Internet outages that characterize the region. Various data streams convey hydrological forecasts and alerts on the Hydrology Thematic Platform (H-TEP), including sets of objective and predictive elements regarding meteorology, water levels (satellite altimetry) and water masses, in addition to the results of *in situ* observations (hydrometry: water level, flow).

Crucial to its role as Regional Climate Centre, AGRHYME is a partner in the Sahel Resilience Project supported by the Government of Sweden (2019-2022). The project strengthens risk data collection, analysis and dissemination functions at regional and national levels in the seven Sahelian countries (Burkina Faso, Chad, Mali, Mauritania, Niger, Nigeria and Senegal).<sup>46</sup>

The Sahel Resilience Project aims to enable AGRHYMET to develop the regional multi-dimensional disaster risk information platform required by its new role as Regional Climate Centre – the very function behind the present capacity assessment. The platform is to bring together the most relevant hydrological and meteorological data, conflict-related humanitarian data and the analysis needed to anticipate disasters and strengthen decision-making for risk-informed development and sustainable resilience across the Sahel.

### 3.9.3. National collaboration frameworks

As per its regional ambit, the Centre collaborates with national institutions in the Member States in the areas of meteorology, hydrology, early warning services and food security, with the following objectives:

- Strengthening the observational data network of National Meteorological and Hydrological Services in member countries
- Training personnel in CILSS-area and other African countries in agrometeorology, hydrology, functional maintenance, computer science, geographic information systems and remote sensing
- Building standardized regional and national database systems (HYDROMET and CLIDATA)
- Deployment and maintenance of satellite receiving ground stations in the member countries

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43 <https://agrhymet.cilss.int/index.php/servir-afrique-de-louest/>

44 <https://fanfar.eu/fr/acceuil/>

45 <https://fanfar.eu/news/fanfar-monitoring-at-CEDEAO/>

46 <https://www.undp.org/africa/sahel-resilience-project-0>

- Establishment and strengthening of cooperation between the meteorological and hydrological services and national government departments in charge of agriculture and livestock, through the CILSS Multidisciplinary Working Group, and strengthening the organization of seasonal forecasts at the beginning of the rainy season

In return, national institutions provide the regional centre with data for the preparation and dissemination of regional seasonal forecast and warning bulletins. However, to date, there is still no formal and legal framework for data sharing between these institutions and the Centre.

The ClimSA project has launched a process that should result in a formal data exchange protocol linking Member States and the Centre. As far as disasters are concerned, exchanges are not yet formalized. A framework for consultation and awareness-raising on disaster data collection and sharing should therefore be established with the relevant national structures.

#### *3.9.4. Potential synergies with ongoing initiatives*

Another, ongoing project is specifically designed to create synergies with AGRHYMET's new regional role and strengthen its capacities to fulfil it, namely, the project known as Capacity Building and Establishment of the Regional Climate Centre for the Sahel and West Africa. The scheme includes a variety of crucial functions such as revision and signature of the data-sharing charter between the Centre and the 17 CILSS Member States; development of climate services; building a user interface platform; and finally, production of seasonal forecasts for the entire sub-region. Upgrading of the CLIDATA and HYDROMET database management systems is also envisaged through purchase of new licenses and servers for the benefit of Member States.

Synergies are also to be expected with the above-mentioned PARIIS project under implementation in six of the seven countries of the Sahel Resilience Project (Burkina Faso, Chad, Mali, Mauritania, Niger, and Senegal), and collection of hydrological data and the *Cadre Harmonisé*.

Also supportive of AGRHYMET's role as Regional Climate Centre is a joint AU, WMO, and UNDRR African roadmap for improved availability, access and use of disaster risk information for early warning and early action. The €60 million, 2020-2030 scheme is funded by the EU. <sup>47</sup>

The roadmap builds resilience to natural hazards across sub-Saharan Africa. This is achieved through improved availability, access to, and use of disaster risk information for the purposes of early warning and early action, including in circumstances of

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<sup>47</sup> Interview with UNDRR representative

transboundary risk management. UNDRR was expected to expand this initiative in the Sahel region in 2022.<sup>48</sup>

Against this background, the AGRHYMET-CRR regional multidimensional disaster risk information platform would draw further, significant synergies from the myDEWETRA application. The latter is a Web-based, open-source system for real-time monitoring and forecasting of natural hazards such as floods, landslides, bushfires, and others.

The myDEWETRA application is designed as a single point of access to a wealth of information and data available at global, regional, and local levels from multiple authoritative institutions and agencies.<sup>49</sup> We shall return to this application in the recommendations in sections 5 and 6 of this report.

*The institutional funding mechanism of the Centre:* Despite the many projects and programmes in which the AGRHYMET Regional Centre is involved, its financial sustainability as an institution remains insecure. On the one hand, the projects and programmes do contribute to the remuneration of experts, but only during the implementation of these specific, time-limited schemes. As a result, the Centre lacks the resources for permanent remuneration of core staff. Furthermore, as a specialized agency of the CILSS, the Centre depends on financial contributions from Member States, which are both inadequate and unpredictable.

### 3.9.5. Gaps

*Consultation frameworks and data-sharing mechanisms:* The CH and MWG platforms are well established at regional level and the funding is integrated into national budgets. However, there is no formal legal framework linking the Centre and the national agencies in charge of civil protection, disaster reduction and humanitarian affairs. Member States do not systematically collect disaster-related data, and consequently lack the risk, loss and damage analysis that would inform national development plans and policies.

*Lack of regulatory framework for regional early warning and regional emergency coordination:* In the region under review, the coordination of early warning systems suffers from a lack of clarity in the mandates, roles and responsibilities of established institutions and governance mechanisms, which does not facilitate early and coordinated action to mitigate the impacts of disasters.

*Regional strategies:* ECOWAS has put in place a Gender Strategy and Action Plan related to disaster risk reduction.<sup>50</sup> Experts have also been trained in disaster response, post-disaster needs assessment and recovery planning. However, this experience has not always

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48 <https://www.undrr.org/media/81954/download>

49 <https://www.infomydewetra.world/>

50 ECOWAS, 2020. ECOWAS Gender Strategy and Action Plan for Disaster Risk Reduction, Abuja. Nigeria.

been put to good use, resulting in gaps in understanding the compound and cascading impacts of disasters and the complex interconnections between risks.

*Limited capacity in national data collection:*

- a) Current systems are not up to the task of collecting the data on vulnerability, exposure, coping capacity and losses that would facilitate anticipation, preparedness, response, and recovery that would inform decision-making and early action at all levels in the face of disaster risk. The lack of capacity takes three main aspects: technical, political, and logistical.
- b) The second, related challenge is of a more qualitative kind, namely, the comprehensiveness of data. The increasing complexity of disaster risks requires data covering different sectors and thematic areas, as well as the capacity to collect, aggregate and perform joint analysis to provide impact-based early warnings and trigger early action.

*The sustainability of national anchoring:* Platforms such as the *Cadre Harmonisé* and the Multidisciplinary Working Group work well at regional level and, again, are integrated into national budgets; but others, such as ECOAGRIS, depend on technical and financial partners. As Member States tend to share national data with regional institutions in working sessions, the ECOAGRIS platform, for all its specific import, could be under threat of marginalization as it is not regularly updated, lacking as it does the financial resources required to organize regional working sessions.

### 3.10. Recommendations

Since AGRHYMET, as Regional Climate Centre, must rely on national services for field data collection, deployment of an effective legal framework for sharing hydrological, meteorological, disaster risk reduction and food security data with Member States is of the first importance. Further recommendations are as follows:

- Consultation and awareness raising among Member States to monitor and evaluate the implementation of protocols and joint projects/initiatives
- Raising awareness among governments (at the various management boards and summits of heads of state) of the need to increase the Centre's financial resources
- Integration of the funds allocated to data collection and disaster and hydro-meteorological risk reduction into the budgets of the various government departments at national level would ensure the sustainability of the regional platform.



## 4. ANALYSIS OF EXISTING PLATFORMS

### 4.1. AGRHYMET Platforms

#### 4.1.1. Seasonal forecasts PRESASS and PRESAGG

Established in 1991, the Sudano-Saharan Africa Seasonal Outlook (PRESASS, formerly PRESAO)<sup>51</sup> and the Gulf of Guinea Seasonal Outlook (PRESAGG)<sup>52</sup> provide a formal regional forecasting and climate outlook process adopted jointly by ACMAD and the AGRHYMET Regional Centre. The two centres work together to improve the dissemination of weather and climate information.

Due to the different seasonal rainfall patterns in the Sahel and the Gulf of Guinea, two regional seasonal climate prediction forums are organized each year:

- (a) PRESASS serves 17 countries in West and Central Africa: Benin, Burkina Faso, Cape Verde, Cameroon, Central African Republic (CAR), Chad, Côte d'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, and Togo.
- (b) PRESAGG serves the Atlantic coastal region of West and Central Africa (Guinea-Conakry, Liberia, Sierra Leone, Côte d'Ivoire, Ghana, Nigeria, Togo, Benin, Cameroon, and Equatorial Guinea).

#### 4.1.2. The Charter for Food Crisis Prevention and Management

In response to major droughts across the Sahel, the region adopted a Charter for the Prevention and Management of Food Crises (PREGEC) in 1990 to strengthen the coordination and effectiveness of food aid. This charter has effectively improved cooperation among recipient countries and partners, contributing to a reduction in in-kind food aid, which had the disadvantage of disrupting local economies. To adapt to changing circumstances, the 17 States in the region and partners adopted the PREGEC Charter in 2012, which addresses the structural causes of food crises and includes new stakeholders such as NGOs and the private sector.

The signatories of the Charter have committed themselves, among other things, to strengthening information systems dialogue platforms and coordinated action. Civil society and private sector organizations play an important role in effective implementation of the principles of the Charter. The Charter guides all food security interventions, resulting in more effective collective action through the Food Crisis Prevention Network (FCPR). The network promotes dialogue and coordination with a view to developing a coherent and consensual view of food and nutrition conditions for the purposes of well-informed decision-making.<sup>53</sup>

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51 <http://acmad.net/rcc/presassS.php>

52 <https://rcc.acmad.org/presagg.php>

53 <https://www.food-security.net/document/charter-for-food-crisis-prevention-network-rpca/>



#### 4.1.3. *The Cadre Harmonisé*

Established in 1990, the *Cadre Harmonisé* (CH) is a regional system for prevention of food crises through rapid identification of affected populations and proposed improvements to food and nutrition security. This rapid analysis is based on food and nutrition security indicators as corroborated by relevant contributing factors, all of which identify the type of food that is likely to be in short supply. National meteorological and early warning services within ministries of agriculture are affiliated with this framework and use climatic (rainfall, temperature, seasonal forecasts) and environmental (NDVI, a vegetation index by normalized difference) information to anticipate any areas of food insecurity and provide appropriate guidance to decision makers.

The Cadre is implemented in all CILSS member countries as well as in Cameroon. The final product is a multi-phase map of food insecurity and famine risk, which distinguishes five phases: minimum (phase 1), under pressure (phase 2), crisis (phase 3), emergency (phase 4) and famine (phase 5). The CH is also used for data collection in various sectors related to food security, population, IDPs and migration, health, disaster risk reduction (DRR), water and climate.<sup>54</sup>

#### 4.1.4. *The Multidisciplinary Working Group*

The Multidisciplinary Working Group (MWG) was set up in 1986 by the CILSS for the purposes of early warning and prevention of crises and disasters. This multi-sectoral consultative framework aggregates data and in return produces various information formats related to agro-meteorological and hydrological parameters. Regarding food security, the MWG enables decision-makers and producers, in real time and throughout the agricultural season, to adapt agro- sylvo- pastoral systems and fisheries production to the vagaries of environmental conditions.<sup>55</sup>

The MWG holds regular meetings during the rainy season, analysing the status of rainfall, impacts on crops and pastures, and the levels of rivers and dam lakes. The meetings started in the early 1980s. They bring together meteorologists, climatologists, hydrologists, agricultural specialists and experts from the health and disaster risk reduction sectors, as well as representatives of NGOs and civil society.

The Group also organizes three field visits per year, at the beginning, middle and end of the rainy season, to monitor the situation and to support its own subsequent recommendations in relation to a range of crucial indicators: rainfall and hydrological conditions, the status of the agropastoral season, nutrition-related and zoo-sanitary conditions, market prices, and the status of disasters and humanitarian interventions. Ten-day information bulletins and special alert bulletins are issued and integrated into national food crisis and early warning systems. The MWG operates in nine CILSS member

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<sup>54</sup> <https://www.ipcinfo.org/ch/>

<sup>55</sup> <https://www.fao.org/faolex/results/details/fr/c/LEX-FAOC174454/>

countries (Burkina Faso, Cape Verde, Chad, Gambia, Guinea-Bissau, Mali, Mauritania, Niger, and Senegal).

## 4.2. The benefits and shortcomings of existing platforms

The AGRHYMET Regional Centre has a long and rich experience running the PRESASS/PRESAGG, CH and MWG-GTP platforms. While acting as stimulating frameworks for the Centre's overall business, the platforms crucially provide the channels through which information is collected and shared between the national and regional levels. A further benefit of the CH and MWG platforms is that their funding is integrated into national budgets, ensuring sustainability. The platforms use data provided by Member States during face-to-face sessions. This facilitates co-management of products with national stakeholders. This is a major difference with other platforms such as PRESASS/PRESAGG or ECOAGRIS which, not being funded by member State budgets, may not be so sustainable.

## 5. STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS

Based on the literature review of the circumstances, services, and products of the AGRHYMET Regional Centre, and also on individual and group interviews with stakeholders involved in data collection, processing, analysis and dissemination in the Western Sahel and the Lake Chad Basin, Table 2 is a SWOT analysis (strengths, weaknesses, opportunities and threats) for improved diagnosis of the issues, capacities and opportunities of the Centre for two-way cooperation.

*Table 2: SWOT analysis the AGRHYMET Regional Centre*

Topics	Strengths	Weaknesses	Opportunities	Threats
<b>Technical capacity development</b>	<ul style="list-style-type: none"> <li>• Capacity to develop regional climate databases</li> <li>• IT infrastructure for processing and disseminating climate information (relay units, supercomputers, inverters, computers, networks, MESA &amp; RARS antennas, VSAT and fiber optics facilities)</li> <li>• Early warning capacities in the agriculture, climate, food security, water resources and environment sectors</li> <li>• Short- and long-term training programmes in agrometeorology, hydrology, plant protection, food safety</li> <li>• Platforms and equipment for data collection, processing and</li> </ul>	<ul style="list-style-type: none"> <li>• Low bandwidth and instability of the Internet connection in the Centre and in the seven Sahel project countries</li> <li>• Lack of analysis on disaster risk reduction</li> <li>• Lack of qualified personnel to develop information sharing models</li> <li>• Limited ability of the Centre to retain its qualified and experienced staff</li> <li>• Inadequate computer equipment for data storage, processing and dissemination</li> <li>• Heterogeneous and non-integrated storage systems</li> <li>• Low capacity to mobilize funds from donors</li> <li>• No databases on disaster impacts and safety</li> <li>• Lack of uniform protocols for collecting and storing disaster risk</li> </ul>	<ul style="list-style-type: none"> <li>• Donor commitment to working with AGRHYMET</li> <li>• Building partnerships with regional and international organizations</li> <li>• Extension of services to other forms of risk (conflict, disaster risk reduction, gender, climate security)</li> <li>• Stronger commitment of technical partners</li> <li>• Provision of IT equipment for each national disaster risk reduction institution in the seven Sahel Resilience Project</li> </ul>	<ul style="list-style-type: none"> <li>• Socio-political instability in member countries</li> <li>• Increased conflict and violent extremism in the region</li> <li>• Weak and random financial contributions from Member States</li> <li>• Financial instability (high dependence on projects)</li> <li>• Staff mobility</li> <li>• Weak coordination between projects and between technical and financial partners supporting the Centre</li> </ul>

Topics	Strengths	Weaknesses	Opportunities	Threats
	<p>archiving (three servers, CLIDATA, HYDROMET)</p> <ul style="list-style-type: none"> <li>• Qualified staff in information processing, archiving and production, in total 51 experts in various fields: one meteorologist, one climatologist, one climate modelling expert; three meteorologists, three hydrologists, six information technology experts, two communication specialists</li> </ul>	<p>reduction data in member countries</p> <ul style="list-style-type: none"> <li>• Random and delayed data transmission</li> <li>• Inadequate computer equipment for data management and information processing systems</li> <li>• Up-to-date IT tools missing for data collection in the seven Sahel Project countries (e.g., tablets)</li> <li>• Unstable power supply to the Centre</li> <li>• Lack of expertise in emerging thematic areas (resilience, gender, climate finance, DRR)</li> <li>• Inadequate human resources in emerging fields and technological innovation in member countries</li> <li>• Inadequate scientific publications on climate, weather, and water change</li> <li>• No annual scientific fora on climate, meteorology, and hydrology to evaluate the projects carried out</li> </ul>	<p>countries</p>	
<p><b>Strengthening the political, legal and institutional foundations</b></p>	<ul style="list-style-type: none"> <li>• Centre of excellence for training and monitoring of climate and food security indicators at regional level</li> <li>• Recognised as a Climate Centre in the Sahel and West Africa</li> <li>• Internationally renowned centre</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of formal cooperation protocols with data-owning institutions at national level</li> <li>• Lack of diverse funding sources</li> <li>• Lack of institutional and longer-term operating budget</li> <li>• Lack of a framework for consultation and awareness-raising on data policy in the project countries</li> </ul>	<ul style="list-style-type: none"> <li>• Donor commitment to working with AGRHYMET</li> <li>• Building partnerships with regional and international organizations</li> <li>• Extension of services to other types of risks</li> </ul>	<ul style="list-style-type: none"> <li>• Socio-political instability in member countries</li> <li>• Increased conflict and violent extremism in the region</li> <li>• Informal cooperation between</li> </ul>

Topics	Strengths	Weaknesses	Opportunities	Threats
	<ul style="list-style-type: none"> <li>• Strong experience and network of cooperation with countries and institutions</li> <li>• Strong institutional anchoring with ECOWAS and national bodies (climate, hydrology, agriculture)</li> <li>• ECOWAS and CILSS Technical Branch on Food Security and Climate</li> <li>• Existing exchange platforms already established with Member States (<i>Cadre Harmonisé</i>, MWG, PRESASS)</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of cooperation with South-South and North-South competence centres and triangulation</li> <li>• Weak cooperation with disaster risk reduction institutions</li> <li>• Lack of cooperation with ECOWAS security centres and other regional security institutions (ISS, ACLED)</li> </ul>	<p>(conflict, gender, DRR, climate security)</p> <ul style="list-style-type: none"> <li>• AGRHYMET designated as ECOWAS Technical Centre</li> <li>• Climate and disaster risk reduction financing (VCF, GEF, AF)</li> </ul>	<p>AGRHYMET and the institutions that own the data</p> <ul style="list-style-type: none"> <li>• Weak funding mechanism for the Centre as an institution</li> <li>• Weak coordination of projects and among partners.</li> </ul>

## 6. PROPOSAL FOR A MULTIDIMENSIONAL INFORMATION PLATFORM

### 6.1. General information about myDEWETRA

**myDEWETRA** is an open-source integrated system developed by the CIMA Foundation of the Italian National Civil Protection Department and specialized in the real-time forecasting, monitoring and surveillance of all environmental hazards. A graphical interface enables the Web application to provide high-resolution and continuously updated information. This enables users to monitor meteorological events, build detailed risk scenarios and assess potential impacts on communities and infrastructures.

The **myDEWETRA** system is available on request for each country thanks to an agreement between the Italian Department of Civil Protection and the World Meteorological Organization. It is particularly recommended for regional data processing.<sup>56</sup> As far as the Regional Centre is concerned, it is proposed that the myDewetra application be managed and updated by AGRHYMET to develop the required multidimensional platform on climate and disaster risks, while granting access rights to Sahel countries.

#### *6.1.1. Functioning and application*

The current application is the Dewetra 2.0 version, which enables any computer connected to the Internet to use the integrated data, regardless of supplier. In fact, the application manages both the data provided by the national systems of functional centres and the territorial and geo-spatial data published by other platforms.

Dewetra 2.0 is capable of loading and displaying geo-referenced static and dynamic layers and allows end-users to browse through the values of each measuring station; this version includes more advanced observation tools and various features, both interactive if and as required, for analysis of both current and past events.<sup>57</sup>

The Dewetra 2.0 application can handle the following input data:

- Observational data, including warning data, water quality, rainfall, fire, drought, wind, soil moisture and cloud cover
- Data from hydrological and meteorological forecasting models, forest fires, air quality and landslides
- Disaster data, including floods, earthquakes, and disaster databases (DesInventar and EM-DAT)
- Data on land use, including flood risk areas (rivers, low-lying areas, flood risk indicators from the UNDRR), and on populations.

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<sup>56</sup> <https://www.mydewetra.world>

<sup>57</sup> UNDRR, 2020. Roadmap for improving the availability, access and use of disaster risk information for early warning and early action, including in the context of transboundary risk management, see: <https://www.undrr.org/publication/africa-road-map-improving-availability-access-and-use-disaster-risk-information-early>

The system also integrates long-term projection data as well as regional/local simulation and observation data, which make it responsive to the needs of any given locality as well as those of long-term planning. For AGRHYMET's specific purposes, the application is so flexible as to enable integration *already existing/available* data, a feature that can only enhance its capacity as a regional centre.

Although some functionalities of myDEWETRA are not yet fully available, the system as it stands makes it possible to perform downscaling to project climate scenarios from the global circulation models developed under the IPCC. The outputs from such an exercise would allow for better long-term decision making. As an added benefit, myDEWETRA can produce a final report based on multi-layer analysis of the data.

On 25 March 2014, WMO signed a cooperation agreement with the Italian Department of Civil Protection, allowing the implementation and deployment of myDEWETRA free of charge to governments on request.

#### *6.1.2. Possible improvements to myDEWETRA*

It should be noted that myDEWETRA is only a synthesis application, as it does not generate forecasts and needs input data to integrate and consolidate information.

For the time being, the system uses freely available data of a global, as opposed to regional, nature: hydrometeorological models, land use and socio-demographic data as well as observation and impact data related to natural hazards.

Unfortunately, these global data are generic. For West Africa, the AGRHYMET Regional Centre can integrate data from Member States as collected through the other platforms listed above.

If AGRHYMET is to achieve effective integration of data from Member States, it is imperative to formalize partnerships with UNDP, WMO, the CIMA Foundation, UNDRR, and Sahel States, which can only enhance the reliability and relevance of the platform to all users.

## **6.2. Financing the implementation of myDEWETRA**

In the short term, the myDEWETRA platform can rely on the limited resources of the UNDP Sahel Resilience Project for the purchase of basic equipment and the expertise needed to get it up and running. As implemented by AGRHYMET, the myDEWETRA platform can also benefit from synergies with ongoing projects such as Hydromet and ClimSA, which support AGRHYMET's role as Regional Climate Centre and also benefit specific countries such as Burkina Faso and Mali.



Further financial support is expected from UNDRR with plans of a €60 million 10-year EU facility for implementation of the roadmap on disaster reduction in Africa, which will initially focus on the Sahel and West Africa.

As for maintenance, myDEWETRA is an open-source application with regular updates by the CIMA Foundation.

### 6.3. Sustainability of myDEWETRA

It is difficult, at this stage, to envisage any sustainable operation of the myDEWETRA system short of support from essential technical and financial partners, along with a determined effort by Member States to collect and share data from the national to the regional level.

In an initial phase, partner can support data collection and sharing through funding of IT equipment (computers, tablets and servers) as well as training and awareness-raising on data collection and sharing tools and techniques.

Ultimately, sustainable deployment of the myDEWETRA system calls for Member States to integrate States the functional costs of data collection in annual budgets. To this end, one of the proposed activities will be to raise awareness among national authorities of the benefits of the platform and the importance of their adherence to the data sharing charter with the AGRHYMET Regional Centre.

It is essential for the regional centre to recruit a resource mobilization specialist with knowledge of strategic planning if sustainable funding is to be secured for the platform's operation and the development of activities.

myDEWETRA was chosen to equip the Centre because of three superior benefits: ease of operation, affordable development costs, and access via a simple, low-speed Internet connection.

The system is maintained by the Italian Government through its Department of Civil Protection, which is allocated an annual budget to ensure that it is constantly updated to take account of the most demanding technical standards and to ensure continued operation.

The AGRHYMET Regional Centre and Sahel States should ensure that the deployment of local versions of myDEWETRA is one available option, but in any case, Member States will retain full control over security and protection of data and access rights.

## 6.4 myDEWETRA services and products

The products of the application should be the result of a multi-layered approach integrating technical data (hydrometeorology, agriculture), socio-demographic data (population, migration, IDPs), disaster risk reduction data and environmental data.

The following products will be considered:

- Annual regional assessment report on past disasters and impacts, for support to planning by decision-makers, and as part of overall disaster risk reduction reports
- Forecast and warning of heavy rains and flooding, including expected impacts and potential numbers of people affected
- Monthly drought forecast and warning bulletin with expected impacts
- Locust risk forecast bulletin
- Forecast of population movements and conflicts due to natural hazards (food security, flooding, drought)
- Food security analysis and forecast bulletin, including expected impacts

The source data will come from the Member States' regional database management systems.

### 6.4. Limitations of myDEWETRA

Where the application as available to this day is most deficient is its inability to integrate migration and IDP data.

In addition, the tool requires the authorization of Member States to use their data. Finally, irregular, unpredictable data feedback from Member States could be a handicap for product development in the various areas of concern.

#### 6.4.1. Institutional arrangements

Deployment of the application requires specific institutional arrangements. At the international level, this involves establishing a partnership with the CIMA Foundation to support AGRHYMET in the deployment phase and to obtain exploitation rights. This institutional arrangement can be facilitated by multinational partners (WMO, UNDRR and UNDP).

At national level, it is imperative to ensure that Member States welcome the idea of a multi-dimensional platform on climate and disaster risk. Awareness should therefore be raised among the various stakeholders. Volta Basin Member States have already started using myDEWETRA, which gives them the advantage of testing the benefits.

Once the platform is established in principle, Member States must also agree to share their data with the Regional Centre if they want to benefit from its products, and if these are to be tailored to their needs. National governments can do so formally by adhering to a data-sharing charter. This should be developed jointly by AGRHYMET and ECOWAS under conditions that allow it to be agreed by Member States.

## 6.5. Recommendations

### 6.5.1. Benefits

The multi-dimensional climate and disaster risk platform is intended to enable continuous two-way exchange between users and the Regional Centre, which in turn will enhance the latter's ability to design products that meet the needs of Member States and the region.

Since these products must inform local decision-making, they must be simple, easily accessible, locally relevant, responsive, and effective. They must also be concise and sustainable.

In addition, the platform must be affordable and operate with or without an Internet connection to facilitate user take-up.

Given these requirements, the myDEWETRA open-source application comes with many benefits. It covers several different sectors, including climate, meteorological, hydrological, health and food safety risks. In addition to affordability, it is easy to adopt and use once in place and does not require complex computer skills.

The application is designed to serve as a single point of access to a wealth of information and data available at global, regional and local levels, as provided by multiple authoritative institutions and agencies, such as the West Africa Flood Forecasting and Warning Operational System (FANFAR), agrometeorological bulletins and those of the *Cadre Harmonisé* for the Identification and Analysis of Areas at Risk and Food and Nutritionally Insecure Populations in the Sahel and West Africa, in conjunction with the Integrated Food Security Phase Classification (IPC).

Although the myDEWETRA application does not integrate conflict data, continued cooperation between the AGRHYMET Regional Centre, UNDP, UNDRR and the CIMA Foundation may enable integration of IDP and migration information in the medium term.

### 6.5.2. Material, technical, and human resource needs

In terms of hardware requirements, the AGRHYMET Regional Centre recommends the purchase of three servers for data processing, and FortiGate encryption processors for network protection and database security for tablets used in field data collection in the seven Sahel Resilience Project countries.

The Internet bandwidth of the Centre also needs to be increased to improve speed of access to the database.

As for technical support, IT specialists must be recruited for the implementation and development of myDEWETRA at regional level, in collaboration with the CIMA Foundation and UNDRR.

In terms of human resources, the Regional Centre has identified the need to strengthen the following functions:

- Recruitment of a resilience expert
- Extension of the contracts of AGRHYMET experts who are currently paid by other projects in the closure phase
- Ongoing training of the Centre's technical staff in the handling and use of the platform (training of trainers for national staff)

The material, technical and human requirements for the operation of the information platform come under three main categories:

*Axis 1: Institutional collaboration and capacity to mobilize the Centre's resources*

The purpose here is to strengthen current cooperation among the AGRHYMET Regional Centre and international, regional, and national institutions for effective two-way flows of information on multi-hazard data collection and management, synergies, and sustainability in actions. Such cooperation also aims to mobilize the resources needed to remedy the Centre's funding gap.

Four priority actions are identified:

- i. **Implementing a framework for consultation between the AGRHYMET Regional Centre and Member States** to raise awareness of actions to collect and share data. This framework will bring together dedicated national services and bodies: civil protection, disaster risk reduction, meteorology, hydrology, food security, early warning systems, humanitarian action, and regional basin authorities. Deployment of the framework will be preceded by the selection of national focal points in countries where they are still lacking. The framework will use existing platforms (CH, PRESASS, GTP). In addition, international partners such as UNDP, FAO, WFP, the Red Cross and ISS, will be invited as observer members. The governing bodies of this consultation framework will meet annually to analyse weaknesses in data collection and ways of improving the dynamics.
- ii. **Development and adoption of a data-sharing charter between Member States and the regional centre**, to fill the current legal gap in this area. The ClimSA project already includes such a charter (in the fields of meteorology and hydrology), and consideration could be given to extending its scope to other sectors. When such

extension happens, it could be reviewed every four years, for example in the margins of regular formal meetings.

- iii. **Organization of a donor roundtable for the financing of the multidimensional platform on climate and disaster risks, under the auspices of ECOWAS and CILSS.**
- iv. **Institutional anchoring of data collection at national level.** The aim is to ensure that the disaster risk reduction and security data collection process is fully integrated into national structures and that a national budget is allocated to these functions, as well as to the renewal of collection tools (tablets, computers), in order to ensure the sustainability of these activities.

*Axis 2: Strengthening the human resources of the AGRHYMET Regional Centre and the Member States*

The imperative here is to overcome the shortcomings in skills and training at the regional centre and in the seven Sahel countries concerned. To ensure the smooth running of the Centre, the following priority actions are envisaged: identification of current and future internal skill needs, implementation of a skills and career development plan for the medium and longer terms, South-South and North-South cooperation frameworks for mobility, exchange of expertise and experience, and scaling up of skill development at the regional and member State levels.

The second component involves training for AGRHYMET and Member States staff: short courses on climate change and resilience and on system maintenance for AGRHYMET staff; in Member States, training in data collection tools and use of the platform, as well as 'à la carte' training on climate change and resilience.

*Axis 3: Expansion of the computer facilities and equipment of the Regional Centre and Member States*

Lack of computer equipment and database management software must be addressed. This involves acquiring computers and data storage servers, reinforcing network security, and increasing the speed of the fiber optics Internet connection. For the seven Sahel countries involved, it is imperative to modernize field data collection tools, replacing paper with IT implements such as tablets and data servers.

A fourth axis summarizes the final objective of all the above-mentioned efforts:

*Axis 4: Implementation and sustainable operation of a multidimensional information platform for resilience in the Member States*

The expected outcome of this set of recommendations is a functional, sustainable platform providing products that serve the purposes of decision-making by partners and member state governments. It is therefore important for the development of the platform to consider the data and output currently available. It is also necessary to put in place a monitoring and evaluation mechanism to assess progress and achievements.

## 7. CONCLUSION

This report has assessed the institutional, operational, and technical capacities and supports needed for the establishment of a multidimensional information platform at the AGRHYMET Regional Centre.

The capacity analysis shows that the regional centre has the assets required for this mission, in terms of experience in processing climate information in West Africa, computer equipment, cooperation with Member States and international institutions and organizations, as well as with data platforms in the sub-region.

However, gaps to be filled include financial contributions from Member States to the Centre's operational budget, which must be increased, cooperation with national disaster risk reduction institutions, which needs strengthening, and a data sharing charter, which must be formalized with Member States.

In terms of data collection and processing tools, servers are needed, including for storage, as well as encryption equipment for data security. It is also necessary to increase the bandwidth of the Internet network to facilitate data transmission.

At the national level, it is imperative to strengthen the capacity of Member States through modernization of the data collection chain and the training of field staff in new collection methods.

In terms of human resources, the AGRHYMET Centre has competent experts but in insufficient numbers and unstable conditions due to their heavy dependence on the various ongoing projects. It is recommended that resource mobilization specialists be recruited in the medium to longer term, which would improve the financial stability of the Centre.

In terms of systems, the myDEWETRA application is recommended, as it meets the Centre's needs because a) it integrates all the data collected and allows for multidimensional information processing, b) it can operate remotely (cloud) or locally, enabling data control by the States and the regional centre, and c) it does not require a license and is maintained by the Italian Department of Civil Protection.

However, it is noted that myDEWETRA does not currently include conflict data.

Still, myDEWETRA can combine existing products managed by the Regional Centre such as FANFAR, hydrological and climatic forecasts, agrometeorological bulletins, bulletins of the *Cadre Harmonisé* and data collected by Member States on food security, IDPs, meteorology, hydrology, and disaster risk reduction; this can result in a single, impact-based information report for decision-makers.

The recommended next steps are summarized in the following roadmap:

- First, the collection, storage and sharing of observation data from member countries to the regional database management system needs to be strengthened, as well as the capacity of the regional centre through the acquisition of servers, workstations, and tablets; the latter are also needed for data collection in member countries. Technical skills will also need to be strengthened in each country.
- Second, Member States must be made aware of the need for integration of their data on a platform that operates online rather than locally. States must give their consent for their data to be used by the myDEWETRA application while ensuring that it is protected and that they retain full control over it. For their part, UNDP, UNDRR, WMO, AGRHYMET/CILSS and the CIMA Foundation should work together to adapt the myDEWETRA platform to the data of the sub-region and grant access rights to users in the seven Sahel Resilience Project countries.
- Third, models adapted to tropical and equatorial regions must be developed. Partners have begun to build the capacity of the AGRHYMET Regional Centre to develop regional models for West Africa through the SAWIDRA project. The project has enabled deployment of RARS satellite data-receiving antennas at the regional centre. These satellite data will feed the regional models by integrating the myDEWETRA application in West Africa, to provide soil data with better accuracy.
- Fourth, cooperation with the CIMA Foundation should allow the integration of local data into the myDEWETRA platform.
- Finally, and fifth, all stakeholders across the CILSS-ECOWAS area must be trained (through face-to-face and online workshops) in the following methods and tools: field data collection, accessing the platform and using the information generated by the AGRHYMET Regional Centre.